THE
SECOND TEN YEARS
OF THE WORLD HEALTH ORGANIZATION
1958 - 1967

WORLD HEALTH ORGANIZATION
GENEVA
1968
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The designations employed and the presentation of the material in this volume do not imply the expression of any opinion whatsoever on the part of the Director-General concerning the legal status of any country or territory or of its authorities, or concerning the delimitation of its frontiers.
Foreword

The scientific discoveries and practical achievements of the past decade have stirred the imagination and roused our expectations for the future. They have also served to confirm that health is purchasable.

This truth, increasingly accepted by modern societies, is well on its way to realization. To this result various emotions and trends have undoubtedly contributed. Amongst them we can recognize compassion for suffering, the feeling that life should be safeguarded, and the knowledge that disease is costly to the individual, the family and the community. Moreover, people are beginning to ask for health, and to regard it as a right.

One other fact adds strength to all these reasons. Health is part and parcel of economic and social development and man is the prime mover in that development. Without him development has no meaning. And without health, development has no hope of putting down its roots. Evident as these facts are, they are not easy to express in terms of the dividends that are yielded by expenditure on health. But it is equally difficult to express financially the benefit that has accrued to society from its vast investment in education.

The great increase in the work of the World Health Organization during the past ten years is, therefore, not surprising. It reflects both the interests and the needs of Member States, which the Organization assists at their request. WHO's expansion is also related to the increase in the programmes of all the United Nations agencies, with which it co-operates.

One important factor in WHO's increased activities is the steadily growing body of knowledge that has become available in matters of health and disease. In fact, WHO itself has found it necessary to bring about some measure of international co-ordination of research. Recognized overlaps have been reduced, and attention has been concentrated on the gaps and areas of weakness, where more knowledge is needed. This programme for planning and co-ordination...
in research under WHO's auspices began only in 1960, although the Organization had earlier been a supporter of a number of investigations.

The development of WHO, and the now general recognition of the importance of health in any efforts for social and economic improvement, are indeed a landmark of achievement. But we cannot be satisfied and rest from our labours. Far from it. Even though multinational efforts are supplemented by large bilateral assistance programmes, the needs of the developing countries are still very great. Many new health problems about which we have much to learn require international action, and may affect the developed countries also. But the hope and expectation that were our main support in earlier years have been replaced by a positive feeling of confidence that combined efforts can achieve results unattainable by individual action over a similar period of time.

The priority needs of Member countries, collectively and separately, will continue to shape the WHO programmes of the future, as can be seen from the published programme and budget estimates for 1968 and 1969.

It is safe to forecast, however, that three areas will be singled out for particular attention. First, there is the education and training of personnel, the objective being not only to increase numbers, but to improve the content of curricula and to adapt them more specifically to ascertained national needs. Secondly, there is the demand for collaboration in the acquisition and communication of knowledge. This is of crucial importance for the expansion and success of many research and kindred activities, whether they concern the control or eradication of communicable diseases, the incidence of cancer and cardiovascular disease, the more efficient and effective organization of health services, or the education of health personnel. And, finally, there is the ever-present demand for direct assistance to countries in the development of health services, either in general — including the development of basic health services — or in more particular fields, ranging from mass campaigns for the eradication of malaria and smallpox to the establishment of laboratories for the control of pharmaceutical products.

Today is the twentieth anniversary of the World Health Organization. It is an appropriate occasion for rejoicing. The Organization is itself a sign of the will of the nations of the world to act together, across national bound-
aries, in order to protect and improve health. Every year that passes proves more clearly their desire to work collectively and in comradeship for the solution of worldwide health problems, and to bring assistance to individual countries in their need.

Today also provides an opportunity to review what has been done already and, looking ahead, to see the next steps on the road before us.

This book, The Second Ten Years of the World Health Organization, is the outcome of our stocktaking and a stimulus to our further endeavours. It is also a vivid and inspiring contribution to our celebrations. I have pleasure in presenting it to you.

Geneva, 7 April 1968

[Signature]

Director-General
MAP 1. WHO REGIONAL OFFICES AND THE AREAS THEY SERVE

AREA SERVED, AS AT 31 DECEMBER 1967, BY:

- Regional Office for Africa
- Regional Office for the Americas/PASB
- Regional Office for the Eastern Mediterranean
- Regional Office for Europe
- Regional Office for the Western Pacific

Legend:
- ○ Regional Office
CHAPTER 1

Worldwide and Regional Health Problems

The health problems and developments in the six regions of WHO are summarized in this chapter, with some reference to WHO’s work during the decade. Variety is there, but there are also certain common elements relating to population, diseases, environment, material resources, trained manpower and new knowledge. Brought together, with their areas of darkness or light, they help in forming a picture of the worldwide health situation during the decade and provide a preview of future developments. This chapter gives the background against which must be viewed the activities of WHO. More details about the health problems in the various countries, and in the world at large, may be found in the reports on the world health situation.

Population. Vital statistics show decreases in general and infant mortality, and increases in the expectation of life at birth. There is less preventable loss of life, in particular that due to infective and parasitic diseases. In the so-called developed countries this is balanced by a reduction of births, resulting, as a whole, in a moderate population growth. In developing countries, this balancing effect has had no time to take place. The population increase is such that it overtakes the rate of economic growth and development of food production and social, including health, services.

Diseases. The prevalence of diseases continues to change. Preventable diseases, especially communicable diseases, are decreasing. Examples are malaria, yaws and poliomyelitis.

There is, however, a recrudescence of some communicable diseases — for example, syphilis — where the notable downward trend of a decade ago is now reversed (in some countries, the incidence is now higher than at the post-war peak). Cholera, in a new form, is spreading to more countries; smallpox is being imported into others; and diseases such as virus hepatitis and haemorrhagic fever are causing concern.

1 See Map 1.
The diseases of aging, especially cancer and cardiovascular diseases, are more difficult to cope with, and becoming prominent in an increasing number of countries. Accidents — especially traffic accidents — mental illness, and, lately, drug dependence and adverse reactions to drugs are on the increase.

Environment. The environment is being rapidly changed by man. Urbanization and industrialization, tourism and migration, all create problems of water supply, wastes disposal, pollution, and higher accident risk. Big land reclamation and irrigation schemes, mining and vast public works create special hazards. Many countries are confronted with these, but it is the developing countries that have most difficulty in finding solutions. While international co-operation and financing are helping to alleviate the difficulties, for instance by providing the capital for water supplies and other developments, there is much still to be done — most of it not usually the direct responsibility of the health authorities, but remaining part of their concern.

Material Resources. The material resources devoted to health, for services, training and research, are increasing. This is not only to meet the expressed needs of a better informed population, but also because it is recognized that disease is expensive and that sound social and economic development has to be safeguarded from health risks to the fullest possible extent. Again, however, the resources fall short of the needs, which the demographic pressure drives steadily upwards, particularly in the newly independent and developing countries, while costs follow the general upward trend.

The cost of health care is thus heavy, and rising. Countries are reviewing their needs and evaluating their services more systematically, with a view to achieving more efficient results. Others have to make very difficult choices between the ideal, what is wanted by a few, and a more realistic system to serve the many. In other cases, health development is deliberately integrated as a component of economic development because simultaneous health and overall planning have been recognized as the best means of marshalling limited material resources to the general advantage.

Trained Manpower. The importance of increasing the pool of trained manpower — especially physicians, nurses, sanitary engineers and health educators, but also those in some of the newer health professions such as physical and occupational therapy—has become more widely recognized. New schools for basic professional training are being created rapidly, while post-graduate education is developing. In each of the professions the role of auxiliaries, to whom can be delegated some of the simpler functions, is gradually gaining recognition in both developing and developed countries.
Needs for the expansion of health services, however, outpace the supply of trained manpower. In many countries there is no reservoir of persons with adequate general education large enough to draw upon for higher education in the health professions. Medical and other schools cannot be established, or their development is impeded, because there is a scarcity of physicians and others from whom teaching staff can be drawn. There is too often a tendency to continue traditional methods of education and service without adaptation to local needs and conditions. Some countries are losing their trained manpower to others offering better opportunities for work or research.

New Knowledge. The acquisition of new knowledge has never before been pursued so intensively and extensively. Unprecedented amounts of money are devoted to it by many governments and institutions, and by industry. Collaborative research is carried out across national frontiers and international co-ordination is being sought. New insecticides and new vaccines are changing the prevalence of disease, while new chemotherapeutic agents and new antibiotics are modifying its course. A beginning has been made with the commercial production of inexpensive protein-rich foods; nutrition is improving in some countries through increased food production, itself the result of research in another area, agriculture.

Research is, however, becoming more difficult and expensive. In most of the disease conditions now emerging as major problems, multifactorial causation is now recognized, and it is not as easy to elucidate as simple cause-and-effect relationships. The appearance of new drugs, applied without the benefit of long therapeutic experience, harbours risks of immediate or long-term adverse effects. Systematic, wide-scale testing of drugs, vaccines and insecticides has often to be carried out in those developing countries where a disease is particularly prevalent but where the means for research are lacking. These countries also need more operational and education research than the developed countries, which can afford the continuation of traditional patterns, wasteful as they may seem to be. There are problems in assisting countries to develop their research potential and in strengthening international collaboration and co-ordination of research.

AFRICAN REGION

For the African Region, the outstanding feature of the decade, profoundly influencing the Organization's work, was the unprecedented increase in membership in the Region — from three Member States and three Associate Members at the end of 1957 to twenty-nine Members and two Associate Members at the end of 1967 — as a result of the emergence of newly independent States.
With few exceptions, the health facilities in all these countries—having a combined population of approximately 220 million—had hitherto been fashioned to provide curative services of varying standard in the cities and larger towns, but limited in scope and elementary in nature in the rural areas, where nine-tenths of the population reside. Often, such preventive services as had been developed were largely restricted to the municipalities, and in the rural areas consisted mainly of mobile services, more or less specialized, operating on one or two circuits annually. Under these circumstances, the first overall objective guiding WHO's assistance was a gradual shift towards increased emphasis on the preventive aspects of medicine, to be developed not as a separate but as an integral part of a general health service, spreading towards the rural areas.

**Health Problems**

It soon became evident, however, that the realization of this objective faced a number of difficulties, the full extent of some of which still remains to be defined.

First, there were the general inadequacy and inaccuracy of vital statistics to serve either as a guide to the magnitude of any specific problem or as a baseline against which to measure progress achieved by remedial action. Data on population distribution were not always available, registration of births and deaths was often limited to the principal cities, while reliable morbidity data for the rural areas were virtually non-existent.

Available data showed that over most of middle Africa malaria infected virtually every child by its third year of life, accounting for probably one third of those who failed to survive that critical hurdle; that although human trypanosomiasis had been largely contained, its reservoir in animals and the ever-present tsetse posed a constant threat of resurgence; that schistosomiasis would probably spread even further as hydro-agricultural and industrial schemes developed; that onchocerciasis continued, unchecked, to create human suffering, while forcing the abandonment of extensive fertile areas the loss of which, even temporarily, the countries could ill afford; that tuberculosis and leprosy pursued their course among a heavy proportion of the population; that although considerable progress had been made in reducing yaws endemicity, the goal of eradication had become more difficult to achieve; and that other diseases such as measles, smallpox and cerebrospinal meningitis added each year to the toll of morbidity and mortality. In addition to this heavy load, the prevalence of kwashiorkor and other manifestations of protein deficiency was also known, as was the general inadequacy or total absence of sanitation facilities and safe water supplies, particularly in the rural areas.
A rough estimated average infant mortality rate of 200-300 per thousand would not have been contested as a single index illustrative of the state of public health in the majority of the African countries.

The countries of the Region were poorly equipped in trained manpower to face this situation. In a large measure this was due to mediocre levels of general education, lack or inadequacy of national (or even regional) training facilities, poor terms and conditions of service, and less availability of expatriate personnel.

Trends of Work

In the circumstances, initial emphasis was given to prevalence and other investigatory surveys with the object of defining the nature of the more important problems. Occasional concentration on a single mass campaign apart, since neither financial nor manpower resources would permit the simultaneous mounting of major specialized disease programmes, the tendency has been to encourage the development of general health services into which could be integrated action appropriate to special health priorities. All the newly emerging countries were preoccupied with formulating long-term plans for their socio-economic development. It was therefore natural that provisions for health should be incorporated in the form of national health plans.

The acute shortage of health personnel already noted led to increasing emphasis on assisting Member States to train their own basic staff. This is reflected in the growing percentage — from 8.9 during 1958-1962 to 19.6 during 1962-1966 — of the total regional budget allocated to fellowships. These figures fall short of the full effort made, since local training of professional and auxiliary personnel is also an important feature.

Running parallel with these principal lines of action, but gathering momentum only during the latter half of the decade, the development of municipal water supplies, sewerage and sewage facilities has come to the fore, chiefly with assistance from the United Nations Development Programme (UNDP).

Programme and Changes in Emphasis

During the first years of the decade, considerable emphasis was placed on antimalaria activities following successes in pilot projects designed to interrupt transmission of the disease in certain upland areas. Lack of resources, lack of proof of the feasibility of such interruption in savanna areas, and the obvious inadequacy of the rural and peripheral health services for supporting malaria eradication programmes, later dictated the less direct approach of strengthening the rural health services while attending to the many technical problems which still required solution.
The results obtained in yaws control programmes with single-injection, long-acting penicillin were satisfactory. After twelve years or more of mass campaign methods little further impression appeared to be made on the vastly reduced incidence of clinical disease. At this stage epidemiological/serological surveys became increasingly necessary and integration of surveillance with overall communicable disease control programmes as part of the routine activities of the local health services was beginning to be attempted.

In tuberculosis, combined surveys (tuberculin test, sputum and X-ray examination) have clarified the epidemiology of the disease under varying conditions. This gave way after 1964 to mass BCG vaccination without prior testing, utilizing diagnostic facilities mainly for suspected cases and favouring domiciliary treatment through the intermediary of the local health services whenever possible.

Limited smallpox vaccination campaigns have been a regular feature of national health activities, but planned total coverage of the population within a fixed period only came to the fore in the form of eradication programmes in 1966-1967, following the resolution of the Nineteenth World Health Assembly on smallpox eradication. Nineteen countries of the Region were offered bilateral assistance, co-ordinated through WHO. By mid-1967 WHO-assisted programmes were under implementation in one additional country and in the planning stage in five others. Assistance for the production of freeze-dried vaccine in Guinea and Kenya has also been supplied by the United Nations Children's Fund (UNICEF) in the form of laboratory equipment. African countries have still to develop the health infrastructure which will become essential for the maintenance phase of the eradication programme following the attack phase, planned to last four years.

In the general field of public health administration, the WHO tendency has been to move away from isolated pilot projects towards the strengthening of the central organization and local health services, and assistance in national health planning. In this, the presence of WHO representatives, in their capacity as chief public health advisers to the governments, has begun to play an increasingly important part.

Despite general recognition of the fundamental importance of educating the masses in any activity that involves changes in established customs, health education has made only limited progress in the Region. Of three country projects initiated since 1964, two were viable in 1967, with qualified national counterparts. Although several governments give a high priority to the training of national staff as health educators and the Organization is prepared to assist, candidates of suitable educational attainments have not been readily forthcoming.

Maternal and child health programmes, inclined to develop independently at first, have moved towards integration into the general health services, but with
the necessary emphasis on training of staff for the specific needs of mothers and children.

From the outset, assistance to nursing has been directed to the strengthening of training schools for both professional and auxiliary grades. In one group of countries it was possible, by 1965, to raise the target to include post-basic nursing education, with the object of training the future administrators and tutors, and further countries were starting on this development at the end of 1967. Meanwhile the integration of public health nursing aspects in curricula is making headway, so that nursing personnel will more readily fit into a general health service.

In the sphere of sanitation primary attention has been given to the training of health personnel, and the fourteen WHO-assisted training programmes have produced over 200 sanitary inspectors in the period 1962-1966. The main object of most of the other country projects in operation has been, besides training, the establishment of a unit of environmental health within the ministries. In general, field activities have been restricted to pilot project areas, in which the material assistance of UNICEF is available. Towards the end of the decade, however, under the stimulus of the United Nations Development Programme and its assistance for large-scale community water supply and sewerage development, governments have made available the necessary counterpart funds to permit implementation of schemes in Accra, Dakar, Ibadan (Nigeria) and Kampala.

Because of the need for qualified personnel in medicine and the allied professions and their auxiliaries, the programme in education and training has not only expanded considerably during the second five years of the decade, but has assumed a definite pattern: there has been a sharp increase in long-term fellowship awards, both for undergraduate medical studies and for advanced post-graduate training of future teachers for the medical schools which are themselves developing. Direct assistance has also been provided to these schools by the assignment of professors.

Inter-Country Programmes

Inter-country programmes provide services more economically than if each country were served separately. In the African Region there are now sixty-five such programmes, either mobile or fixed, including full-time training projects such as international malaria eradication training centres, schools of nursing, certain university professorships and projects such as the Epidemiological Centre at Nairobi and the Regional Food and Nutrition Commission for Africa, sponsored jointly by the Food and Agriculture Organization of the United Nations (FAO), the Scientific, Technical and Research Commission of the Organization of African
Unity, and WHO. The mobile programmes provide for staff to assist a number of countries in turn. There are also supply programmes — such as the cerebrospinal meningitis control project — which make drugs available at times of threatened epidemics.

An inter-country programme which may have far-reaching effects was the seminar on medical education held at Yaoundé in 1966. This brought together participants from thirteen countries of the Region already engaged in the planning or management of medical schools. After an exchange of views and experiences, it was agreed that the African student should be trained in institutions within the Region, where his education would be directed towards the diseases most usually encountered, the structure of local health services, and the social and economic environment in the countries of the Region. It was felt that even though there was a considerable shortage of doctors, the idea of training "sub-professional" doctors should be abandoned. A pattern of medical education suited to the countries of Africa should emerge, aimed at producing practitioners who were well versed in public health questions, and whose services could be extended simply by training more auxiliaries. The curriculum should therefore give a large place to preventive medicine, with emphasis on epidemiology, problems of maternal and child health, nutrition, environmental health and health education. Tropical medicine should be an integral part of the curriculum and should not be treated as an optional post-graduate subject.

Towards 1960 inter-country malaria eradication assessment teams were organized, first in south-east Africa and later in central Africa. Tuberculosis, treponematoses, nutritional and other advisory teams, or other mobile units dealing with a variety of communicable diseases common in the Region, have been or are still at work. An example is the onchocerciasis advisory team, which has assisted the Governments of Ghana, Togo and Upper Volta in drawing up a co-ordinated control programme.

By 1966 the facilities at the Tuberculosis Epidemiological Centre in Nairobi were being utilized for other communicable diseases also. The objectives of the Centre, re-named "Epidemiological Centre", are to assist governments on technical questions related to general epidemiological investigations, and to process, analyse and appraise epidemiological and statistical material received from survey projects.

Assistance of this type was provided for a demographic study in Lesotho, a communicable eye disease project in Tanzania, and an inter-country nutritional advisory service project. The Centre also participated in a serological survey in Nyanza Province, Kenya. A wider effect of these services is to help health personnel to gain better understanding and appreciation of the statistical approach in their particular fields.
Health Priorities in the Context of General Needs

In newly developing countries the public health needs of the population necessarily compete with other priorities. Informed public opinion is limited, while financial resources are totally inadequate for a multiplicity of ambitious plans in every sphere. Self-evident health needs may call for priority attention; but their satisfaction greatly depends on the general advance in economic development. The first six years of the United Nations Development Decade, however, have failed to fulfil expectations. The gap between the developed and the developing countries has increased, per capita income having risen by 14 per cent. in the former and by only 8 per cent. in the latter.

In these circumstances, one may limit to three the major health priorities in the African countries. First, a local health service so organized as to be within easy reach of most of the population for meeting its elementary requirements in curative care and prevention; secondly, the requisite numbers of trained staff, including auxiliaries adequately supervised in the performance of polyvalent duties; thirdly, a system of health education which will effectively create in the population a consciousness of disease as preventable, and an understanding of the services available.

These targets, translated in practical terms in many of the countries of middle Africa, work out as a system of simple health posts spread out according to population density. But the static service rendered by such posts requires to be supplemented by some provision for regular domiciliary visits in so far as feasible and for some specialized mobile services.

There has been encouraging progress in this direction in experimental areas of Togo and Cameroon, although difficulties have been encountered in providing at the local level for the additional staff required. It is significant that during the sixteenth session of the Regional Committee for Africa (in 1966) the view was expressed that governments may be unable to provide the necessary buildings or the salaries to man a basic health infrastructure aimed at total coverage.

In certain circumstances buildings can be constructed by community self-help with or without subsidies. Equipment, supplies and transport can be provided to a limited extent by international or bilateral assistance. For the growing payroll of an expanding service, however, no immediate local solution is evident.

In view of the general shortage of professional personnel, reliance will have to be placed on large numbers of auxiliaries, both at the operational periphery and at intermediary supervisory level. The necessary training facilities already exist in the majority of the countries and could be readily augmented in order to accelerate the rate of turn-out of auxiliaries, but these need to serve within an organized health service providing for guidance, supervision and referral, and their absorption into such a service is again conditioned by budgetary limitations.
REGION OF THE AMERICAS

In the Americas, as in other regions of the world, development appears as a gradient, both in the hemisphere as a whole, and within each country. With regard to health care — which usually reflects the trends of development — the Americas are in a stage of transition. The great quarantinable diseases have been steadily disappearing in this century but the endemic diseases persist, revealing that knowledge to prevent and cure them is not being systematically applied. At the same time, chronic diseases now appear amongst the ten leading causes of death and, in some countries, amongst the five leading causes of death.

Basic decisions have been taken during the decade defining health problems, establishing concrete objectives, determining norms and procedures to solve the problems, and mobilizing external and internal resources to finance some of the programmes.

A ten-year public health plan was included in the Charter of Punta del Este, giving formal recognition to health as a fundamental factor in economic development and opening a new era in public health work affecting about 460 million people.

In 1963, at a meeting in Washington, D.C., ministers of health reviewed the plan in detail. In the light of knowledge, experience and resources available, they concluded that the ten-year plan was practicable, provided its objectives were realistically integrated with the other economic and social goals the countries proposed to reach. Planning, the better utilization of human and material resources, and further investments were considered to be essential means for reaching the specific objectives. The organization and administration of health services, the education and training of professional and non-professional personnel to put the plan into practice, and basic and operational research were no less important.

This ten-year plan became in effect that of WHO in the Region by formal decision of the PAHO Directing Council/WHO Regional Committee in 1963. A review of the progress achieved with reference to each one of the main objectives provides, therefore, a general picture of the health situation, including problems and trends, in the Americas.

1 The WHO Region of the Americas covers North, Central and South America. The Pan American Health Organization (PAHO) — created in 1902 as the Pan American Sanitary Organization — has a Bureau and a Directing Council which act as WHO's Regional Office and Regional Committee respectively. Canada is not a Member of PAHO, otherwise the membership is identical. For the financing of international health activities in the Western Hemisphere, see p. 309.
Communicable Diseases

Malaria eradication as a concerted regional programme was started at about the same time as the WHO world campaign, in 1956, when some 130 million people were estimated to be exposed to the disease (50 million in the consolidation or maintenance phase). Ten years later the population had risen to 166.5 million, and the maintenance and consolidation total stood at 106 million (of whom a high proportion lived in areas where eradication had been certified). The technical problems encountered, chiefly vector resistance, are dealt with in Chapter 5 (see page 168). Administrative and financial problems were heavy in the early years, but have recently eased somewhat.

The trend today is towards establishing close relations and co-operation between eradication campaign teams and the regular national health services, the latter having an essential role, epidemiological and other, to play in all phases but particularly in the consolidation and maintenance phases. Two seminars sponsored by the Organization in 1964 and 1965 worked out procedures in this field, and subsequent meetings, an inter-country pilot project and technical guidance have been used to further the process of integration, at the appropriate time, of malaria campaigns with regular public health services.

Smallpox, still prevalent in the early 1950s, was reported from seven countries or territories in 1958 and from five only in 1961. But the incidence is still high in one Latin American country, and there have been relapses in others. Eradication programmes have not always been followed by continuous consolidation and maintenance action, nor have adequate epidemiological surveillance services been organized. An assessment of the overall situation made by the Organization early in 1966 emphasized the need for intensification of the programmes in the Region with international assistance.

Other common communicable diseases are referred to in the relevant chapters of this volume. Much progress has been made in recent years in several of them. However, further reduction in the morbidity and mortality rates is dependent on a strengthening of administration of the services and the availability of epidemiological data, as well as on an increase in investments.

Environmental Health

The governments agreed to provide water supplies to 70 per cent. of the urban population and 50 per cent. of the rural population. A major advance — one of historic importance — has been achieved in this programme, with investments of US $1100 million in the period 1961-1967 (40 per cent. from external resources, chiefly from the Inter-American Development Bank). Fifty-three million people have been so supplied, 40 million of them living in urban areas and the remainder
in rural communities. This in itself is a remarkable achievement, although to accomplish the goals as stated another 67 million should be supplied with water by 1971. Thus there is a need for prolonged effort and greater investment of domestic and external resources.

Less progress has been made with wastes disposal. Nevertheless, up to the end of 1966 some $70 million had been loaned by the Inter-American Development Bank and other financing agencies for the construction of sewerage and sewage treatment systems in twelve countries, whose governments matched the amount of the loans.

Governments are also concerned with the problems deriving from industrialization and urbanization; occupational health; the contamination of air, soil and water; the control of vectors of disease. In all these areas some advances were made with the assistance of the Organization.

Nutrition

Protein malnutrition in early childhood is one of the main health problems of Latin America and one of a particularly complex character. While the production of foodstuffs in the Region, and in many cases their importation, have increased, the rise in population has neutralized this improvement.

There has been steady progress in the diagnosis and treatment of nutritional disease and deficiencies, but general lack of knowledge on foods and nutrition, qualitative and quantitative, makes prevention of malnutrition difficult. Moreover the formulation of nutrition policy itself must overcome tradition and habit. Its application calls for concerted action by different authorities, mainly the ministries of health, agriculture and education. Further, the gravity of the problem remains hidden because of incomplete statistical and epidemiological data and the fact that malnutrition in infants often renders them susceptible to death from another cause. This unclear sequence of cause and effect between malnutrition, morbidity and mortality makes it difficult to obtain for the problem the priority it deserves in national health plans.

However, the progress made during the decade can be seen in the organization of nutrition departments in the ministries of health of most of the countries, the increasing concern with nutritional problems, the definition and the identification of priorities, and the training of key personnel. The applied nutrition programmes developed in seventeen countries with the collaboration of FAO and UNICEF have yielded appreciable results. An evaluation of these programmes was the subject of a seminar held in Colombia in 1966.

A special acknowledgement must be made of the contribution of the Institute of Nutrition of Central America and Panama (INCAP) in training, research and
WHO'S FORMER HEADQUARTERS

The Palais des Nations, Geneva, former headquarters of WHO, where most sessions of the Health Assembly are held. The new WHO building can be seen in the background.

HEALTH ASSEMBLIES ELSEWHERE

During the decade two Assemblies were held away from headquarters — the Eleventh in Minneapolis (USA) in 1958, and the Fourteenth in New Delhi in 1961.

Mr Jawaharlal Nehru, the late Prime Minister of India, addressing the Fourteenth World Health Assembly.

The Vigyan Bhavan, New Delhi, where that Assembly was held.
WHO'S HEADQUARTERS

WHO’s new headquarters building was erected between 1962 and 1966 on a site made available by the Genevese authorities near the Palais des Nations. The architect was Mr Jean Tschumi, of Lausanne, whose design won first prize in the international competition in which architects from thirteen countries took part. After Mr Tschumi’s death, Mr Pierre Bonnard became the responsible architect.

The President of the Fifteenth World Health Assembly, the late Dr S. V. Kurasov, seals into the foundation stone of the new building, on 24 May 1962, a cylinder containing documents recording the event.

Dr Brock Chisholm, the first Director-General of WHO, speaking at the inauguration ceremony on 7 May 1966. Seated on his right are the Director-General, Dr M. G. Candau, and the Chairman of the Standing Committee on Headquarters Accommodation, Professor E. Aujaleu.
The secretariat block, in concrete and steel with façades of glass and aluminium, is carried on twenty-two pillars. On the right is the Executive Board building in patterned marble, with the library in the foreground.

The interior of the Executive Board room is in teak panelling, which (like the marble of the façade) was among the many gifts received from Member States for the building.

The library, with its unique collection of documents concerning international health, is open to all qualified medical workers, who have free access to its 100,000 volumes.
advisory services to its six Member governments. It has carried out investigations on the epidemiology and pathology of protein malnutrition; the connexion between sanitation, infection and malnutrition; the evaluation of nutritional status; the methodology of dietary surveys; and the relationship of physical growth, mental development and working capacity. Earlier investigations of protein-rich vegetable mixtures led to the commercial production of “Incaparina” which is being widely used in Guatemala and Colombia and tried in several other countries of Latin America (see also page 222). Over the last ten years the Institute provided training for almost five hundred professional personnel from various countries. It has also promoted the creation of nutritional departments within the health ministries and the introduction of integrated and broad-based nutrition policies within the six countries. The whole programme of INCAP is having a favourable repercussion throughout the Region and elsewhere also.

Education and Training

The education and training of both professional and auxiliary health personnel have received great emphasis during the decade. Special attention has been paid to educational research on the human resources needed for health planning and economic and social development. Progress has been made in improving the quality of teaching institutions and in increasing the number of those trained. The fellowships programme of the Organization has been a major factor. In all some 6000 fellowships were awarded during the period covered by this report, for academic studies, and attendance at group courses, and in the form of travel grants for observation visits to various institutions. In spite of these results sustained efforts are essential if the necessary numbers and types of health personnel are to be produced and rationally distributed as between urban and rural areas. Education is a process that should clearly be under constant review to ensure that curricula are adapted to the types of prevalent problems.

The existing 112 schools of medicine are sufficient to maintain the number of physicians at the current level, but unequal distribution of physicians and increasing population clearly call for considerable expansion.

Medical pedagogy and the improvement of the teacher-learning process have received special attention, as has the incorporation of preventive and social aspects into the medical curriculum. A new quarterly journal on medical education in Spanish has been published since 1966. For the last fifteen years sound co-ordination among the different agencies working in the field of medical education in the Americas has been ensured by a medical education information centre sponsored by the Organization.

The most serious shortage is in nursing personnel. For every ten thousand of the population Latin America has 2.6 graduate nurses and 7.2 nursing auxiliaries,
mostly untrained. Every country in the Region, with one exception, has at least one school of nursing with modern standards, and the Organization's assistance during the 1960s has been directed to expanding the output. The shortage is rendered more acute because trained nurses are often assigned administrative or specialized duties in hospitals, while others have to be withdrawn from general nursing for training as nurse educators in order to reduce the high proportion of untrained auxiliaries. Much of the Organization's recent assistance has taken the form of courses, at the different levels of nursing, aimed at improving standards. This, by raising the prestige of the profession, is showing results in attracting to it greater numbers of recruits.

The expansion in environmental sanitation programmes, especially water supply projects, which was noted above, has resulted in a shortage of sanitary engineers throughout the Region. The Organization has contributed to some notable results through an integrated regional programme under which countries have strengthened their training facilities along uniform lines. Assistance came from the United Nations Development Programme, the Organization of American States, the Inter-American Development Bank, the Organization, and others. Up to 1967, a force of some 2000 graduate sanitary engineers had been strengthened by the addition of several hundred newly trained.

Considerable progress can be cited in all the other health professions.

National Health Services

Most countries of the Region have well organized ministries of health or equivalent administrations and follow a system of technical centralization with operational decentralization to the provincial or local level. They are all concerned with the task of translating policy into effective action throughout the country, with particular attention to remote rural areas which enjoy little or no health care facilities.

The Organization has provided assistance for an increasing number of projects, reaching some forty for the year 1966. The purpose has been to strengthen the structure of health services, to improve administrative efficiency, and to train professional and auxiliary level personnel with a view to obtaining the best possible results from the human and material resources. Integration of preventive and curative services has been introduced in varying degrees in both urban and rural areas, providing for comprehensive health care of the individual and the family. The same objective is being pursued at the universities in education for the health professions.

The Organization has given guidance in this field, directly to governments or through a number of advisory committees, including one on the integration of
medical care into the public health structure. The co-ordination of the services of the ministries of health and of social security was analysed by another committee, whose report served for the technical discussions at the XVII Pan American Sanitary Conference / eighteenth session of the WHO Regional Committee, in 1966.

The countries of the Region are at different stages in the formulation of national health plans. What is significant, however, is the growing acceptance of health planning as an integral part of national economic and social development. This is reflected in the increasingly close co-operation between the Latin American Institute for Economic and Social Planning and the Organization in matters of education.

With advice from the Organization six governments in Latin America have formulated national health plans and in eleven other countries the process of health planning has been established as part of the national development effort.

This experience has shown that the organization and administration of the services to implement the plans need strengthening, that vital and health statistics need to be improved, and that objectives need to be established and results evaluated. Also some of the planning methods being applied need to be investigated particularly through operational research.

Health Statistics

Vital and health statistics in the Americas have improved substantially, both with regard to quantity and quality of data. Particular emphasis has been given to advisory services to the ministries of health, to education and training for statisticians at advanced and intermediate levels and for auxiliary statistical personnel, and to research. The programme as a whole has facilitated the analysis of problems and resources, as well as the evaluation of the results of health projects and health plans. A regional advisory committee on health statistics has contributed to developments in this field (see also page 76). Further efforts are needed to improve data with regard to completeness, speed of publication, distribution of statistics and their utilization by health officials in the central, regional and local services.

The inter-American investigation of mortality, a collaborative research project supported by a grant from the United States National Institutes of Health, was initiated in 1962. The field work was completed in 1965 in the twelve participating countries. This comparative study shows differences in mortality distribution that call for further research of an ecological and biological nature (see also page 75).
Research

Research in the biological and health sciences has been established in the Region as a fundamental activity. The PAHO Advisory Committee on Medical Research, created in 1962, has helped to define the policy of the Organization and to analyse projects on specific subjects, especially on nutrition, malaria and other communicable diseases (including some zoonoses of great economic importance) and environmental health. Many national institutions were assisted in research work in their specialized field.

Reports on some of the problems that were the subject of research have been published in a special series. Titles include *Science Policy in Latin America: Substance, Structures and Processes,* and *Migration of Health Personnel, Scientists, and Engineers from Latin America* (see also pages 274 and 289).

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These are some of the main health problems in the Americas and approaches followed by the Organization in assisting the governments of the Region. With specific goals established by them for their major health problems, results can be measured periodically and further activities planned. It is evident that greater efforts will be needed to achieve the stated objectives, particularly larger investment of domestic and external funds as well as more and better training of professional and auxiliary personnel. Notwithstanding, the results achieved so far are encouraging. Health being a dynamic process, subject to change as societies progress, planning needs to evolve with the new circumstances that condition disease.

SOUTH-EAST ASIA REGION

The South-East Asia Region has nine Member States, with a total population approaching 700 million.

In the last ten years, common features of the Region have been a rapid increase of population and an urge to accelerated change in a generally unfavourable social and economic environment: a low standard of nutrition resulting from lack of mass purchasing-power and inadequate food production, serious deficiencies in environmental health, a heavy incidence of communicable disease, and a general shortage of financial resources as well as of trained health personnel and facilities. Overall mortality rates have been declining with sustained high fertility rates,
resulting in an average annual increase in population of the order of 2.2 per cent. or more and a striking increase in the number of family dependants: more than 40 per cent. of the population are under fifteen years of age, and 22 to 25 per cent. are women of child-bearing age, these two categories together constituting approximately two-thirds of the population. More than four-fifths of the people live in rural areas, although urbanization and industrial expansion are in progress in varying degrees.

In these circumstances WHO has given priority to the promotion of comprehensive and integrated health services at national, intermediate and local levels. Major health problems of the Region and trends of work are summarized below.

**Communicable Diseases**

Heavy endemicity of communicable diseases has throughout continued to demand the major share of available resources for health in South-East Asia, reaching in most years 40 to 50 per cent. of total expenditure. This has been due principally to programmes for yaws and malaria and to the considerable extension of the next largest programmes, for tuberculosis and leprosy. In addition the policy of smallpox eradication, followed since 1965 by the five countries in which smallpox is endemic, and the threat resulting from the spread of cholera El Tor, have necessitated increased assistance for dealing with these diseases.

The success gained in some of these mass campaigns has, in itself, raised new problems. They are expensive, and if they are not absorbed in good time and sustained as an integral part of continuing health services their impact may be transitory. Governments are being advised to use the available resources for building up permanent general health services sufficiently strong to take over responsibility for malaria surveillance and the control of other communicable diseases. Recent integrations of this type include the yaws programme in Thailand and Indonesia and particularly, at the end of 1966, the malaria eradication programme (on its transfer to the maintenance phase) in areas in India and Ceylon with a population of no less than 265.6 million. In the fight against tuberculosis, leprosy and trachoma, the experience gained now permits concentration on selected areas of high prevalence and integration into the general health services, at the outset, of simplified ambulatory treatment. Finally, as a routine for newborn and young children, direct BCG vaccination without prior tuberculin testing has, in the last few years, been introduced as part of the general health services in all nine Member countries of the Region.

To facilitate the integration of immunization programmes into the permanent health services much support has been given in recent years to the local production of potent and thermostable vaccines. It must be added that much remains to be done, even in areas where general health services offer reasonable coverage, to
develop and maintain adequate immunization programmes against smallpox, tuberculosis, diphtheria, pertussis, tetanus and poliomyelitis. In fact, the inability to maintain an adequate infant immunization programme has been the most distressing weakness of most national health services.

Health Personnel

The need to fill the gap between health requirements and available staff has been reflected in a rapid growth in the number of medical teaching institutions and their intake. The number of medical schools has increased in nearly all countries of the Region, from a total of sixty-one in 1958 to 113 in 1967.

A grave consequence of this expansion is, however, the dilution of teaching staff in both number and quality. WHO has promoted the development of medical education by assigning staff to medical colleges, awarding fellowships to prospective teachers, assisting sparsely staffed non-clinical departments, and helping to develop departments of preventive and social medicine and of pediatrics. The major difficulty in this WHO assistance has been in recruiting medical teachers for long-term assignments. WHO has therefore tended to rely increasingly on repeated assignment of teachers on a short-term basis in various disciplines, and on working seminars and teams of educators to demonstrate modern teaching methods.

The shortage of trained nurses is even greater than that of doctors. The WHO programme has steadily developed over the past ten years from assistance to basic nursing education, with integration of the public health aspects, to the support of post-basic and post-graduate programmes designed to increase the supply of nurse educators, nurse administrators, supervisors and specialists. The establishment of nursing units within national or state directorates of health services has also received WHO support in almost all the countries of the Region, resulting in proper guidance of all aspects of nursing services.

To obtain a minimum of health coverage, wide use is being made of various categories of health auxiliaries working under professional supervision. The Organization has from the beginning promoted and assisted in the training of auxiliaries in the major health professions, particularly in nursing and midwifery, medicine (curative-preventive) and sanitation, including multipurpose basic health workers at the lowest level. Again, in view of the serious lack of adequate supervision and assessment of functions and workload of health auxiliaries, WHO has encouraged the studies recently initiated in this field in India and Thailand.

The training of radiographers, physical therapists and laboratory technicians has also been assisted in several countries. Since 1966 WHO, through its Revolving Fund for Teaching and Laboratory Equipment for Medical Education and Training (see Chapter 11, page 311), has helped in the equipment of medical schools and teaching institutions for the other health professions.
Development of Health Services

The last ten years have shown that orderly development of the health services demands overall planning on a long-term, phased basis if technical staff and material resources are to be used to the best advantage. The era of emergency measures to satisfy apparent priorities has yielded to advance planning of national health services. Here the advice and participation of the Organization and its representatives in the countries have contributed to better planning and development, to improved co-ordination of international and bilateral assistance, and to greater emphasis on training in public health administration by means of fellowships and special courses.

The establishment in Bangkok in 1964 of the Asian Institute for Economic Development and Planning — with the Economic Commission for Asia and the Far East (ECAFE) as executing agency — gave WHO the opportunity of introducing health planning as a component of general social and economic planning by appointing a public health administrator as a member of the faculty of the Institute. Assistance has also been given to a variety of national health institutes.

The strengthening and expansion of local health services and the training of the necessary health personnel, together with the improvement of supervisory cadres, have become matters of the highest importance in this region. It has also become essential for these services to be better supported by programmes in epidemiology, microbiology and health statistics. Priority has therefore been given to the development of national teaching institutions in epidemiology and preventive and social medicine, and of central and intermediate health laboratory services. Simultaneously, there has been a constant effort to rationalize the collection of data in rural health services and to promote better hospital recording and reporting systems.

A relatively new field for WHO assistance in the last two years has been the planning and design of hospitals and other health units.

Maternal and Child Health

In the field of maternal and child health, the programme has been periodically appraised and assistance has developed in three stages. Starting with demonstration and training projects, the programme moved to a more comprehensive coverage of the population through a network of maternal and child health centres, with a simultaneous strengthening of services at the centre. In the second stage, efforts were directed towards the integration of maternal and child health services into the general health system. The third phase was concentrated on education of paediatricians and paediatric nurses, with a parallel effort to develop public health nursing and to train auxiliary nurse-midwives for service at the peripheral
levels. In the past five years, some countries in the Region have also adopted programmes of family planning within the framework of the general health services.

**Environmental Health**

As a step towards meeting urgent needs in environmental health, assistance has been given in training national specialists in sanitation and in the public health aspects of engineering. The functions and duties of professional and auxiliary sanitation personnel have been defined, basic curricula developed and minimum requirements formulated for teaching facilities and staff. Most of the countries have received advice from WHO public health engineers and fellowships in sanitary engineering.

Many rural water supply and sewerage schemes are being assisted by UNICEF and WHO. The Organization has also given assistance in the management and financial aspects of urban water supplies and sewerage and the development of such projects qualifying for international loans, particularly the Calcutta water supply and drainage scheme (see also page 256). Since 1961, as the executing agency for a project under the United Nations Development Programme, WHO has assisted in the development of the Central Public Health Engineering Research Institute in Nagpur (India) as a major centre for research in environmental health problems and training of research workers.

**Health Education**

As organized health education programmes did not exist in most countries, fellowships have been awarded to train health educators for the national health services. Assistance from UNICEF and WHO has contributed to the establishment of active health education units in the national health directorates of all the Member countries. In India, there are now fifteen state offices of this type. Two centres in the Region also provide training for health educators at the professional level. The methodology of the planning, implementation and evaluation of health education, with special attention to services and training, has been developed since 1966 on an inter-country basis.

**Nutrition**

WHO has given special attention to the recognition, causes, prophylaxis and treatment of malnutrition, in particular through the maternal and child health services. It has sought to raise the level of nutrition expertise within directorates of health services; to organize training courses in nutrition; to promote public health control of special problems — in particular, endemic goitre and nutritional anaemias — and to participate with FAO and UNICEF in applied nutrition pro-
grammes designed to improve nutrition education and the production and utilization of food in rural areas.

**Collaboration with the United Nations and other Agencies**

A substantial portion of WHO's activities in the Region has, throughout, been carried out collaboratively, in particular with UNICEF and the United Nations Development Programme. WHO has also collaborated with the United Nations Bureau of Social Affairs in social welfare programmes and medical rehabilitation; with the World Food Programme; with ECAFE in all health aspects of regional development schemes (such as for the Lower Mekong Basin) and in connexion with the Asian Institute for Economic Development and Planning; with FAO in applied nutrition programmes and the health aspects of irrigation projects; with the International Labour Organisation (ILO) on occupational health; with the United Nations Educational, Scientific and Cultural Organization (UNESCO) on the health education aspects of general education programmes; and with the United Nations Development Programme (Special Fund component) and the International Bank for Reconstruction and Development in respect of major water supply and sewerage projects. WHO has also worked closely with intergovernmental agencies (in particular with the Colombo Plan authorities), the United States Agency for International Development and other bilateral assistance agencies, and also with many non-governmental organizations.

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In conclusion, whereas in the first ten years WHO in the South-East Asia Region was engaged in immediate short-term demonstration and training projects for the control of prevailing communicable diseases, in the promotion of maternal and child health and in the improvement of medical education, the last ten years have been chiefly directed towards the development of long-term national plans for integrated general health services. These plans include the building-up of basic health services in rural areas, staffed by health auxiliaries working under professional supervision and providing reasonably adequate health coverage for the total population; the further strengthening of maternal and child health services within the framework of the general health services; the promotion and acceleration of education and training of all categories of staff, from auxiliaries to postgraduates; and the development — as an integral part of the general health services — of epidemiological services, health laboratories and health statistics for better health intelligence and planning of control measures against the most prevalent communicable diseases and other conditions. The plans also provide for the promotion of environmental health, with emphasis on sanitary engineering...
education and community water supply and sewerage projects in selected rural and urban areas; general health education, including nutrition education; and evaluation of health services through periodic independent assessment and operational studies.

EUROPEAN REGION

The European Region of WHO counts thirty-three Member States, with a population of just over 750 million, and stretches from the mid-Atlantic to the Pacific Ocean and from well beyond the Arctic Circle to below the Tropic of Cancer. Though in the main a certain cultural unity exists, physical and economic conditions vary widely.

Even in the Region's richest lands, there are areas of economic and social backwardness, with health conditions far below those found elsewhere in the same country. National infant mortality rates varied in 1963, for example, from 15.4 per thousand in one country to 77.4 per thousand in another; but within one and the same country with a national rate of 21.7 per thousand, extremes of 12.7 and 35.4 were found in different provinces. Similar variations may be seen within individual cities.

Everywhere migration is causing problems of peoples uprooted — strangers in their new surroundings and requiring facilities that exceed the capacity of the receiving areas to supply. There is much migration between countries: industrial and agricultural workers flock to countries with better conditions or high seasonal demands for labour, and tourism is no longer the privilege of the few but is enjoyed by the masses. Within countries displacements of population are not simply from country-side to metropolis but also from old towns to the new towns being built to relieve pressure on the old. Existing cities also need renewing. All these movements bring both advantages and problems to host and migrant.

Industrialization brings its own problems, both human and environmental, throughout the Region. Man-made environmental pollution in all its aspects is a major problem and a major field of work for WHO. Pollution crosses national boundaries along the rivers of Europe.

All countries in the Region have conducted national censuses and all produce some vital statistics. Nevertheless inter-country comparisons are hampered by differences in the development of statistical services, and WHO has devoted much effort to their improvement by means of meetings and training courses. A feature of most countries in continental Europe is the rising percentage of dependent persons in the population, now mainly due to the increasing number of elderly people. In Belgium, for instance, the working population between the ages of fifteen and sixty-five forms 63.8 per cent., children under fifteen, 23.8 per cent.,
and those over sixty-five, 12.4 per cent. of the total. In Morocco, however, by way of contrast, children under fifteen years account for 45.8 per cent. and persons of sixty-five and over for only 2.5 per cent. of the population, leaving a working population of 51.7 per cent.

**Communicable and Non-Communicable Diseases**

With the exception of relapsing fever in North Africa, the Region is now free from the six quarantinable diseases defined in the International Sanitary Regulations, but is at risk from imported cases, especially of smallpox. Quite recently, cholera El Tor briefly invaded Uzbekistan, USSR.

In malaria control, also, great progress has been made, and in continental Europe, under the impact of the co-ordinated eradication plan, transmission no longer exists.

Despite general advances, the control of other diseases is uneven. For instance, in one country no cases of diphtheria have been reported since 1962, while in another there was an incidence of 20 per hundred thousand in 1964. Moreover there are black spots in all countries, even in the control of bacterial diseases, one of these being the rise of hospital cross-infections with antibiotic-resistant organisms.

Tuberculosis is slowly declining. Again, there are wide inter-country differences, from a death rate, in 1964, of 38.4 per hundred thousand in one country to 1.5 in another. However, wide differences occur within countries: for example, in the United Kingdom in 1965 the death rate from tuberculosis in men aged forty-five to sixty-four varied in different hospital regions from 20.5 to 4.6 per hundred thousand.

Control is being achieved over some virus diseases — notably poliomyelitis. No cases are now being reported in several smaller countries; in others, even highly populated, rates had fallen by 1965 to below 2 per million.

On the other hand, viral hepatitis has been a considerable problem, mainly in Central European countries.

With this decline in communicable diseases, other threats to health are assuming greater importance. In a large majority of countries, accidents now rank first or second among causes of death between the ages of one and forty-four. At a more advanced age, chronic and degenerative diseases, such as cardiovascular disease, cancer, rheumatism and chronic lung disease are the main problems. The problem of cardiovascular diseases has been the object of numerous consultations, inter-country meetings and collaborative research sponsored by WHO in European countries, especially Belgium, Czechoslovakia, Denmark, France, Italy, the Netherlands, Sweden, the United Kingdom and the USSR.

Mental ill health is a major problem in Europe today, making great demands both on hospital accommodation and on physicians, nurses and other health
workers. Considerable work has been done in this field, with emphasis on preventive programmes, children’s mental health and the place of mental health in public health practice, including epidemiological aspects.

**Health Services and Medical and Allied Education**

With the exception of two small countries, all countries in the Region now have one or more medical schools. Almost half of the world’s medical schools are in the European Region. There is a relatively high physician/population ratio, with a median of 1 : 840, but extremes of from 1 : 510 to 1 : 9700. Similarly, for the hospital bed/population ratio the median is 1 : 115 and variations range from 1 : 70 to 1 : 600.

A striking feature of Europe is the wide difference in types of health service and their forms of administration. Most countries of the Region have highly developed medical care insurance systems, while others have national health services providing medical care and, to a large extent, drugs and appliances, free to the population. In the latter case, the hospitals are mainly state-owned, but in some countries they are owned and operated by local government bodies, while in others, religious and charitable organizations, together with some degree of private enterprise, provide a substantial amount of hospital care.

Nevertheless, in practically all countries, subsidized medical care — covering both general practitioners’ and hospital services — is available to at least 80 per cent. of the population. All countries have public health services, some of them extensive.

Clearly, variations in health status depend on many factors other than the type of health service in a country. Nevertheless it is interesting to note the similar results in certain countries with health services of different kinds, according to their own environment. For instance, in 1965 the infant mortality rate of 25.3 per thousand in Czechoslovakia was identical with that in Ireland. Similarly, in 1962, the perinatal mortality rate in Sweden was 23.8 per thousand live births, and in the Netherlands 24.4 per thousand. Yet in Sweden 99 per cent. of births took place in hospital, and in the Netherlands only 28 per cent.

No country is entirely content with its health services; studies and experiments are going on everywhere. WHO has contributed consultant services and provided a setting for study and discussion on the planning and evaluation of medical care and public health services. Many aspects of hospital organization, and the relations between the hospital and the community, have also been explored in this way. The health aspects of regional economic planning and community development have been studied in a European setting and in urban areas with the participation of the United Nations and other agencies. Much of this work has helped newly independent countries to replan their health services and train their staff.
WHO has also promoted discussion on such topical subjects as ionizing radiation and health applications of computers and data-processing, and has arranged training courses for health officials in these fields.

Much effort has been devoted to the development of nursing services and nursing education, culminating in the establishment of two international centres of higher nursing education, one teaching in English and one in French. Planning has been started for the establishment of a centre teaching in Russian.

Among environmental problems, important matters of water supply and sewage disposal have been attacked, both in individual countries and on an inter-country basis, in collaboration with the other agencies concerned. The pollution of waters, rivers, lakes and sea, as well as air pollution, have been studied with particular attention to basic problems of measurement, standards and epidemiological studies.

The education of health personnel has been a central theme throughout the decade. All countries have availed themselves of fellowships offered by the Organization. One feature of the programme has been courses for training teachers in specific subjects, such as human genetics or the medical aspects of radiation. Meetings have been organized to study undergraduate medical education, as regards both content and method, and the further training of doctors and of public health officers in relation to their work in the community.

These activities have called for frequent collaboration with many universities and teaching institutions, as well as with intergovernmental bodies such as the Council of Europe and the Economic Commission for Europe. As a direct result of WHO initiatives, continuing association has been established between European schools of public health, and also between schools of tropical medicine.

Work in the European Region differs in emphasis from that in other regions. Though direct assistance to countries in need of it has not been neglected, there has been constant activity to promote the exchange of knowledge available within Europe and elsewhere. This has, in part, been achieved through an extensive series of symposia, conferences and travelling seminars for senior health staff.

The emphasis is thus on inter-country activities, education, exchange of knowledge and special-purpose courses.

*Europe and the Needs of other Countries*

Europe has vast potential means to assist other areas. Much of this potential is being used, though only a fraction of it is channelled through the Organization. The medical schools and institutions of Europe are thronged with overseas students for advanced or basic studies. The Organization has provided considerable numbers of fellowships for post-graduate studies and some for undergraduate students from newly independent countries which do not yet have a medical
school; the latter face the problem of adaptation to the needs and conditions in their own countries. The special measures taken to deal with the Congo emergency, when France and Switzerland took "assistants médicaux" on WHO fellowships to complete their education as fully qualified physicians, are described elsewhere in this volume (see page 89). Approximately one half of all WHO fellows from all parts of the world study in the European Region during some of the period covered by their fellowships. Many of them take part in regular classes at European post-graduate schools and institutes, but a feature of WHO's regional educational programme is the ad hoc course which gathers in students from other regions also. For example, the anaesthesiology course in Copenhagen, sponsored by WHO and supported by the Danish special contribution to the Technical Assistance component of the United Nations Development Programme, received students from over fifty-nine countries between 1958 and 1967. This programme also provides refresher courses for former students to bring them up-to-date on recent advances, while teachers from the course visit and lecture in some of the countries of origin of the students.

There are also courses designed to train specialists, such as the WHO-sponsored courses in tuberculosis at Prague in English and at Rome in French, or the course on maternal and child health in Warsaw, assisted by UNICEF. WHO also collaborates with the UNICEF-aided International Children's Centre in Paris.

**Co-operation with the United Nations and other Agencies**

In providing assistance to some of its Members, the Organization has had the collaboration of other agencies in the United Nations system, notably UNICEF and the United Nations Development Programme.

Much of UNICEF's aid has been devoted to control of communicable diseases, and it has also provided assistance for training maternal and child health personnel, including nursing and midwife-aids; more recently, wider support has been given for programmes such as the development of public health services in Algeria.

The United Nations Expanded Programme of Technical Assistance, now the Technical Assistance component of the United Nations Development Programme, has frequently co-operated with WHO, notably in projects of environmental sanitation, education for the paramedical professions and of auxiliary personnel, development of basic health services and control of communicable disease.

Three projects financed by the Special Fund component of the United Nations Development Programme were in operation in 1967, with WHO as executing agency: waste disposal and water supply in Malta, the protection of river waters against pollution in Poland, and a master plan for water supply and sewerage for the Istanbul region in Turkey. There have been many opportunities for collabo-
ration with the United Nations, other agencies of the United Nations system, intergovernmental and non-governmental organizations.

EASTERN MEDITERRANEAN REGION

The seventeen Member States and one Associate Member of the Eastern Mediterranean Region, with a total population of almost 250 million increasing at the rate of about 2.5 per cent. a year, have been trying to bring rapid technological advances to bear on social and economic problems that took root thousands of years ago.

Planning

Some countries are starting virtually from zero, still drawing up blueprints of an orderly social growth. Others have already developed comprehensive planning and executive organs to make full use of all available social and economic resources. The formulation of plans for social and economic development has become accepted government practice in most countries of the Region. The preparation of health plans — either long-term prospective plans or a succession of short-term plans — has increasingly become an integral part of normal government activity, though in ways that vary with the administrative practices of each government.

Many governments in the Region have drawn up periodic health inventories to the extent possible. These have included information on existing health services, health institutions, including training institutions, and the major health problems, and a review of resources, both human and material, available for the health services. The governments of some countries (Ethiopia, Iran, Jordan, Libya, Pakistan, Saudi Arabia, Somalia, Sudan and the United Arab Republic) have prepared such inventories, mostly with assistance from WHO.

A critical observation of these developments in many countries leaves open the question whether health plans really form part of an integrated overall national plan. Sometimes the national plan still appears as a mere aggregate of individual sectorial plans developed in isolation and subjected to co-ordination, mainly of a financial nature, at higher levels. The necessary, continuous consultation between health ministries and all other departments concerned with the national plan, not least the top government planning authority, is developing slowly.

Development of Health Services

Attempts have been made to assist in the advanced planning of essential structures through public health advisory services, demonstration and training projects,
pilot areas, rural health services and other activities. Urgent problems of higher priority as well as lack of adequate resources have, however, hampered progress in many instances. This planning is the pre-condition for a satisfactory further development of health programmes and especially for the operation and integration of mass campaigns in the Region. The experience gained during the past decade shows that well organized networks of health services are indispensable as a basis for any short-term or long-term health programme. In many instances the lack of adequately staffed and equipped local health services still constitutes a serious handicap to the sound development even of health programmes and campaigns which, as such, no longer represent a technical problem — for example, smallpox eradication or tuberculosis control.

**Education and Training**

A major obstacle to the development of health services is the lack of trained medical and paramedical staff and their auxiliaries. Particular emphasis has therefore been laid upon assistance in the education of health personnel at all levels. Despite the efforts made to raise, for example, the number of physicians, there are still very wide variations in the physician/population ratio in the several countries. At one end of the scale are countries with ratios of 1:400 or 1:800; at the other end there are ratios of 1:30,000 or less. The regional mean appears to be of the order of 1:4500.

Nevertheless there has been a steady increase in the number of registered physicians in the Region as a whole, although in one or two countries the situation has not appreciably improved, and may even have deteriorated owing to the departure of expatriate physicians.

WHO has helped a number of countries, including Ethiopia, Syria and Tunisia, to establish new medical schools, by providing consultative groups, teaching personnel, supplies and equipment, and fellowships for the training of teaching staff. It has also assisted in reviewing the possibility of establishing new medical schools in Kuwait and Saudi Arabia. Fellowships for undergraduate medical education have been provided for countries without medical schools.

Nursing education in the Region generally has lagged behind medical education, despite strenuous efforts by governments and private bodies. A few figures for the years 1963-1964 will illustrate the current situation. Taking together qualified nurses and midwives, but not assistant or auxiliary workers, the nurse-and-midwife (NM)/population ratio at its best is about 1:980, with a NM/physician ratio of 1.3:1. At the other end of the scale figures are more difficult to assess, but there are some NM/population ratios of 1:22,000, with a NM/physician ratio of 0.5:1. The situation is even worse in two or three countries where there are virtually no fully trained nurses of professional standard. By comparison, many
economically developed countries have a NM/population ratio of 1 : 400 and a NM/physician ratio of at least 2 : 1.

In practice, the situation is less serious than the above figures indicate, because all countries have a large number of nursing auxiliaries of various types, and if these are added to the fully qualified personnel the ratios improve significantly. Using auxiliaries on a large scale is not an ideal situation. The major tasks in this field in the next decade will be to expand the training of fully qualified nurses as rapidly and extensively as possible, and to improve the training and supervision of auxiliary workers.

**Communicable Diseases**

The principle of malaria eradication has been accepted and implemented in a number of countries of the Region. While ten years ago only limited malaria control measures were in operation, today, with the assistance of WHO, nine countries are carrying out full-scale malaria eradication programmes and four countries are in the pre-eradication stage.

The main hindrances to complete eradication of smallpox have been scattered populations, nomadism and periodic migrations. Moreover, the Eastern Mediterranean Region is bordered by some of the highly endemic regions of Africa and South-East Asia. In addition, slow progress in the development of local health services in some countries results in insufficient surveillance and control. Since 1959-1960, when a WHO survey team assessed the smallpox situation, the production of vaccine has been stimulated, fellowships have been granted for training national personnel and eradication projects have been assisted by WHO. Further intensified efforts are needed to wipe out the disease.

Cholera has reappeared in the Region owing to the westward spread of cholera El Tor. On the basis of past experience, governments of countries on the expected line of spread and the authorities responsible for the Mecca Pilgrimage prepared and instituted measures of protection against potential infection. WHO gave assistance in various forms. Over the last ten years the Pilgrimage has remained free of infection, thanks to the efforts of all governments concerned.

National programmes for the control of schistosomiasis have been developed in several countries of the Region and different approaches have been used in each country. WHO has assisted in particular Iran, Iraq and the United Arab Republic, and more recently Libya, in establishing pilot projects for the study of the disease and the development of an effective and economical methodology for its control under local conditions. Elsewhere assistance has taken the form of technical advice or improvement of laboratory facilities and the supply of molluscicides, herbicides and medicaments. Seminars, group meetings and training courses have been organized. Fellowships and research grants have been provided. As
a result, qualified, well trained national staff are now available in each country where this disease is present.

Tuberculosis was among the leading causes of death in the Region, and high priority has been given to control programmes. The discovery of effective and inexpensive drugs made possible the reorientation of national programmes, which previously concentrated on the institutional care of individuals. Despite these technical advances, the control of tuberculosis still remains a serious problem, though many countries have reached a stage where nationwide campaigns can be envisaged.

One element in the effective control of communicable diseases is the existence of efficient laboratory services, both for diagnostic purposes and for the preparation of vaccines. A number of countries have given attention to this subject, and inter-country programmes have been organized, with the assistance of WHO, for laboratory personnel training. For example, in Lebanon a course for training laboratory technician instructors has been running for a number of years.

Environmental Health

The establishment of environmental sanitation services staffed with professional personnel, as a necessary step towards the development of national programmes in this field, has been assisted. But the total number of sanitary engineers in the Region remains small.

The provision of safe drinking-water is one of the major problems. It is estimated that no more than one-third of the population have access to piped water within a reasonable distance of their houses, and these supplies are often intermittent. The remainder must obtain their domestic water from open wells or surface sources, usually highly contaminated. The problem is further complicated by the rapid increase in the population.

Nutrition

Most of the countries of the Region have insufficient food supplies and large population groups vulnerable to malnutrition. The population is young, with high fertility and mortality rates. Nutrition programmes have been developed in a number of countries, with the co-operation of the United Nations Development Programme, UNICEF, FAO, ILO, UNESCO and WHO.

Radiation Health

Finally, the rapid development in the use of sources of ionizing radiation during the past decade has posed problems, here as in other regions. There has been a steady growth of advisory services to national health authorities and institutions
where radiation is in use or being planned, together with training programmes, with particular attention to radiation health protection.

WESTERN PACIFIC REGION

The Western Pacific Region covers a vast area which includes countries and territories showing a considerable variation in environment and standing at varying stages of technological, economic and social development. There are twelve WHO Member States with a total population of roughly 220 million (excluding mainland China).

In Australia, Japan and New Zealand, non-communicable diseases of later life cause the highest mortality. In China (Taiwan), Hong Kong, Malaysia, the Philippines and Singapore, infectious and parasitic diseases continue to be leading causes of death, but degenerative diseases and accidents are becoming important. There is a third group of countries and territories, in which most of the illnesses and deaths can be ascribed to infectious and parasitic diseases.

WHO assistance has, in the main, been directed to the developing countries, which are faced with vast problems and have limited resources. Ten years ago, the governments of these countries still showed a preference for projects from which visible results could be expected quickly. Gradually, however, it became apparent that communicable disease control programmes could never be completely successful unless they were part of a strong health structure. The trend towards integration has gained impetus, but is hampered by lack of funds and personnel and, in some cases, unsettled conditions.

Development of Health Services

The importance of long-range health programming as an integral part of socio-economic development, the necessity for establishing a planning body in the national health administration, and the need for statistical data for health planning and programme evaluation, are now receiving much attention. Emphasis is being placed on realistic planning in terms of manpower needs and resources, taking into consideration projections of population increases and the need both to expand health services and to improve their quality. In nine countries and territories, health plans have been integrated into overall development plans. A number of other countries have included provision for health in national development plans, or have indicated their desire to integrate health planning with the national plan.

The continuing growth of population, the increasing size of the over-sixty age-group in some countries, and the relative rise in the number of chronic patients have increased the demand for some institutional services. There is an evident
need for better planning and use of hospitals, the establishment of adequate health care linked with hospital outpatient departments, the provision of ambulatory medical care and rural health units, the co-ordination of private and public efforts, and the introduction of health insurance schemes.

**Occupational Health**

Rapid industrialization in many countries has brought concomitant health and safety problems. Projects of assistance in this field are either in progress or being planned in six countries. The organization of occupational health services and the need for co-ordination between health and labour authorities have been discussed in two regional seminars organized jointly by ILO and WHO.

**Maternal and Child Health**

In many instances, specialized projects have been used as stepping stones for the building of comprehensive local health services. This is particularly true of maternal and child health activities which, in a number of areas, especially in the South Pacific, have stimulated the development of rural health services. Maternal and infant mortality rates have continued to fall, and there is much closer co-ordination of preventive and curative services for mothers and children. A persistent problem in many maternal and child health programmes is how to reach pre-school children, and a promising development in this connexion is the establishment and regular use of day-care centres. Interest in school health services has increased, and these are now being used for the health education of schoolchildren and, through them, of the families.

The interrelationship between population growth and health has aroused a considerable amount of interest in the Region. A number of countries have undertaken family planning campaigns. In some cases this started as an isolated and independent activity. In others it was linked with the health services, especially with those for maternal and child health.

**Nursing**

Pressure for more nursing care has sometimes resulted in the implementation of unsatisfactory training programmes to meet the demands for more nurses. The need to achieve a balance between the numbers of nurses and the quality of nursing is a problem throughout the Region. WHO is assisting in the development of general nursing education programmes at all levels, patterns of nursing education are being evaluated, and new approaches and methods introduced. Nursing personnel are participating in WHO-assisted projects designed to strengthen public health administration, and in country and inter-country health teams.
Health Education

The Regional Committee at its sixteenth session in 1965 stressed the importance of establishing health education services as an essential and integral part of national health programmes, with professionally qualified health education personnel. Post-graduate courses for health educators have been started in two countries and similar courses are planned in two others. Twenty-one countries and territories now have health education units in their national health services. Inter-ministerial committees have been organized by education and health authorities in a number of countries.

Nutrition

Problems of malnutrition in the developing countries centre chiefly on mothers and children, especially infants. Protein-calorie deficiency, vitamin-A deficiency, nutritional anaemias, goitre, growth retardation, high infant mortality rates and poor patterns of infant feeding have been recognized as the main problems. WHO, together with FAO, has encouraged the establishment of national food and nutrition committees to formulate and co-ordinate priorities and policies. The trend is towards helping governments to develop practical programmes of applied nutrition in which health, education, agriculture and community development are all involved and in which the positive participation of local communities is actively fostered. Programmes of this type are in operation or are planned in eight countries, including one in Fiji sponsored jointly by the Government, FAO, the South Pacific Commission, UNICEF and WHO.

Nutritional concepts and activities are being progressively integrated into health programmes, particularly those concerned with maternal and child health, and introduced in the training of health personnel.

Mental Health

The care of mental patients in many developing parts of the Region is still undertaken by tradition in the close-knit family circle, except in acute cases. With increasing urbanization and lessened family cohesion, however, greater reliance is placed on governmental care facilities, although this is tempered by a preference for community health programmes rather than institutional care. WHO has been conducting epidemiological surveys of mental health, promoting training in mental health nursing, and helping several countries in the study of the mental health problems of urbanization and industrialization.
Dental Health

Although dental care receives a low priority in most of the developing countries, dental epidemiological surveys have been carried out in a number of areas. These have drawn attention to the needs and possibilities for setting up national dental health programmes.

Health Statistics

The lack of reliable health statistics, due to the shortage of adequately trained staff, still remains a major problem in many parts of the Region. WHO is assisting some countries in the overall organization of a statistical service, and others in special aspects, such as hospital and health centre records and statistics.

Environmental Health

Recent outbreaks of epidemic diseases have demonstrated the need for more vigorous and more comprehensive environmental health programmes. The problems are widely recognized, but many continue uncorrected, partly because of lack of funds for the necessary measures. WHO has advised governments on environmental health in general, on water supply and food sanitation, air and water pollution and sewerage, and has assisted training programmes for environmental health staff. Emphasis has been placed on establishing central units to plan, administer and supervise the work. Courses have been organized for various categories of sanitation personnel, including undergraduate and post-graduate courses in sanitary engineering, in four countries.

The improvement of community water supplies and wastes disposal remains a problem in the greater part of the Region. In six of the least developed countries, with a total population of about ninety million, not more than a fifth of the urban population has access to safe water supplies. Construction programmes for individual and community water supplies and sewage disposal system are in operation in a number of places, particularly in the South Pacific area. Pre-investment engineering studies with a view to obtaining long-term loans for the construction of waterworks and sewerage systems are being increasingly undertaken.

Communicable Diseases

There have been significant changes in the prevalence and occurrence of communicable diseases. Cholera El Tor, haemorrhagic fever and plague have either reappeared or shown an alarming increase in incidence; in contrast, smallpox,
yaws, poliomyelitis and rabies have fallen to very low levels. Japanese encephalitis, schistosomiasis, filariasis and other parasitic diseases are problems in certain countries. Measures to combat communicable diseases have been strengthened and immunization programmes are being expanded everywhere. Assistance has been provided in upgrading central and provincial laboratories and in the establishment of epidemiological and health statistics services, which will be responsible for planning and guiding national disease control programmes. The continuing high incidence of certain quarantinable diseases has focused attention on the importance of systematic measures to prevent the spread of diseases from one country to another.

Malaria is still a problem in nineteen out of the thirty-five countries and territories in the Region, its nature and extent varying according to the local environment. WHO is helping five countries with eradication programmes and four others in the pre-eradication stage. Operational and administrative problems continue to hamper some programmes and the lack of efficient local health services to support the eradication programmes is a major handicap.

For tuberculosis, still a most important public health problem, WHO assistance has been given to almost every country and territory either by regional advisory teams or in long-term projects. Governments have accepted the pilot area approach as a means of testing the feasibility and adaptability of modern methods of community-wide control under local conditions. The nucleus of an organized tuberculosis control service and an active BCG vaccination service now exist in almost every country and territory in the Region. Approximately three million vaccinations are being performed each year in the programmes assisted by UNICEF and WHO. Two types of regional courses have been organized: an annual course for tuberculosis workers from all parts of the Region, and one for assistant medical officers in the South Pacific area.

Education and Training

Manpower shortages in most health professions remain a serious issue in many countries of the Region. They are particularly acute in the newly independent and more rapidly developing countries, where demands for improved health services are greatest. Another problem is the loss of trained staff by emigration which is affecting most of the Region, particularly the less developed countries.

An element of training, therefore, is contained in practically all activities receiving assistance from WHO, and many are wholly devoted to education and training. Eight new medical schools were established during the decade, bringing the total in the Region to eighty-three. Strong support has also been given to public health training. Over the decade, WHO has sponsored or participated in
125 group educational activities. The number of fellowships awarded has increased each year, with emphasis on fellows studying in countries with a similar background to their own, within the Region. The improvement of standards of undergraduate and post-graduate medical education was discussed extensively at conferences of deans of medical and public health schools held in 1963 and 1967.

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The following chapters summarize the activities undertaken by the World Health Organization with respect to the health problems outlined above and to other developments in the field of health.
Several elements have exerted influence on the activities relating to the organization of health services. They include the emergence of many newly independent countries, a more informed and demanding public, the cost of health care and the concept of balanced economic and social development.

The Organization has been increasingly called upon to assist the national health authorities in carrying out their responsibility for formulating a detailed national programme covering all the various preventive, curative and other fields, and for seeing that the health sector has a definite place in the overall national development.

There has been a trend towards the reorganization of existing health services, at the central, intermediate and local levels. This has tended to promote the association of originally separate specialized services in an integrated whole, and has in many cases given a powerful impulse to the development of the health service in general.

Reorganization of health services and changes of emphasis in their development are closely associated with the need to evaluate both the technical and administrative aspects of the programmes and the use being made of manpower and financial resources. Operational research programmes and field studies have been related to these developments, with special attention to the needs of developing countries.

This chapter covers activities in the areas of planning, administration of public health, medical care, health laboratory services, occupational health, health education, maternal and child health, nursing and health statistics. The training of manpower is dealt with in the next chapter.

NATIONAL HEALTH PLANNING

Although WHO’s assistance to governments in strengthening their national health services has from the start included advice on health planning, little
consideration was originally given to the relation of the health sector to general socio-economic development. Study of this relationship is, as far as WHO is concerned, a fairly recent development. Much of the early work was done in the Region of the Americas.

The Pan American Health Organization participated in April 1959 in the second meeting of the Special Committee of the Organization of American States, which emphasized that health problems must be considered as fundamental when economic and social development is being planned.

Most of the countries of Latin America have prepared to engage in national health planning as part of their general national development programmes (see also page 15). By 1967 six countries in Latin America had formulated national health plans, and in eleven others the process of health planning had become established as part of the national development effort.

A major difficulty was the lack of methods for measuring health needs and presenting them in a manner comparable with other demands for national investment. Since 1962 an annual three-month course for health planners has been sponsored by PASB/WHO Regional Office for the Americas with the Latin American Institute for Economic and Social Planning in Santiago, Chile, and national health planning courses have received assistance from the Organization.

The Fifteenth World Health Assembly (1962) authorized an accelerated programme for assisting newly independent and emergent States, particularly in Africa, with emphasis on national health planning and the related training. Since then national health planning projects have been undertaken in five African countries — Gabon, Liberia, Mali, Niger and Sierra Leone — with assistance from WHO and financial support from the United States Agency for International Development. WHO provided health planners to act in an advisory capacity, and supporting staff. National health planning committees were set up by the governments and provision made for collaboration with the central planning boards and other governmental agencies.

Five national health plans have thus been drawn up for countries in Africa, and approved and published by the governments concerned. In each case the plan provides for a comprehensive programme which can be implemented with the resources available over a given period — ten or fifteen years — in successive stages. These are outlined in the plan and take into account the characteristics of the country, the state of the existing health services and the health problems requiring priority attention.

To arouse interest in national health planning as a component of economic development, various meetings have been organized. An example was a seminar in Manila in 1964, when participants from fifteen countries or territories in the Western Pacific Region reviewed current practices in the subject and drew up
guidelines for national health planning in their countries, taking into account the resources available for the implementation of the plans.

The choice of health planning as the subject of the technical discussions at the Eighteenth World Health Assembly in 1965 reflected the growing interest of Member States in this field. The wide participation in the discussions confirmed the importance given to the organization and rational deployment of resources in the interests of public health. It was recommended that WHO should institute or support experimental research into the establishment of norms for use in the planning of health services, promote courses of training in health planning and provide guidelines to facilitate planning in developing countries.

These technical discussions were followed by a series of activities concerned with the study of the planning process. In October 1965 an inter-regional seminar on national health planning was held in Addis Ababa to review the experience gained in the five African projects mentioned above. The participants, from countries of the African and Eastern Mediterranean Regions, discussed the possibility of formulating a general policy and methods which might help governments of developing countries in the preparation of national health plans. The final report has been widely distributed.

In 1966 an expert committee on national health planning in developing countries considered the subject under three aspects: the preparation of planning, the elaboration of the plan and planning methods, and training for planning. The committee emphasized the need for training in health planning to be given to all supervisory staff in health departments, and outlined the subjects to be included in the curriculum at different levels.

Following that recommendation, and using the experience gained in the Region of the Americas, a pilot course in national health planning was given in 1967 at the University of the West Indies, Kingston, Jamaica. It included a theoretical part taught by university staff and lasting eight weeks, and a practical part undertaken in Trinidad with the Organization’s assistance.

Collaboration with the United Nations and with other specialized agencies has been sustained, and close liaison has been sought with the more important bilateral and multilateral programmes of assistance to developing countries. The Organization has co-operated with the African Institute for Economic Development and Planning in Dakar, the Asian Institute for Economic Development and Planning, Bangkok, and, through PASB/WHO Regional Office for the Americas, with the Latin American Institute for Economic and Social Planning, Santiago, Chile. It has participated in the general training courses given in the three institutes.

PUBLIC HEALTH ADMINISTRATION

The establishment of permanent, well-staffed and effective health services has been a major aim of WHO's advisory work in public health administration over the last ten years. Strengthening of local health services, the health component of community development, integration of mass campaigns against specific diseases into general health services, urbanization and research on public health practices have been some of the main concerns of the Organization in this field.

The third Expert Committee on Public Health Administration (1959) ¹ discussed the organization and further development of health services at the local level in rural areas. These, often very simple health establishments, need to be linked with larger and better equipped institutions to a centre or centres with hospital facilities and specialist staff where a higher level of services is offered. The pattern obviously varies from country to country, depending on local conditions and social and economic circumstances.

Increasing concern to provide essential preventive and curative health facilities to all the population, especially to inhabitants of the remoter districts where health services are often non-existent, has been reflected in the attention given to the establishment of basic health services to meet the everyday simple needs of the inhabitants. This is in line with the view expressed by the Fifteenth World Health Assembly that: "The creation of a network of minimum basic health services must be regarded as an essential pre-investment operation, without which agricultural and industrial development would be hazardous, slow and uneconomic."

In many parts of the world the development of basic health services, particularly in rural areas, is being extensively supported by UNICEF, which in 1966 provided assistance to over ninety projects of this type. In Latin America the progressive integration of hospital and basic health services is a feature in many programmes — such as those in Brazil, Chile, Ecuador, Guatemala and Venezuela.

Often projects for the improvement of maternal and child health serve as useful nuclei for the further development of local health services. These, as in a recent exploratory attempt in Iraq, Lebanon, Somalia and Tunisia, may include — through appropriate training of personnel — such activities as simple mental health.

In many countries circumstances have brought about a concentration of effort on the control of some particular disease — such as yaws, tuberculosis, smallpox or malaria — through mass campaigns. For permanency of results and economy after the early stages, there is need to rely on the facilities offered by local health services (see Chapters 4 and 5). Such campaigns themselves can serve as a step

towards comprehensive health programmes, and should be progressively assimilated in the general health services. This is generally agreed and has been stressed, notably in the second and third general programmes of work (covering the periods 1957-1961\(^1\) and 1962-1966\(^2\)).

A study group\(^3\) examined the question of integration of mass campaigns into the general health services and underlined the great complexity of the operations involved which exclude the possibility of any general solution.\(^4\) The group outlined two possible approaches — the sequential campaigns and the pre-eradication programme. The latter is being increasingly applied in the case of malaria, an example being the development of basic health services in rural areas within the pre-eradication programme in Togo.

In the other approach, the early stage of a campaign against one disease is followed by surveillance measures undertaken concurrently with activities against other diseases, thus allowing the single-purpose campaign staff to broaden their experience and be fitted gradually for the developing basic health services. The use of yaws surveillance teams for smallpox vaccination and leprosy case-finding is described later (see page 121).

The process of integrating mass campaigns into the health services is going forward in many countries with the advice of WHO and often with strong support from UNICEF. This is the case in Afghanistan, Algeria, Ethiopia, Greece, India, Indonesia, Iraq, Pakistan, Philippines, Senegal, Syria, Thailand and Tunisia.

During recent years WHO has assisted a number of countries — among them Cyprus, Malaysia, Philippines, Sudan and Thailand — to assess their health services and has advised on measures for their reorganization and development. In work of this kind one of the problems is often the lack of basic epidemiological and statistical information on health and the traditional training of personnel without adaptation to local needs and circumstances. This calls for arrangements whereby the health services may engage in studies and may contribute to the education and training of health personnel.

One solution which is explored is that of a health development institute, to be entrusted with such functions. The Organization is helping the Government of Bulgaria in developing the central institute of public health, in Sofia, which is to be concerned with the reorganization of peripheral public health services and with the training of health personnel to meet local needs. This project is supported by the Special Fund component of the United Nations Development Programme.

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The growth of health services has been mostly empirical, based on trial and error, and deeply influenced by tradition. While the need for evaluation is recognized, progress is slow. But methods of operational research are gradually being introduced. The place of WHO in research in this field was discussed by two scientific groups on research in public health practice in 1960 and 1961. Such research was defined by the groups as a continuous function of a health agency to acquire or advance knowledge in the application of medical, social and allied sciences, through scientific studies, for direct utilization in planning, organization and administration of services to promote, protect and restore health.

A community health study was carried out with the Organization's assistance in Northern Ireland (near Belfast), with the object of developing methods for testing the needs of the population as stated by its members or objectively determined in other ways, and of measuring the gap between available services and requirements. This investigation resulted in the drawing up of a list of indicators of community health, of major factors affecting these indicators, and of some medical standards in the provision of public health services.

These preliminary findings are to be applied again in other areas in developing countries to ascertain the validity and feasibility of the method in different local conditions. It should then be possible to work out a methodology and to determine a set of norms for planning community health services on a realistic basis.

The problems, functions and organization of urban health services were discussed in 1962 by an expert committee on public health administration. It examined the preventive and remedial measures which could be taken, with particular attention to the responsibilities of the health authorities in expanding and improving health and sanitation programmes in urban and peri-urban areas.

The problems of city growth in the developing and developed countries, and the various attempts being made to solve them, were reviewed by the Twentieth World Health Assembly in 1967 during the technical discussions on "The challenge to public health of urbanization".

Health cannot be dissociated from community development programmes and broad programmes of social reform which can facilitate national development. WHO has contributed to the work of the United Nations Commission for Social Development in fields relating to health. It has collaborated with the United Nations and specialized agencies, contributing assistance in individual countries and participating in the work of the two regional community development train-

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ing centres which are assisted mainly by UNESCO—one for Latin America, at Pátzcuaro, Mexico, and the other at Sirs-el-Layyan, United Arab Republic, for community development workers from the Arab States.

The Organization has also advised on the health implications of a number of large-scale land settlement and irrigation development programmes (including those involving man-made lakes) which are being sponsored by the Special Fund component of the United Nations Development Programme with FAO as executing agency: the Hari-Rud and Upper Kabul River basin development project in Afghanistan; the Mahaweli Ganga irrigation and hydro-power project in Ceylon; a reclamation and agricultural development project for the Ouémé Valley, Dahomey; the Volta Lake research project in Ghana; the Kainji Dam development project in Nigeria; the Lake Nasser development centre, Aswan, United Arab Republic; and the Lower Mekong Basin development programme (Cambodia, Laos, Thailand and the Republic of Viet-Nam).

A further joint activity under investigation is the possible establishment of pilot comprehensive rural development programmes in selected districts. These would receive technical advice from the United Nations and the specialized agencies concerned, and financial assistance from the Special Fund component of the United Nations Development Programme.

With regard to the health aspects of the United Nations research and training programmes on regional development, WHO has participated in preparatory missions to the areas concerned. Visits have been made to development regions in the following countries: Brazil, Ceylon, Chile, Czechoslovakia, Ethiopia, France, Israel, Italy, Japan, Mexico, the Netherlands, Pakistan, Poland, Saudi Arabia, Syria, the United Arab Republic and Yugoslavia.

As in the past, WHO co-operated with the Trusteeship Council and provided it with observations on health conditions and their improvement in trust territories. In 1965, at the request of the Secretary-General of the United Nations, the Organization conducted a survey of health facilities in the Trust Territory of the Pacific Islands. The report of the survey team was adopted by the Trusteeship Council and many of its recommendations are being implemented. Close co-operation with UNICEF, FAO, ILO and UNESCO, particularly on questions pertaining to basic health services and community development, has continued—for instance in the programme of assistance to Argentina, Bolivia, Chile, Colombia, Ecuador and Peru for the economic, social and health development of the indigenous populations of the Andean highlands. Collaboration with ILO has covered studies on the settlement of nomadic tribal populations. WHO advised on the public health aspects of refugee programmes carried out in Africa under the auspices of the United Nations High Commissioner for Refugees, and for Rwanda refugees in Burundi. It has also continued to be responsible for the technical
direction of the health programme of the United Nations Relief and Works Agency for Palestine Refugees in the Near East.

Assistance in drafting health legislation has also been given to several countries, including Afghanistan, Cyprus and Mali.

*Emergency Assistance to the Democratic Republic of the Congo*

Early in the period covered by this volume, WHO was called upon to take action in exceptional circumstances. In July 1960, following a resolution (S/4405) of the Security Council, the Secretary-General of the United Nations requested WHO to supply emergency assistance in remedying the rapidly deteriorating health situation in the newly independent Democratic Republic of the Congo.

Most of the 761 foreign doctors who had previously formed part of the medical service had left the country. This, together with the breakdown of communications and transport and the consequent failure of supplies to hospitals, had resulted in the virtually complete disruption of medical services in the country. A number of WHO staff members specialized in various aspects of public health were detached from their normal duties and sent to Kinshasa (then Leopoldville).

The WHO mission recommended the following emergency measures which were agreed on by the Government of the Republic: a planning and advisory team to be attached to the Ministry of Health and field staff to be assigned to the areas most affected; emergency medical care teams to be placed at key points in the country; urgent measures to be taken to prevent the outbreak of epidemics, and priority to be given to the training of Congolese personnel at all levels, both locally and abroad.

The WHO adviser to the Minister of Health took up his duties as chief of the advisory team on 31 July. With this team he studied the existing medical services and assessed the needs of the country.

The interrupted medical care services were reinstated thanks to the prompt and excellent co-operation of the International Committee of the Red Cross and the League of Red Cross Societies, which arranged for thirty-three emergency care teams recruited from national Red Cross societies to be made available for work in the Congo. Similar teams were provided by certain governments. In the meantime WHO recruited physicians, sanitary engineers, nurses and X-ray and laboratory technicians — amounting at one time to 200 — to be deployed where most needed. UNICEF placed 119 vehicles and a stock of spare parts at the disposal of the Government of the Republic.

At the request of the Secretary-General of the United Nations and the Government of the new Republic, WHO accepted the responsibility for co-ordinating,
ORGANIZATION OF HEALTH SERVICES

WHO is providing assistance to governments in all the regions in developing health services and in training the necessary staff. The pictures on this and the following pages illustrate aspects of this work.

Domiciliary services: Auxiliary nurse/midwives from Kabul on their rounds in an Afghan village.

Health centres: A mother brings her child for a routine check at a centre in the Congo (Brazzaville).
A nursing instructor in Guatemala demonstrates infant nursing care to students.

In Iran, assistance was given in the development of the Reza Shah School of Nursing in Teheran and of other schools.
WHO assistance in the training of nurses and midwives, for whom the need is especially acute in the developing countries, is often given jointly with UNICEF.

This young Ghanaian registered nurse is to receive further training as a midwife before assignment to a rural health centre.

These Syrian “dayats” (traditional midwives) received modern kits on completing their course in midwifery techniques in a rural health centre set up near Damascus.
DENTAL HEALTH

With assistance from WHO the Royal Dental College, Copenhagen, has given an annual three-month advanced course on child dental health since 1965, for participants from countries in all the WHO regions.

NUTRITION

In many developing countries, basic teaching on diet and food hygiene is being given in the schools. In Paraguay the teachers attend special cookery classes and in turn give cooking lessons to the children.
through the Ministry of Health, the activities of all international personnel concerned with the health of the civilian population.

The operational staff were financed by the United Nations. A special WHO account for assistance to the Congo had been established with the agreement of the Executive Board to facilitate the acceptance of offers of assistance from Members of the Organization.

In the preventive field, the problem was aggravated by a breakdown, particularly in rural areas, in environmental sanitation and in services for the control of endemic and epidemic diseases. WHO provided a number of medical officers and sanitary engineers for work in the provinces, and four mobile health teams, each consisting of a medical officer and a technician, for the rural areas. Apart from an outbreak of smallpox in 1961, major epidemics were prevented.

The most important long-term decision was the priority given to the training of higher medical personnel so that they could assume responsibility for the country’s health services. The emergency fellowships programme for providing complementary training to "assistants médicaux" is described in Chapter 3 (see page 89). In addition WHO assisted with local training programmes in Kinshasa, providing training for seventy-five hospital administrators, sixty-four sanitarians, forty-eight technicians in radiology and eighteen assistants in pharmacy.

By the end of 1967 all responsible posts in the health services had been filled by Congolese medical officers. The operational staff in the provinces are being withdrawn progressively as they can be replaced by qualified Congolese personnel. Assistance to the Congo is now proceeding on the normal basis.

ORGANIZATION OF MEDICAL CARE

The organization of medical care has been greatly influenced in the last ten years by the concept of regionalization of health services, now widely accepted by many countries. With this concept the role of hospitals, placed at nodal geographic and communications centres, increases in importance. They are systematically developed as referral centres for the regions they serve. Their mobile care services are deployed in connexion with preventive programmes, such as those for maternal and child health and for tuberculosis and cancer detection.

In some countries or districts this integration of the hospital in a general health structure implies some limitation of its administrative and financial autonomy. In other cases it leads to a wide degree of co-ordination between social security systems and public health authorities.

The hospital’s place in the health services was discussed by two expert committees, the first (1959) dealing with the role of the hospitals in ambulatory and
domiciliary medical care,¹ the second (1963) with the general practitioner's relation to hospital care and preventive programmes.²

A WHO monograph, published in 1966,³ deals successively with the planning of a network of hospitals, general principles of hospital administration, programming a hospital in relation to site, staff and general lay-out, and finally, planning its main departments.

A general review of the principles of hospital administration was carried out in 1967 by an expert committee which examined a draft comparative study on hospital legislation in fifty-four countries. This shows that the main patterns and essential elements of hospital laws and regulations vary widely throughout the world but have certain common features. The study, after being finalized by the participating countries, is intended to serve as a guide for developing countries which have as yet no legislative framework for hospitals.

Any objective approach to the organization of medical care has suffered hitherto from a lack of comparable data on costs and on utilization of services in various countries. A WHO pilot study in six countries ⁴ with different systems of financing health services and different living standards was followed by a further study of budgets for health in about thirty countries. The latter study was published in 1967.⁵

Another study is in progress to measure the utilization rate of health care services of different population groups defined by their characteristics according to age, sex, socio-economic and educational status. Comparisons are made between two villages in Yugoslavia, several localities in Israel, two areas in Belgium and an industrial town in Canada.

A further study endeavours to discover the factors influencing hospital utilization in the Federal Republic of Germany, Finland, France, Sweden, Yugoslavia, and the United Kingdom, by determining the hospital discharge rate of patients according to age-group, sex, marital status, socio-economic conditions, residence, main diseases, and form of admission and discharge. It may permit the development of a method to assess hospital bed requirements by clinical departments, with a view to planning regionalized hospital networks.

The organization of medical and social services for the elderly was the subject of a number of courses and seminars for participants from countries in the European Region where the care of the rapidly increasing proportion of older people

in the population is giving rise to serious problems. Recent advances in geriatrics, problems of retirement, and factors of daily life, such as diet and recreational activities, that can prevent premature aging, were among the subjects dealt with in these meetings.

Evidence from several countries indicates a growing determination to face in a systematic way the problem of the physically handicapped and their rehabilitation. The concept of rehabilitation as an essential part of the public health services is now widely accepted. Over 400 WHO fellowships were granted in this field during the decade. A European conference on medical rehabilitation, organized by WHO at Copenhagen in 1959, was followed by the establishment of training facilities, chiefly in Denmark, for physicians, instructors in physical therapy and, more recently, other rehabilitation personnel. The organization of rehabilitation services figures prominently in nine inter-country programmes, some of them aided by UNICEF. Schools of physical or occupational therapy have been set up in Algeria, Morocco, and Spain.

Similar trends have also been evident in other regions. WHO is assisting in the development of rehabilitation services in Nigeria, of a centre for poliomyelitis victims in Uganda, and of a training workshop for leprosy patients in Zambia. Schools of physical therapy have been established in three countries of South-East Asia, while a fourth is launching a comprehensive rehabilitation campaign. Concern for the handicapped is evident throughout the Western Pacific Region, where many rehabilitation projects are now active, particularly in China (Taiwan), Japan, Laos, and the Philippines.

HEALTH LABORATORY SERVICES

WHO's main role has been to help countries in planning and developing their laboratory services and in training personnel adapted to the particular national circumstances. Such activities have been implemented in close co-operation with all the other health services in the different branches of curative and preventive medicine at all levels of the health administration.

New areas in which preparatory studies have been undertaken include work risks in laboratories, methods for quality control, and the evaluation of the quantity of work performed in laboratories.

Organization of Health Laboratory Services

Two expert committees (1958 and 1961) considered hospital laboratory services and the organization of a laboratory system at the national level, with
particular reference to the needs of the developing countries. Their reports, together with that of the first expert committee on health laboratory services (1956), provide a useful guide for the preparation of long-term programmes for the expansion of laboratory activities as an integral part of the health services.

Questions of technical, operational and economic importance in the organization of laboratory services were discussed at a seminar for directors of laboratory services in the Western Pacific Region, in Manila in 1960, at seminars in London and Petropolis (Brazil) in 1967, and during the technical discussions of the Regional Committee for South-East Asia in 1966.

The expansion in WHO's activities in the field of health laboratory services is shown by a comparison between 1959, when twelve countries received assistance, and 1966, when assistance was given to sixty-four countries in seventy-five projects concerned exclusively with laboratory activities.

*Training of Laboratory Personnel*

Much of the Organization's work has been directed to training national scientific and technical personnel for laboratory work. To this end a number of fellowships have been awarded (see page 87 and Annex 9), and basic and advanced training has been organized. This has ranged from the training of auxiliaries as laboratory technicians to specialized courses, such as that held in Copenhagen in 1966 for pathologists and biochemists on chromatography and electrophoresis in medicine.

Other specialized training has been assisted under the communicable diseases programme, including two WHO inter-regional courses on immunofluorescence techniques: in English at the Statens Seruminstitut in Copenhagen in 1965, and in French at the Pasteur Institute in Paris in 1967. These provided an opportunity for senior scientists and laboratory workers from thirty-seven countries to exchange views and experience on the application of these modern techniques to diagnosis and research in communicable diseases.

In the Eastern Mediterranean Region two-year courses for instructors of laboratory technicians have been organized in Beirut. In addition to courses for technical laboratory staff, a considerable amount of training in laboratory work has been provided in specialized programmes such as those on malaria, tuberculosis and other communicable diseases. In 1966, for example, such specialized training included two courses in São Paulo, Brazil, on the diagnosis of smallpox, and courses in cholera control for countries in the South-East Asia and Eastern Mediterranean Regions most affected by the spread of that disease.

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Documentation on laboratory techniques has been prepared with the assistance of specialists in different disciplines and published in the WHO Bulletin or distributed in mimeographed form. A syllabus for laboratory technician schools was prepared for French-speaking African countries.

In 1965, an expert committee considered the training of the various categories of laboratory personnel, their recruitment, the minimum basic education required, the duration of training, and the curriculum. It also studied the problem of the redeployment of the numerous microscopists and similar personnel trained in accelerated courses for mass campaigns against certain communicable diseases (such as malaria and yaws). As the surveillance activities of the various mass campaigns are gradually integrated into the health services this personnel provides a useful source of manpower needed for laboratory services.

**Blood Transfusion Services and Haematology**

With developments in medicine, the need for fresh human blood, plasma and blood plasma fractions has increased rapidly.

WHO, working in close co-operation with the League of Red Cross Societies, has given technical assistance to ten countries in the organization of their blood transfusion services and the training of the necessary personnel. A six-month inter-regional course, organized in 1967 at the Institute of Haematology and Blood Transfusion in Budapest, dealt with all the technical aspects of the organization and operation of blood transfusion services, and with the special problem of recruiting blood donors.

By the end of 1967, thirty-two countries were participating in the network of national blood group reference centres working in close co-operation with the WHO International Blood Group Reference Laboratory in London.

WHO has been co-operating with the International Committee for Standardization of the European Society of Haematology in the development of an international terminology for haematology.

**Laboratory Animals**

Since 1962, WHO has been giving its support to the International Committee on Laboratory Animals (ICLA), set up in 1956 by UNESCO with the co-operation of several international scientific organizations, including the Council for International Organizations of Medical Sciences (CIOMS), the International Union of Physiological Sciences, the International Union of Biological Sciences, and the

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International Union against Cancer. ICLA has provided technical assistance to a large number of countries and is co-operating closely with WHO to promote the production of healthy laboratory animals with stable biological characteristics for fundamental and applied research.

OCCUPATIONAL HEALTH

The rapid pace of economic and social development during the last decade has called for particular vigilance because of the harmful effects that sometimes follow sudden changes in working methods and habits. In assisting governments in this sector, the Organization's principal objective has been to promote the prevention of occupational diseases and accidents, and as far as possible to make working conditions not only safe but also conducive to efficiency. Its activities have been closely linked with those of other international agencies, especially ILO.

There is today an increased realization that the direct and indirect costs of occupational diseases and accidents are often an important economic consideration; the occupational illness of comparatively few workers can seriously affect production and thus the livelihood of many; in several industries technological developments are occurring at a rapid rate and more attention needs to be given to the associated non-technical aspects; chemicals are being used without adequate pre-use toxicity evaluation; industrialization may entail migration with its social consequences; many employees who have no previous industrial experience are required to work under potentially dangerous conditions. There is also a growing realization that occupational health stands to gain by close co-ordination or integration with the general health services of a country.

Problems relating to agricultural health, including protection against toxic hazards, occupational diseases and the organization of occupational health in agriculture were reviewed by a joint ILO/WHO committee on occupational health in 1962. WHO organized a European symposium on occupational hazards in agriculture in Milan (Italy) in 1964, and an inter-regional travelling seminar in the USSR in 1965. Participants studied the health problems resulting from the rapid introduction of modern agricultural methods and the type of health services required to deal with them.

An International Medical Guide for Ships, published in 1967, was the first attempt at the international level to bring together in a practical form the three elements of medical care at sea—a medical guide, medicine chests and advice by radio. The guide consists of recommended treatment for various conditions, a

list of the necessary drugs and equipment, and the medical section of the international code of signals to allow a captain to seek medical advice by radio. The outcome of many years' co-operation between ILO, WHO and the Inter-Governmental Maritime Consultative Organization, the guide was discussed by two joint ILO/WHO committees on the health of seafarers (1961 and 1965).

The improvement of health services in international ports was also considered by the same committees and had been discussed at a European regional conference held in Marseilles (France) in 1959. The possibility of establishing at least two pilot health centres in ports in different regions is being studied. An account of WHO's work in administering the Brussels Agreement concerning venereal disease treatment facilities in ports for international seafarers is given in Chapter 4, page 127.

Present-day industry and conditions in general often expose the population to the risk of absorbing harmful substances. A collaborative international study to ascertain the normal values for toxic substances in the human body was therefore undertaken. The investigators, at a meeting in 1965, reviewed the analyses made and suggested international standards of normal values for lead, mercury and arsenic in blood and urine.

A symposium on pneumoconiosis, a serious health hazard for miners and other workers exposed to mineral dusts, was organized at Katowice (Poland) in 1967. In 1963 WHO collaborated with IAEA and ILO in organizing a symposium on radiological health and safety in the mining and milling of nuclear materials. For other work in radiation protection, see Chapter 8, page 263.

The control of the occupational environment requires qualified personnel to assess existing conditions and to recommend corrective measures, and training has therefore been an important part of WHO's programme in this field. Training activities included: in 1958, a joint ILO/WHO regional conference in Calcutta (India) on the training of personnel for industrial health services and the training of industrial management and workers in health and safety measures, and a travelling seminar in England and France for industrial medical officers; in 1959, a course in Alexandria (United Arab Republic) for physicians, engineers and chemists concerned with the supervision of work conditions; in 1960, a study tour in Czechoslovakia for industrial medical officers from European countries, and an ILO/WHO seminar in Tokyo on occupational health services for physicians, engineers and chemists from the Western Pacific Region; in 1961, an eight-week inter-regional course in Alexandria on occupational health, and a joint ILO/WHO seminar at Dun Laoghaire (Ireland) on health services in small factories; in 1962, an inter-regional travelling seminar in Finland, Sweden, the Union of Soviet

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Socialist Republics, and Yugoslavia, when participants studied the development, organization and administration of occupational health services under different economic conditions; in 1964, a course in Zagreb (Yugoslavia) for industrial hygienists from developing countries. Finally, in 1967, an inter-regional course was organized in Bombay (India) on ergonomics for physicians and engineers from Asian, African and European countries.

The basic needs and special occupational health problems of the developing countries were discussed by a joint ILO/WHO committee in 1966. Its report contains practical guidance on the organization of the requisite services, with particular reference to the role of professional and auxiliary health personnel.

Since 1964 the Organization has been concerned with establishing the Institute of Occupational Health and Air Pollution Research in Santiago, Chile (financed under the Special Fund component of the United Nations Development Programme). This institute has already trained nearly 400 students from twelve countries of the Region of the Americas and offers two regular courses, one of six months for engineering technicians and a one-year academic course for physicians and engineers. The Institute is also engaged on developing methods for measuring radioactive contamination resulting from atomic explosions.

WHO is also assisting with projects in occupational health in China (Taiwan), and in Mauritius, and in planning others in Malaysia, the Philippines, the Republic of Korea, Singapore and the Republic of Viet-Nam. In 1967, proposals for assistance in establishing an East African occupational health and hygiene institute — the first in Africa — were under consideration.

During the decade the concept of occupational health has expanded in European countries. The shift of emphasis from the detection of occupational diseases to the preservation and improvement of the workers' health is manifest in a new applied science, ergonomics, which combines biomedical, psychological and engineering skills for adapting the working environment, tools and methods of work to fit the human organism and its functional characteristics. WHO arranged a three-week course in ergonomics in English at Helsinki in 1962, and a similar course in French in 1966 at Zurich (Switzerland). It also sponsored the first Latin American seminar on occupational health in São Paulo (Brazil) in 1964.

Accidents, whether in the home, on the road, or in factories, cause more deaths in some countries than any single illness, cancer and cardiovascular diseases excepted; but they have attracted less attention and been studied less. In 1958 a WHO seminar on the prevention of accidents to children was held in Europe and led to a number of smaller, detailed meetings and studies. A study on home accidents,

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published in 1965,¹ shows that domestic accidents are of increasing importance as a cause of injury and death in most countries. The epidemiology of home accidents is being studied in preparation for a symposium on the prevention of accidents in the home, to be held in 1968.

A study on road traffic accidents was published in 1962.² An inter-regional seminar on the epidemiology, control and prevention of road traffic accidents, held in Alexandria in 1965, called for better co-ordination of preventive work among official and voluntary agencies concerned with road construction, vehicle control, driver training and licensing, safety education and emergency treatment. Accident prevention was the theme of World Health Day in 1961.

A study on noise and its effects on hearing impairment was published in the Public Health Papers series in 1966.³ It deals with noise as a danger to mental and physical health, methods of noise control, and compensation for noise-induced loss of hearing.

HEALTH EDUCATION

A clearer conception is emerging of the role of health education as one of the essential components of both health programmes and general education. The main aim of health education has continued to be "to help people to achieve health by their own actions and efforts".⁴

Several developments have contributed to the trend towards improved health education services within the framework of national health programmes, not least the technical discussions on health education held during the Twelfth World Health Assembly in 1959.⁵

The need for planning health education services as integral aspects of national health programmes was considered at several WHO-sponsored regional meetings. These included technical discussions on health education held in connexion with meetings of the Regional Committee for Africa (1964) and the Western Pacific (1965) (see also page 33), and regional seminars for the Western Pacific Region (Manila, 1966), Eastern Mediterranean Region (Alexandria, 1967) and South-East Asia Region (New Delhi, 1967). Planning and evaluation of health education services was also discussed by an expert committee in 1967.

⁵ WHO Chronicle, 1959, 13, 320-332.
Several government authorities have taken steps to establish or to reorganize health education services in their national health programmes at national, provincial or state levels and have asked for WHO's collaboration. Since 1958, such assistance has been given to health ministries in forty-four Member States.

In the process of developing health education with a view to the more effective use of both preventive and curative health services, the nature and scope of the technical functions of health education services have been broadened. These now include assistance in the planning of the health education components of specific priority projects or campaigns, studies concerning the attitudes and practices of people in relation to health and disease, integration of health education and related social sciences in the training of professional and auxiliary health workers, production of manuals, journals, technical publications, and audiovisual aids, collaboration with educational authorities in the planning of teacher education and of primary and secondary school programmes, and co-ordination with other governmental and voluntary agencies.

Health education has been gradually integrated in mass campaigns and other major programmes assisted by WHO. For instance a manual on health education aspects of malaria was prepared for the use of field project staff and training centres; health education was included in training curricula of WHO-assisted malaria eradication centres in several countries; health educators were assigned to assist in several malaria eradication projects in countries of Central America, in Panama, and in Surinam. Starting in 1967, comparable action was initiated in support of WHO-assisted programmes of smallpox eradication, with a view to enlisting the active co-operation of the people in various national projects. Health education was also integrated into WHO-assisted community water supply programmes in Latin America, intestinal parasite surveys in Afghanistan, leprosy projects in the Republic of Korea, and several applied nutrition projects sponsored by FAO and UNICEF.

WHO has also assisted in developing and strengthening post-graduate training in health education (including related social sciences) for various categories of students attending schools of public health. Such assistance has included fellowships to prepare professional teaching staff in health education, the provision of WHO specialists in health education to serve in the faculties of selected schools of public health on both short- and long-term teaching assignments, and participation in curriculum studies for selected schools of public health, including consideration of minimal admission requirements, the nature, scope and methodology of academic instruction, and suitable types of field experiences.

WHO has also assisted with a health education training course held in France for physicians from eleven European countries, and with a health education train-
ing programme sponsored by the British Society for International Health Education for tutors of auxiliary health workers in East Africa.

In 1963 a working group on the training of doctors in health education, convened by WHO in Copenhagen, advocated special courses for doctors in key positions, orientation courses for other members of the medical profession and the inclusion of health education in the undergraduate medical curriculum.

A travelling seminar (1961) organized by WHO in co-operation with the health authorities of the USSR enabled participants from seventeen countries to study the health education aspects of training programmes and health services in the Soviet Union.

During the past ten years, nearly half of the Member States have established full-time posts for health education specialists who have completed post-graduate studies in public health and health education. Fellowships were provided by WHO, bilateral assistance agencies and voluntary bodies. Most of these health educators work as directors or technical staff members of health education services within health ministries. Others hold teaching posts in faculties of preventive medicine or in post-graduate institutes or schools of public health.

Many governments are progressively raising the required qualifications for senior staff responsible for planning and developing government health education services. The need of countries for at least a limited cadre of well qualified specialists in health education was considered at the PAHO/WHO Inter-regional Conference on the Post-graduate Preparation of Health Workers for Health Education, held in Philadelphia, USA, in 1962. It has now been generally agreed that specialized health education personnel should at least have completed university studies in biology, social sciences, education, or the equivalent, and a full programme of post-graduate public health preparation at an accredited school of public health or equivalent institution, with specialization in health education.

Although some headway has been made in helping governments to prepare qualified persons for technical leadership positions in health education, many health ministries are still handicapped in strengthening the educational component of health services owing to the acute shortage of qualified staff. Nevertheless, some countries, during the initial development of their health education services, have been able to appoint as directors persons with post-graduate training in public health and specialized studies in health education, and also with either an initial medical qualification or university preparation and experience in psychology, sociology, anthropology, biology, or advanced education.

Participants in several WHO-sponsored conferences and seminars have emphasized the need for a more scientific basis for planning the health education aspects

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of preventive and curative health services at various administrative levels. For example, the technical discussions on health education held in connexion with the meeting of the Regional Committee for the Western Pacific in 1965 drew attention to the continuing need for WHO collaboration in stimulating studies and research concerning the beliefs, attitudes, and practices of people in relation to health and disease.

The first two of a series of six monographs, *Review of Research and Studies related to Health Education Practice*, were issued in 1967. These are based largely on recent and current research activities in health education in the six regions of WHO. The series is being prepared, at the instigation of WHO, by a faculty member of Harvard University and published by the Society of Public Health Educators with the co-operation of WHO and the Yale University Press.

Since 1958 WHO has co-operated with the League of Red Cross Societies in its development programme, which has included emphasis on the role of health education in promoting voluntary participation in priority health programmes. The Organization has also participated in conferences sponsored by the International Union for Health Education (Düsseldorf, 1959; Philadelphia, 1962; Madrid, 1965), the International Union against the Venereal Diseases and the Treponematoses (Lisbon, 1965; Munich, 1967) and the International Dental Federation (Paris, 1967).

**Health Education in Schools**

Since 1958, WHO has been working closely with UNESCO in assisting national authorities in education, health and related fields in matters of health education and school health work. Other international agencies, notably UNICEF and FAO, have also been involved, together with several bilateral assistance agencies.

Activities assisted jointly by UNICEF, UNESCO and WHO have included the planning and conduct of international seminars, regional technical discussions, and working conferences; the preparation of a bibliography focused on school health education, and the publication of a UNESCO source book entitled *Planning for Health Education in Schools*, for use in primary and secondary schools and in teachers' colleges. (A preliminary draft of this publication was sent in 1962 for criticism to ministries of education by UNESCO and to ministries of health by WHO; suggestions received from ninety-four countries were taken into account in the final version.)

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In 1967 the Organization also assisted in a discussion of health education in primary schools at the thirtieth session of the International Conference on Public Education, organized jointly by UNESCO and the International Bureau of Education. Educational authorities of ninety-four countries had previously responded to a worldwide inquiry carried out by the International Bureau.

MATERNAL AND CHILD HEALTH

The value placed by modern society on the health and well-being of mothers and children is without parallel in any previous age. Expenditure for the health care of children and of their mothers has come to be considered over the last two decades as one of the most profitable long-term investments a country can make.

While there is general agreement on the principles underlying maternal and child health programmes, their practical application has had to be adapted to the prevailing situation in each region and indeed in each country. A gradual convergence of ideas and practices is, however, discernible, and has received the support and encouragement of UNICEF and of WHO, working in close association.

From the start UNICEF and WHO have co-operated on joint programmes to improve the health and welfare of mothers and children in many parts of the world. Periodically (in 1957, 1959, 1961, and 1967) appraisals have been undertaken of various aspects of this work. The latest appraisal of activities and training programmes in maternal and child health during the years 1960 to 1964 was discussed in February 1967 by the UNICEF/WHO Joint Committee on Health Policy and in June 1967 by the UNICEF Executive Board.

In many developed countries, maternal and child health services have set standards and reached a level at which, in the constant effort to reduce infant mortality, attention can be concentrated on specific problems such as the causes of perinatal mortality and congenital malformations. Problems of child mental health (see also page 217) and accidents, and problems of the pre-school child whose mother is a wage-earner, are among those receiving greater emphasis in child health work. In the sphere of maternal health, the psychological and emotional disturbances associated with pregnancy and child-birth are one of the main concerns. In less developed countries the major problems are still those of communicable diseases, particularly diarrhoea, and malnutrition — as well as those of organizing the minimum necessary services for as many mothers and children as possible at the least cost, and of training personnel.

The steady development of the maternal and child health programmes in developing countries needs careful planning, closely co-ordinated with the entire health
programme and national development plan; and specialized technical guidance is necessary for the balanced development of maternal and child health activities within this framework. In order to give guidance and continuous supervision, many countries have established a maternal and child health unit at national level. Technical assistance and fellowships from WHO for advanced studies abroad are helping these developments. Where health services have spread out towards the periphery the need for technical advice and supervision at intermediate levels is becoming urgent, since maternal and child health aspects of the work are in danger of being swamped by the demand for general curative services.

Evidence of great interest in maternal and child health activities, as well as of differences in emphasis, due to prevailing problems, is found in the technical discussions on these subjects at regional committee sessions. In 1958 the Pan American Sanitary Conference/WHO Regional Committee discussed the prevention of accidents in childhood; in 1964 the Regional Committee for the Eastern Mediterranean considered infantile diarrhoeas and in 1965, school health; in 1966 the Regional Committee for Europe discussed the prevention of perinatal mortality and morbidity. In 1967 three regional committees considered problems related to maternal and child health: in South-East Asia, maternal and child health with particular reference to integration into general health services; in the Western Pacific, integration of maternal and child health and family planning activities into general health services; and in Africa, health problems of the pre-school child.

The coverage achieved by maternal and child health services in their present form is difficult to assess in the absence of reliable records. It has been found that families living beyond a certain distance from a health centre (three or four kilometres in India and six kilometres in Uganda) are unlikely to attend except in an emergency. Inadequate coverage has been recognized in India and plans to set up more sub-centres have been approved. It is estimated that in Uganda 25 per cent. of the population are at present served by medical or health centres and 80 per cent. have one accessible in case of need. In the Eastern Mediterranean Region, it is calculated that in rural areas between 10 and 15 per cent. of children under fifteen years and in urban areas between 15 and 25 per cent. benefit from existing health services. All available data show that the number of women examined during pregnancy and assisted at delivery is increasing.

Maternity Care

The maternity care programme in the economically less-favoured countries has been concentrated on the provision of some degree of prenatal supervision for as many women as possible, including treatment of infectious and other diseases, correction of anaemia and poor nutrition, and the essential health education for
pregnancy. A system of screening those pregnancies most likely to result in complications, necessitating services and attention above the minimum care given to normal pregnancies, is gradually being introduced. Some facilities have been provided, capable of saving lives in complicated and emergency deliveries.

The expansion of midwifery services in many assisted countries and the changing role of the midwife within the framework of modern health services were reviewed by an expert committee on the midwife in maternity care (1965). It surveyed developments in the past decade and discussed the particular contribution of the midwife, not only to maternity care itself, but also to the health of the child and the family. The need for training all categories of midwives, including the traditional birth attendant, was strongly emphasized (see also page 67).

In many countries the teaching of obstetrics and gynaecology is still entirely clinical and limited to the hospital. An expert committee on maternal and child health, in 1963, stressed the need for greater attention to the social aspects of obstetrics and gynaecology in the education of both medical and post-graduate students. By means of fellowships, special courses, seminars, the recruitment of visiting professors of obstetrics, and (as in Uganda and Ethiopia) the establishment of teaching units, WHO’s assistance for the improvement of education in obstetrics has continued.

Child Care

In many countries, services for infants and children of all age-groups have, in the past, commonly developed along two separate lines — prevention of disease on the one hand, and treatment on the other. A new, comprehensive approach to maternal and child health, using all possible contacts with mothers and children as opportunities for preventive, educational and curative activities, was given practical application in a pilot area set up in a rural health district in Panama, with assistance from the Organization, in 1962. During a period of three years, with no increase in manpower resources, infant mortality dropped by 25 per cent. (more rapidly than for the country as a whole) and population coverage doubled.

Another feature of the pattern in developed countries was the concentration of efforts on reducing the high mortality rate in the first year of life. In fact, in countries where economic, social and climatic conditions are not propitious, children after weaning run relatively greater risks of malnutrition and infection than do infants. While in these countries infant mortality rates may be ten times higher than in advanced countries, mortality rates among children between the

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ages of one and four years are from thirty to forty times higher. Services need therefore to be extended to this high-risk group.

Immunization programmes and efforts to relieve malnutrition have been given high priority in maternal and child health activities. In urban areas where maternal and child health services have been improving, the records of completed successful immunizations against the common infections have been encouraging. For example, in the WHO-assisted demonstration and training centre in Tunis, the annual number of combined diphtheria, pertussis and tetanus (DPT) immunizations has been rising steadily. By 1965 about 50 per cent. of the babies born in the area were fully immunized with DPT, whereas in the country as a whole it appeared that only 20 per cent. had received a first injection and only 11 per cent. were completely immunized.

Activities designed to combat malnutrition, concerning both maternal and child health and nutrition workers, included the establishment of rehydration and nutrition rehabilitation centres, and these have increased in number in several countries. Other activities to the same end included education of maternal and child health personnel in special courses and seminars, and of the mothers in centres and at home; the encouragement of community efforts to provide the needed foods, and the provision of protective foods, vitamins and iron preparations through health centres. The inclusion in maternal and child health advisory teams of a public health nutritionist has proved useful.

The high percentage of live births registered as premature led health authorities in some countries to question the international definition of prematurity (a birth weight of 2500 g. or less) adopted by the First World Health Assembly in 1948. In order to ascertain whether this definition was equally applicable to all countries, WHO initiated a study, carried out between 1958 and 1960 in thirty-seven institutions, to collect data on a worldwide basis.

The preliminary findings were presented to an expert committee on public health aspects of low birth weight (1960). An analysis of the first 23,000 births studied presented convincing evidence that many of the new-born babies included within the limits of the definition are born not prematurely but under unfavourable environmental conditions which are of greater importance to child-bearing than was formerly realized. The committee recommended that the concept of "prematurity" in the definition be replaced by that of "low birth weight". This concept has gained acceptance and is currently used in technical publications.

The number of day-care centres for children has multiplied in recent years in several countries, while the concept of day care has broadened. Today these

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centres are used not only to supplement maternal care but also to fulfil other needs, e.g. those of poorly-nourished children.

In Kenya 2600 such centres have been established to cater for some 220 000 children. They form part of a UNICEF-assisted social project to encourage mothercraft, homecraft and community development; WHO collaborates, advising on health aspects.

In 1962, FAO, ILO, and UNICEF participated in a joint UN/WHO expert committee meeting on the care of well children in day-care centres and institutions.1 The committee recommended standards of medical, social and educational services for children. Papers on different aspects of day-centres, prepared for the committee, were later published in the Public Health Papers series.2

To utilize scarce trained manpower and facilities to the utmost and to provide continuity of attention, school health programmes are being developed as part of maternal and child health activities in the general health services.

In Nigeria, part of the duties of health centres is to supervise the health of local schoolchildren, and community nurses receive special training to equip them to examine schoolchildren and to give health talks to pupils. Surveys of primary schoolchildren were undertaken in Ghana and Burundi to ascertain their health status on entering school.

In most countries of the Western Pacific Region there is an established school health programme, which in some countries (in Laos, for example) has developed as a logical sequel to maternal and child health programmes. This development was discussed at a meeting on child health and the school held in Manila in 1961 in co-operation with UNESCO.

A seminar on child health and the school was organized in 1963 for participants from the European Region.

A first step was made towards consideration of the health problems raised by adolescence through an expert committee convened by WHO in 1964.3 The United Nations Bureau of Social Affairs is examining the broad spectrum of youth problems and the means by which some of the most outstanding ones might be met. UNICEF, FAO, ILO, UNESCO and WHO are co-operating in this project.

Training of Personnel for Maternal and Child Health Work

Improvements in maternal and child health in developing countries depend directly on the availability and efficient use of the necessary trained personnel and

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their auxiliaries. At the institute of child health and demonstration and training area supported by UNICEF and WHO in Nigeria, it was found in 1962 that attendance at rural infant care sessions had risen by 70 per cent. in centres staffed by community nurses trained in this project area, but only by 25 per cent. in centres without community nurses.

Assistance was given by WHO to improve the teaching of paediatrics in medical schools and the training of paediatricians or obstetricians to direct the organization of maternal and child health services. Fellowships have been awarded for this purpose for studies abroad in schools of public health and other institutions.

Post-graduate activities included inter-regional advanced courses in paediatrics held in Warsaw in 1964 and 1967; an annual course in paediatrics at the Institute of Child Health, London, for senior teachers; a course in child health and paediatrics in Ankara in 1967, and the courses organized by the International Children’s Centre, Paris — all assisted by UNICEF and WHO. Two permanent bases for such training were set up with the Organization’s assistance in the Region of the Americas: the Departments of Paediatrics and the Schools of Public Health at the Universities of Chile and Antioquia (Colombia). Each centre offers a three-month course emphasizing the social and preventive components of paediatrics for WHO fellows selected annually from paediatric faculty members throughout Latin America.

In 1960 a study tour provided an opportunity for senior administrators of maternal and child health services from seventeen developing countries to observe the planning, organization, administration and operation of such services in the USSR. A report completed during the tour was subsequently published by WHO.¹

At the triennial world congresses of the International Paediatric Association, WHO sponsored “workshops” (or working conferences) and group panel discussions on such subjects as education in paediatrics and nutrition. WHO collaborated with the International Federation of Gynecology and Obstetrics and the International Confederation of Midwives on a worldwide survey of midwifery.²

Attention has recently been directed towards the development of a research programme in the areas of paediatrics, obstetrics and the administration of maternal and child health services. A scientific group on paediatric research met in 1967 to discuss trends and developments and to identify the gaps which could be filled by international co-operation.

NURSING

During the decade, WHO assisted countries in more than 160 nursing projects and gave further help through inter-country nursing projects (see Annex 8). Nurses provided by WHO also worked on over 230 WHO-assisted projects concerned with subjects other than nursing: some fifty nurses on maternal and child health, a further hundred on public health administration, fourteen on mental health, eleven on education and training, fifty on tuberculosis and seven on other diseases. Nurses also participated in about thirty regional projects on other subjects, mostly serving as members of tuberculosis survey and advisory teams in Africa and, to a lesser extent, as participants in regional conferences and courses on maternal and child health and on mental health.

Until recently WHO assistance in nursing was generally related to the establishment or improvement of basic nursing education. Although this type of assistance is still of great importance, especially in developing countries that have no such programme and where existing nursing personnel are inadequately trained, emphasis is increasingly being placed on comprehensive nursing education, on post-basic and advanced education, and on the overall planning of nursing services at state and national level. This type of assistance implies acceptance of a leadership role for nurses in nursing affairs related to the whole health programme of a country.

Advisory Services at National Level

During the decade WHO has increasingly been asked to advise on the planning, strengthening or extension of national nursing and midwifery services and education, and on the development of nursing units at national level. Over twenty-five countries were thus assisted, an indication of the new emphasis on nursing as a professional associate of medicine and public health.

Among countries receiving WHO's assistance in developing nursing services were Afghanistan, Algeria, Cameroon, India and Trinidad and Tobago. WHO nursing advisory assistance contributed to the planning of services in India and Indonesia, for example. Assistance was given to Libya in the planning of nursing services as part of the national health plan, and to Trinidad and Tobago for a nursing survey leading to a draft programme for the complete revision of the system of nursing education. In Paraguay, nurses working at national level with the Ministry of Health participated in 1965 in evaluating the results of a completed two-year plan and in elaborating the plan for the years 1967-1968.
In order to help nurses to determine the nursing needs and resources of a country within the context of health planning as a whole, the development of a guide for national studies of nursing resources is proceeding. This guide covers the broad range of nursing and midwifery services required to carry out health projects and programmes, especially in developing countries where resources are limited and health needs great.

In addition to the reports of expert committees and other meetings issued in the Technical Report Series, five numbers in the Public Health Papers series dealt with different aspects of nursing. The monograph Principles of Administration Applied to Nursing Service has been widely translated, and issued in eight languages—English, Finnish, French, German, Italian, Japanese, Portuguese and Spanish.

Five inter-country congresses in the Region of the Americas, the last of which was held during the decade under review, contributed greatly to the recognition of the value of professional associations in the promotion of nursing and the provision of nursing care.

Basic Nursing Education

Schools of nursing in many countries continue to form part, in some cases a small part, of a system for providing nursing services to hospitals, but the past ten years have shown some interesting trends. Qualifications for admission to nursing schools have been raised, more schools are connected in some way with institutions of higher education, a greater number are directed by nurses and have full responsibility for student training, and physical facilities such as libraries, classrooms, laboratories and student residences have been improved.

Greater co-operation has developed between schools of nursing and the hospitals and health services where additional practice is acquired. Basic curricula have included, to an increasing extent, public health, psychiatric and maternity nursing, together with some preparation and experience for teaching and administration.

In some countries assistance has been given to schools of nursing where students lacked full secondary education. For example, at the school of nursing

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in Niamey, supported under the Special Fund component of the United Nations Development Programme, a new programme was established as part of the national health plan. It prepares both auxiliary and fully qualified nurses; a third category of nurses, selected from among the latter, are given further training as nurse teachers and supervisors.

In 1966 the Expert Committee on Nursing emphasized the need for incorporating the education of nurses, at basic as well as post-basic levels, into the system of higher education of the country concerned as rapidly as conditions permit. Several countries have basic schools of nursing in universities and others are making plans for them.

At the University of Baghdad, for example, a WHO-assisted college of nursing, opened in 1963, offers a four-year basic course leading to a Bachelor’s degree. At the University of Cairo a second school of this kind in the United Arab Republic was opened in 1965 with WHO support; the Higher Institute of Nursing at Alexandria University—which was also established with assistance from WHO—was the first such school of nursing to serve Arabic-speaking countries. Nearly all its nurse graduates are in key positions in their countries.

Post-basic and Advanced Nursing Education

Greater facilities for post-basic nursing education are required as the need for teachers, clinical-nursing specialists and administrators in hospitals, health centres, schools of nursing and ministries of health increases. In the beginning, the simplest course for many countries is to obtain such training abroad, and WHO has assisted with fellowships. But after a certain stage of development, such facilities are needed in the country concerned. WHO has been providing assistance in this connexion.

The post-basic and advanced education programmes established were designed to prepare nurses for leadership roles in the circumstances of their country’s health needs, taking into consideration the cultural and social factors affecting the care of patients, the variety of clinical settings in which nurses serve, staffing patterns, and existing facilities for nurse training.

One of the earliest programmes of this nature was the centre for post-basic nursing education set up with WHO assistance in 1958 at the Institute of Public Health in Tokyo. In India, too, a post-basic degree programme was organized at the College of Nursing, Institute of Post-graduate Medical Education and Research, Chandigarh, and similar facilities are being created in the Universities of Ahmedabad, Bombay and Madras.

The first post-basic programme for nurses in the African Region was established at the University of Ghana, and in Nigeria assistance was given to a post-basic degree programme at the University of Ibadan. Both these institutions receive students from other countries of the Region. In a comparable project for French-speaking students at Dakar, the first two-year diploma course has been planned and will receive its first students in 1968. With WHO assistance a post-basic degree programme was also started in 1967 at Pahlavi University in Shiraz (Iran).

In the European Region assistance was given to two international schools of advanced nursing education: one at the University of Lyons and the other at the University of Edinburgh. Many of the nurses attending these schools have received WHO fellowships.

Post-basic education for nurses studying outside their own countries was discussed at an inter-regional conference held in 1959. Its report provides a guide for nurses who plan to study abroad, for nursing and health administrators who select nurses for such study and for subsequent employment, for faculties of institutions that receive students from abroad, and for agencies that sponsor fellowship programmes for such students. The number of fellowships awarded by WHO for advanced nursing studies, including nursing administration, increased from 113 in 1958 to over 300 in 1966.

Certain other opportunities for advanced training abroad are organized by WHO. One of these, aimed at enlarging the sources of recruitment of WHO field staff, was begun in 1962 to prepare French-speaking nurses and midwives for teaching and administrative positions. The ten nurses trained to date have been assigned to WHO-assisted projects, mainly in the African Region, for the development of basic, post-basic, and in-service education for nursing personnel, and the expansion and improvement of nursing services.

In-service Nursing Education

In 1966 the Expert Committee on Nursing emphasized the need for in-service education and training for all nursing personnel as a means of improving the quality of patient care, and such training is implicit in nearly all WHO-assisted nursing projects. Algeria, Barbados, India, Jordan and Laos are among the many countries where in-service education has been receiving considerable attention. In Jamaica a series of working groups of nursing personnel met to determine how improved staff education could lead to better care of patients. In-service education and clinical practice were among the chief subjects discussed at a seminar on nursing held in Teheran in 1966 and attended by nurse educators and administrators of nursing services from fourteen countries.

Three courses sponsored by WHO with support from the Danish special contribution to the Technical Assistance component of the United Nations Development Programme provided training for eighty-six nurses. The first course dealt with home-care nursing services, the second with nursing services administration and the third with in-service education for nursing personnel. Further activities included a course at the post-basic school of nursing, Colombo, on in-service education for ward sisters; and an inter-country working conference in Thailand for senior nurse educators and administrators, designed to stimulate interest in modern methods of adult education and to help develop guidelines for sound in-service education in hospitals and public health nursing. There was also a travelling seminar on nursing in the USSR in 1966. A guide on in-service education of nursing personnel was prepared.

Midwifery

In many countries there has been a trend towards closer integration of the two professions of nursing and midwifery. This emerges in the training programmes for nurses and midwives. In some countries it is necessary to complete the general nursing course before proceeding to midwifery training. In others a common basic training is given to nurses and midwives, after which they specialize in one or the other profession. In nearly all countries maternity care is now included in the basic training of nurses.

At a conference on midwifery held in Moscow in 1964, participants from seventeen Member States considered the changing pattern of maternity services, especially in relation to developments in public health nursing services, and the effect of these changes on the work and education of midwives and nurse/midwives. In this context an expert committee on the midwife in maternity care (1965) recommended that in countries where the training of midwives is separate from that of nurses the curricula should be co-ordinated at national level so as to shorten the training period of students wishing to qualify in both nursing and midwifery.

Midwifery has been included in most WHO-assisted basic and post-basic nursing programmes, and in some instances provision has been made for training teachers of midwifery. In India, WHO assisted in revising the syllabus and regulations established by the Indian Nursing Council for the training of nurses and midwives, and prepared a guide for nursing and midwifery training to help the staff in implementing the revised syllabus.

In Singapore a countrywide midwifery service and education programme was developed with assistance from WHO; and in the Region of the Americas the

Organization has helped to introduce short courses in nursing for midwives in Argentina, to train midwives as teachers of midwifery in Chile and to improve post-basic courses in midwifery for nurses in Paraguay.

Nursing Auxiliaries

Hundreds of thousands of largely untrained nursing and midwifery auxiliaries are known to be working in health services throughout the world—in Latin America alone they are estimated at 100,000.

A WHO-assisted study in Europe in 1961 showed that in many countries auxiliaries had not been integrated into the nursing service and their training had not followed a systematic plan. The implication of this study was that, if auxiliary nursing personnel were to continue to provide the greater part (about two-thirds) of nursing care—the kind of care which involves the most direct contact between patients and nursing personnel—it was necessary to train this vast category of health workers. The Expert Committee on Nursing also emphasized the need for training auxiliaries to become effective members of a highly integrated team.\(^1\)

The training and use of auxiliaries were dealt with at three conferences—in Delhi in 1958, El Escorial (Spain) in 1962, and in Cuernavaca (Mexico) in 1963, when the need for planning and for legislation on the scope, supervision and evaluation of the work of auxiliary nursing personnel was emphasized. It was also agreed that training programmes were best planned nationally and that the training schools concerned should conform to a uniform level of training in each country.

An important element in WHO's assistance to many countries is the training of qualified nursing staff to provide in-service education for the rapidly increasing number of auxiliary personnel. In some community development areas, for example in Ethiopia, Ghana, India, Kenya, Morocco, Nigeria and Turkey, nurses provided by WHO are advising national nurses in the training of auxiliary nurse midwives.

While experience in teaching and supervising auxiliary personnel forms a part of the preparation of every nurse, and an increasing number of post-basic nursing education programmes includes such preparation, the shortage of teaching staff continues. In order to extend the effective range of the few trained instructors, programmed instruction for teaching auxiliaries is being tried in some countries with assistance from the Organization.

Expanding national health programmes will have to depend quite heavily on auxiliary health workers. These auxiliaries are helping to meet service needs in

both hospitals and public health establishments as permanent and essential members of the team and cannot be considered as emergency personnel, filling gaps caused by inadequate numbers of professionals. A study just completed by WHO in conjunction with three states of India may affect the training programme of future auxiliary nurse-midwives and allow for their more efficient use both for traditional duties and for new ones, such as those connected with family planning programmes.

**Research in Nursing**

Following the meeting in 1963 of a scientific group convened by WHO to identify nursing problems of international significance requiring research, a start was made on the preparation of a methodology for studying the discrepancy between current nursing practice and basic nursing education. In 1966 the Expert Committee on Nursing recommended that research into the improvement of nursing care should be promoted as an essential part of the planning of health services.

In order to stimulate research into nursing practice as a step towards the general improvement of nursing services, several meetings were organized. In 1964, for example, senior nurses from Indian public health and hospital services, at a five-week conference in Delhi, discussed the appraisal of staffing patterns and the application of the methods of study described in *The Staffing of Public Health and Outpatient Nursing Services.*\(^1\) A draft guide was tested in four centres and revised for use in activity studies. In the Western Pacific Region the first regional seminar on staffing (in 1965) enabled senior nurses from seven countries to discuss methods for conducting staff utilization studies in the hospitals and health centres of their own countries. Follow-up consultant services in the countries of the participants have been provided.

In 1966, WHO co-operated with the Northern Nurses Federation in organizing a seminar in Copenhagen on the promotion of research into nursing problems, the preparation of nurses for research, and the utilization of the findings of studies.

The duties of various categories of nursing staff and the range of technical skills required are being examined in order to determine personnel needs and resources and the most effective staffing patterns. Such WHO-assisted studies have been carried out in India and Switzerland, and also in Israel where, following the study, administrative changes were introduced to enable nurses to spend more

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time on the care of their patients. The results of all three studies should lead to
better preparation and utilization of nursing personnel in the health services. WHO has also contributed to the systematic investigation of specific aspects of
nursing, such as the study on psychiatric nursing care in twenty-one European

HEALTH STATISTICS

The planning and organization of health services, and their rational development,
utilization and appraisal, are dependent upon a sufficiency of reliable vital
and health statistics. The continuing general inadequacy of such statistics, despite
improvements achieved in some countries, inhibits progress in many aspects of
public health.

WHO's work in health statistics has followed two main lines of development:
assistance to governments in improving their health statistics, and the use of
sound statistical techniques in research and other programmes sponsored by
the Organization. The publication of international statistics and the develop­
ment of definitions and classifications in order to facilitate greater international
comparability have been continued.

The compilation and computation of statistical data provided by governments
for purposes of studies and research have greatly increased. Some use was made
of electronic computers for statistical analyses from 1960 onwards, but with the
installation of WHO's own computer in 1966 a complete transfer to it of all data
for retrieval and of all mathematical computational work took place. More than
half the work performed on the computer has been in connexion with health
statistics. The computer has provided not only the means for carrying out statisti­
ical operations much more quickly and accurately than before, but has also exten­
ded enormously the possibilities of making studies and analyses that were hitherto
impracticable, because of the time and effort involved.

*Development of Health Statistical Services*

The role of statistics as a central activity of local, national and international
health services has been emphasized at many regional meetings and conferences,
as well as at the technical discussions held in connexion with the Nineteenth
World Health Assembly in 1966. On that occasion the subject was "The collection
and use of health statistics in national and local health services", and it was
stressed that health planning and the effective operation of health services are only possible on the basis of reliable statistics.\footnote{WHO Chronicle, 1966, 20, 301-309.}

The increasing demand by health administrations for reliable statistical information can be met only if each country has an adequately staffed and efficient vital and health statistics service.

Direct assistance to countries in developing their statistical services, in applying international recommendations and in putting statistical principles into practice has therefore been a major activity of WHO in this field; in 1967, thirty-eight WHO-assisted projects on different aspects of vital and health statistics were in operation, as compared with eighteen in 1958 (see Annex 8).

The various stages of development of health services have called for a variety of approaches ranging from advice on specific problems to assistance in reorganizing health statistical services, as in the Philippines, or in the establishment of statistics units in ministries of health or in another governmental body at central level, as in Ghana, Pakistan and some Latin American countries.

However, as the shortage of trained staff at all levels is a major handicap to the development of statistical services, training has been the principal element in the Organization’s assistance.

Training abroad with fellowships (see Annex 9) has been supplemented by help with the development of regional and national training facilities. A case in point is the model vital and health statistics unit in Nagpur (India), completed with WHO assistance in 1960, and now used as a regional training centre in general health statistics and medical coding. In the Americas, courses at intermediate level have been introduced by schools of public health in Argentina, Colombia, Cuba, Jamaica, Mexico, Paraguay and Peru; and the schools of public health at São Paulo (Brazil) and Santiago (Chile) now provide courses at professional level.

Regional seminars and courses have been organized: in the European Region, where facilities for post-graduate training in epidemiology and health statistics were limited in many countries, WHO has sponsored a series of international courses in those subjects in English, French and Russian. In the Western Pacific Region, a seminar on surveys and reporting was organized in Manila in 1963, and courses on vital and health statistics in Manila (1960), Suva (Fiji) (1962) and Wellington (1966). Regional seminars in South-East Asia have dealt with certification and classification of mortality and morbidity (1958), with hospital records (1962), and with health centre records and reports (1967). In the Eastern Mediterranean Region, seminars have been organized for public health administrators in charge of statistical services (1963), and for working statisticians (1965).
Regional meetings have contributed to the development of statistical services by enabling senior statisticians to discuss specific aspects of the subject of particular interest to their countries. In recent years a pattern has developed in the European Region whereby conferences in health statistics are held once every three or four years for discussion of new methodological developments. In addition, meetings have been held on specific topics of current interest, such as that on the application of electronic computers in health statistics and medical research in 1966. Meetings in that region have also dealt with the following: hospital statistics (1958), mortality statistics (1961), teaching of statistics to undergraduates (1962), morbidity statistics (1963), automatic data-processing systems in health administration (1964) and vital and health statistics (1962 and 1965).

An inter-regional meeting on "Training of statistical personnel for work in the health services" is being prepared for 1968 to bring together teachers of health statistics and public health from the African, South-East Asia, Eastern Mediterranean and Western Pacific Regions to discuss the problems of recruitment and training.

The Organization has contributed lecturers on health statistics to international training centres such as that established at Yaoundé by the United Nations Economic Commission for Africa and the International Statistical Education Centre in Beirut.

Hospital statistics provide not only data on the utilization of hospital facilities, but also information on health that is often not otherwise obtainable. In 1962 the Expert Committee on Health Statistics stressed the importance of developing hospital statistics as an integral and basic part of the national statistical programme, defined uses of hospital statistics, suggested some tentative definitions and recommended the minimum general content of statistics programmes which all countries should attempt to carry out.

By the end of 1967, fifty-three WHO-assisted projects had been initiated, in which hospital statistics were the chief subject or figured prominently in conjunction with other fields of health statistics. Several seminars and conferences were conducted by WHO at regional and country levels for personnel working on medical records and hospital statistics. A regional conference on hospital records and statistics was organized in Manila in 1966. In the South-East Asia Region, where the 1962 regional seminar centred mainly on hospital records and statistics, development in this special field has led to hospital in-patient statistics becoming increasingly available. Six countries of the Region have since received WHO assistance in organizing medical records departments, courses have been given for

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medical records technicians in Burma and in Afghanistan, and in-service training has been organized in India, Nepal and Thailand.

A draft manual of hospital morbidity statistics dealing with statistics relating to the patient, and a manual of hospital statistics, covering primarily statistics on hospital beds and their utilization, were prepared for distribution to the National Committees on Vital and Health Statistics.

The system of national committees on vital and health statistics was introduced by WHO in its first decade. These provide not only a channel of technical communication between Member countries and WHO but also a means of intra-country co-ordination among the various national agencies concerned with health statistics. A series of some 230 documents has now been issued to national committees in order to keep them informed of developments in various aspects of health statistics.

National committees in various countries have carried out studies in connexion with the Eighth Revision of the International Classification of Diseases, hospital statistics, and a wide range of other subjects, and have reported their findings to WHO.

Collection and Publication of International Health Statistics

The collection and publication of international health statistics is a continuing activity of the Organization. The past ten years have seen expansion as regards both the number of countries represented in the Organization’s publications of international statistics and the topics covered.

In 1965 the title of the Organization’s annual statistical publication was changed from Annual Epidemiological and Vital Statistics (under which it had been issued since 1948) to World Health Statistics Annual, which corresponds better to the wider range of statistics now presented. The publication is issued in three separate parts — the first volume, giving vital statistics and causes of death; the second, data on infectious diseases (cases, deaths and vaccinations); and the third, statistics on health personnel and health establishments.

Data published in the World Health Statistics Annual are compiled from information made available to WHO by the various countries. Recent data received from individual countries are published in the monthly Epidemiological and Vital Statistics Report, along with detailed information on selected subjects of current interest.

Not only must statistical data be reliable and up-to-date, but they must also be consistent, whatever the country of origin, in order to achieve comparability. Much attention has been given in compiling these volumes to the clarity of classification and to the significance of particular entries or figures. The delay involved
in compiling figures and publishing the results is expected to diminish with the introduction and use of the electronic computer.

In the Region of the Americas, statistical publications have included the annual *Reported Cases of Notifiable Diseases, Health Conditions in the Americas* (published at two-yearly intervals) and two special publications *Facts on Health Problems* and *Facts on Progress*.

Work is progressing on the development of guides, based on national practice, to assist national authorities in the collection of accurate, reliable statistics. Two types of guides are being studied, on notifiable diseases and general morbidity respectively. *A Guide for the Reporting of Statistical Information in the Health Field*, prepared in the Region of the Americas, outlines the procedures developed in that region for collecting information for use in statistical publications of the Organization.

**Statistical Methodology and Studies**

A topic which has attracted the attention of public health authorities in recent years is the use of sampling methods in morbidity surveys and other public health investigations. Permanent nationwide systems of reporting or registration of health data are expensive to operate, and not easy to modify or improve to meet changing needs. Moreover, with the steady prolongation of life expectancy conventional information on causes of death is proving inadequate for the purpose of assessing the state of health of the population. Sampling inquiries provide a more flexible and economic means of obtaining the wide range of statistical data required as a basis for health planning and decision making. They should take their place as an essential part of health statistical services, and are of even greater value in developing countries.

In the European Region, *ad hoc* epidemiological surveys, usually on a sample basis, have proved of value in yielding the required additional information. They call, however, for some re-orientation and greater flexibility in national health statistical services.

Sampling methods in morbidity surveys and public health investigations were examined in 1965 by an expert committee.¹ Technical and organizational problems arising in the planning, execution and evaluation of sample surveys in public health, and the application of automatic data-processing systems were among the subjects discussed.

In order to meet the need for guidance in statistical methods in the field of health, the preparation of appropriate manuals has been undertaken. In addition

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to the monograph on *Statistical Methods in Malaria Eradication*¹ (see also Chapter 5, page 170) two documents, one on statistical analysis of data in schistosomiasis research and the other on the adequacy of sample size, were issued in mimeographed form.

Statistical methodology formed an important element in the international training courses organized by WHO in the fields of malaria eradication, tuberculosis and enteric infections.

Epidemiological studies on treponematoses, malaria, filariasis, tuberculosis, leprosy, diarrhoeal diseases, trachoma, smallpox, cardiovascular diseases, dental health and nutrition were among the projects in which extensive work in statistical methodology was involved. Analyses were also made of data on skin-test trials in schistosomiasis, laboratory and field trials of vaccines and other prophylactic and therapeutic agents, susceptibility tests of insect vectors to insecticides, as well as biological assays for the biological standardization programme. A number of scientific papers were published on these topics.

While WHO has adopted modern computing techniques in its statistical work, it is evident that the results obtained from the computer depend on the completeness and accuracy of the data that are fed in. Thus WHO's primary objective in developing and improving statistical services for both national and international use remains unchanged — to ensure that the basic records are themselves complete and accurate. This in turn requires that those responsible for the provision of the basic records know how these records should be compiled and understand the uses to which they will be put.

A collaborative statistical research programme, the inter-American investigation of mortality, has been carried out in eleven cities in the Americas and one in the United Kingdom. The project was started in 1962 and the field work was completed in 1965. The data collected, relating to over 43,000 deaths, have been analysed and a report on the findings published.²

Two demographic research projects in the epidemiology of population dynamics were undertaken in collaboration with schools of public health in Latin America.

**International Classification of Diseases**

In order to facilitate international comparison of health statistics WHO has continued to develop international statistical standards, definitions and classifications. The International Statistical Classification of Diseases, Injuries and

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Causes of Death has become firmly established for international use and is being followed in many countries, not only for cause of death statistics, but also for morbidity purposes and as a basis for the diagnostic indexing of hospital clinical records. During the period under review, for example, the international form of medical certificate of cause of death was introduced in the new registration system in Burma, and in major hospitals and places with modern registration systems in four other countries of the South-East Asia Region.

The Seventh Revision, which was in use from 1958 to 1967, had been limited to the correction of inconsistencies and to small but essential amendments, but the Eighth Revision,¹ adopted by the Nineteenth World Health Assembly in 1966, introduced major changes and was the outcome of prolonged and intensive work at national and international level.

A number of Member countries established committees to study the Classification as a whole, or particular sections of it. Such committees were set up by Australia, Czechoslovakia, Japan, the United Kingdom of Great Britain and Northern Ireland, the United States of America, and by the USSR in co-operation with a number of other East European countries. In the Americas a regional advisory committee was set up to co-ordinate the revision proposals of the countries of the Region, assisted by the Latin American Centre for the Classification of Diseases established in 1955 to carry out for Spanish and Portuguese-speaking countries functions similar to those performed for English-speaking countries by the WHO Centre for the Classification of Diseases in London in elucidating problems connected with the Classification. The results of these national and regional revision studies were the subject of a series of progress reports issued by WHO to all participants.

The Expert Committee on Health Statistics set up a Sub-Committee on Classification of Diseases, which met in 1961 and 1963 and guided the preparations for the Eighth Revision. At its meeting in 1964, the Expert Committee itself drew these various threads together and issued proposals for the revision of each section of the Classification. These were studied by a large number of countries, whose comments to the Organization resulted in amended proposals to the International Revision Conference in 1965. The Conference’s recommendations, formally adopted by the Health Assembly in 1966, come into effect on 1 January 1968.

**Nomenclature Regulations**

The responsibilities of Member States regarding the compilation and publication of mortality and morbidity statistics had been defined in WHO Regulations

The success of most health programmes is dependent on the active co-operation of the public, and health education holds an important place in much of WHO's work. Schoolteachers at a seminar in the Philippines, which was part of a project assisted by the United Nations, UNICEF and WHO to develop a co-ordinated school health education programme.

Many health authorities are now establishing systematic rehabilitation programmes. In Spain a national programme for the rehabilitation of physically handicapped children was developed with the assistance of UNICEF and WHO.
Industrialization and urbanization have increased the pollution of air and water to levels that often present hazards to health. WHO's role has included the promotion of international collaboration in identifying the most important problems and advice on preventive measures. Such co-operation is particularly necessary in combating pollution of rivers, such as the Rhine, which flow through several countries.

Rhine water before and after purification.
WHO has sponsored many meetings aimed at ensuring adequate protection in the medical uses of ionizing radiation.

A European seminar at Lund, Sweden, in 1965.

COMMUNITY WATER SUPPLY

Safe drinking-water in sufficient quantity is essential to health. WHO assists governments in planning long-term water supply programmes and in dealing with the problem of their financing. The schemes illustrated here for the metropolitan areas of Accra-Tema, Ghana, and Calcutta, India, are among those receiving assistance from the Special Fund component of the United Nations Development Programme, with WHO as executing agency.
A number of travelling seminars have been organized in the USSR to enable participants from all the WHO regions to observe different aspects of its health services. The seminar in August 1966, shown here, was on the organization of epidemiological services and their role in the control of communicable diseases.

Under a WHO-sponsored scheme 144 "assistants médicaux" from the Democratic Republic of the Congo were enabled to continue their medical studies in France and Switzerland. In the foreground is one of these Congolese medical students at the University of Lyons, France, in 1961.

WHO fellowship holders from countries in the Western Pacific Region with their diplomas, after a year's post-graduate training in nursing in Wellington, New Zealand.

Through the award of fellowships and the organization of training schemes, courses and seminars, and in other ways, WHO helps governments to increase the numbers and improve the skills of personnel in the medical and other health professions.
No. 1, adopted by the First World Health Assembly in 1948. These placed great emphasis on the underlying cause of death as the most useful single element in the analysis of mortality. In implementing these regulations many countries realized the need for improving on single-cause tabulations and experimented with various methods of multiple-cause analysis. Several countries came to the conclusion that some flexibility in the Regulations would allow more latitude in these experiments and possibly lead to new concepts in the presentation of mortality statistics. Furthermore, the Regulations contain a number of articles governing such matters as groupings by age, cause, area of residence, etc., to be used in tabulations, and stipulate that any Member wishing to vary these groupings must go through the formal process of lodging a reservation to the article concerned.

The Nineteenth World Health Assembly in 1966 therefore decided to review the Regulations. A draft revision of the Nomenclature Regulations, reducing to a minimum the requirements considered to be indispensable as a basis for international statistical comparability, and introducing the desired flexibility, was prepared for comment by Members, after which a further draft revision was submitted to and adopted by the Twentieth World Health Assembly in 1967.¹

The effect has been to simplify the Nomenclature Regulations. Most of the technical items have been removed and given by the Assembly the status of recommendations under Article 23 of the Constitution, pending the preparation of a compendium of recommendations, standards and definitions to be adopted by the Assembly at a later date.

The emphasis on education and training of medical and other health personnel has been little changed in the successive general programmes of work established by the Executive Board and World Health Assembly, and continuity of effort has thus been assured.

The fourth, and latest, of these general programmes of work, covering the period 1967-1971, provides a summary of objectives: "The education and training of health staff holds for all Member States a universality of interest in that it is basic to their total health endeavours. The programme will continue to cover the undergraduate, post-graduate and specialist fields of medical education, as well as the education and training of nurses, sanitary engineers, midwives, health visitors, health educators, public health inspectors, and all types of auxiliaries, and will reserve for the preparation and improvement of the teacher a very special place, especially in the award of fellowships." ¹

For some of the health professions, information on the patterns of education and facilities available in professional schools throughout the world has been published in directories of medical,² dental,³ and veterinary ⁴ schools, post-basic and post-graduate schools of nursing ⁵ and schools of pharmacy.⁶ A world directory of schools of public health was in press at the end of 1967.

In the collection and checking of the material for publication in these directories the Organization had the benefit of the co-operation of government authorities and of individual institutions. The directories provide a clear picture of the essential elements in education for the health professions and of worldwide trends.

This chapter is concerned principally with education in medicine and public health and with the training of auxiliary health workers. Assistance in the training of members of other health professions — such as dentists, nurses, laboratory

¹ Off. Rec. Wld Hlth Org., 143, 64.
⁵ World Health Organization (1965) World directory of post-basic and post-graduate schools of nursing, Geneva.
technicians, sanitary engineers, health educators, veterinarians — is mainly dealt with elsewhere in this volume, in the sections on the various subjects.

**BASIC EDUCATION IN MEDICINE**

A physician has, of necessity, to be trained abroad if the country itself has no medical school. But a country cannot have sufficient physicians as long as it depends on foreign training alone. Moreover, medical schools contribute to the development not only of the medical profession itself, but also of the other health professions and of public health services generally. The establishment of new medical schools and the strengthening of existing ones have therefore claimed much attention (see pages 81-82).

Attention has also been given to the essential elements of medical education. There is a need for reviewing the curriculum; for adding new material to the extent that old material becomes obsolete; for altering the relative importance of topics; for accepting that the student cannot learn all specialties but needs a good general medical grounding which will prepare him for the type of medical practice that he is likely to encounter and which will enable him, after graduation, to profit from more specialized training.

The first of these aspects was discussed in 1961 at a European regional conference, at which an attempt was made to define the duties of the physician in general practice and to suggest ways of improving undergraduate medical training to meet the demands made on him. Papers presented to the conference, together with summaries of the discussions, were later published in the *Public Health Papers* series.¹ A more comprehensive review of the training of the physician for family practice² was carried out by an expert committee the following year. The growing shortage of general physicians, due partly to the trend towards greater specialization, and the need to reinforce and extend the family doctor service emerged clearly from both these meetings.

The problems inherent in establishing internationally acceptable minimum standards of medical education were analysed in 1961 by a study group which made a number of suggestions, relating principally to the curriculum and to teaching methods, for overcoming the difficulties in attaining such standards.³

On the related question of the recognition and equivalence of degrees, a study was published on legislation governing the practice of medicine in forty countries.⁴

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Two World Conferences on Medical Education were organized during the decade by the World Medical Association with the assistance of WHO, one in Chicago in 1959, on “Medicine — a lifelong study”, the other in New Delhi in 1966, on “Medical education — factor in socio-economic development”.

WHO itself organized regional conferences on the general subject of medical education: at Teheran (1962) for the Eastern Mediterranean Region, at Manila (1964) for deans of medical schools of the Western Pacific Region, and at Yaoundé (1966) for the African Region.

There have been expert committee and regional meetings on specialized topics: for instance, expert committees discussed in 1960 undergraduate teaching of psychiatry and mental health promotion; in 1961 the teaching of genetics in the undergraduate medical curriculum and in post-graduate training; and in 1966 the teaching of immunology in the medical curriculum. Regional meetings included a seminar on the teaching of nutrition in medical schools (in Brazil in 1965) and a European symposium on the teaching of epidemiology and public health (in Brussels in 1967).

The number of articles published on medical education grows steadily. An annotated bibliography, containing reviews of some three thousand articles, was published by WHO in 1958 and abstracts of current literature are now being made available in some regions: in South-East Asia and Europe WHO issues selected articles on medical education, while in the Americas a new quarterly journal, Educación médica y salud, was launched in 1966 jointly by PASB/WHO Regional Office and the Pan American Federation of Associations of Medical Schools.

The inclusion of preventive medicine and public health in the medical curriculum — a subject much discussed since the end of the Second World War — has been considered by expert committees on preventive aspects in the teaching of pathology, the teaching of the basic medical sciences in the light of modern medicine, the promotion of medical practitioners’ interest in preventive medicine, and social aspects in the teaching of obstetrics and gynaecology. Education and training of the physician for the preventive and social aspects of clinical practice

was the subject of the technical discussions at the Sixteenth World Health Assembly in 1963, when the needs and problems of the developing countries received special attention. ¹ Regional meetings included a European symposium on the teaching of the preventive aspects of medicine in medical schools (in Nancy in 1964) and a seminar in the South-East Asia Region (held in Colombo in 1966) on the teaching of preventive and social medicine.

WHO has promoted the teaching of preventive medicine by direct assistance to medical schools. In South-East Asia, visiting professors of preventive medicine were provided to medical schools in Afghanistan, Burma, Ceylon, India, Indonesia and Thailand. UNICEF has co-operated with WHO in supplying equipment to the departments of medical schools to promote, particularly, field training in preventive medicine and hygiene. In India alone, more than fifty departments have been assisted in this way.

Attempts have also been made to promote the integration of preventive medicine into general medical textbooks. ² Publishers of medical textbooks held a small meeting at the end of 1967 at which they confirmed their interest in this suggestion and explored ways of giving effect to it.

With the high sophistication of teaching hospitals, the question arises whether the practical and clinical training of medical students in hospital wards is by itself sufficient. ³ The limitations of the teaching hospital in providing the undergraduate student with the necessary full range of experience were brought out in 1966 by an expert committee which considered the use of health service facilities in medical education, ⁴ with particular reference to the orientation of students in the field of community medicine.

The contributions that university health services might make to the teaching of preventive medicine for medical students was also mentioned by the expert committee which, in 1965, considered the need for such services. ⁵ The general question of health services for students was also discussed at a meeting organized in 1966 for participants from European countries.

The continued increase in the number of medical schools, as reflected in successive editions of the World Directory of Medical Schools, is impressive: there were 533 medical schools in WHO Member States around 1950. By 1960 the figure had risen to 656 and by 1966 to 717, the bulk of the increase having occurred principally in Latin America and Asia. The burden of setting up the new schools has

³ WHO Chronicle, 1964, 18, 423-424.
rested with the countries concerned, but some have received outside assistance and WHO has contributed advice on the establishment of the schools and their organization, visiting professors, fellowships and some equipment. Cameroon, Ethiopia, Kenya, Syria and Zambia are among the countries that have recently received such help.

Some of the new schools had to seek professorial staff abroad and WHO was of assistance in some cases. In addition to individual recruitment, group arrangements were made between a developing school and a well established one, as for instance in the case of the Baroda Medical College and the Edinburgh University Medical School. In other cases, as in India in 1966, teams of medical teachers were assigned to developing medical schools for short periods of up to three months. This arrangement goes some way towards meeting the difficulty of recruiting medical teachers to work for long periods away from their substantive posts.

These, however, are stop-gap measures, and WHO has given much attention and assistance to the training of national teaching personnel (see the following section on post-graduate education).

Assistance to developing medical schools has come from many sources, especially from foundations and from individual governments (from the latter through bilateral agreements). WHO itself has often helped in such arrangements, and has sought to promote general co-ordination. In the Americas, for instance, PASB/WHO Regional Office ensures the functioning of the Medical Education Information Centre, which organizes annual meetings of all assisting agencies and acts as a clearing house for information on medical schools and the assistance provided. At an inter-regional conference organized by WHO in Geneva in 1964, medical education specialists from twenty-one countries and representatives of several donor foundations discussed basic principles of medical education in developing countries, with a view to more effective and co-ordinated assistance in this field.

As the lack of medical textbooks is a difficulty facing students in the developing and some smaller countries, a programme for publishing medical books at low cost and in the requisite languages is being started by the Organization in agreement with Member governments and universities in the Americas.

POST-GRADUATE EDUCATION IN MEDICINE AND PUBLIC HEALTH

The need to widen the scope of advanced education in medicine is reflected in a variety of activities: a European regional symposium on post-graduate medical education was organized in 1963; assistance was provided for post-graduate
courses on such subjects as the application of basic medical sciences to surgery and on advances in clinical biochemistry; specialization in certain disciplines, such as psychiatry \(^1\) (see page 219) was discussed by expert committees; a survey was undertaken of recent legislation on post-graduate specialization in medicine to bring up to date that published in 1957.\(^2\)

The preparation of medical teachers has been the subject of special concern; more than one-tenth of the WHO fellowships have gone to teachers (see section on fellowships, page 87), and courses have been organized for teachers in new subjects. For instance, three courses on the teaching of human genetics were held in Copenhagen (see also page 233). In the South-East Asia Region, annual study tours for medical educators began in 1957 with teachers of pathology and continued until 1965 (1963 excepted), covering in turn the teaching of all the basic medical sciences and of paediatrics.

Not every teacher has an innate ability to transmit his knowledge to students and this skill is usually only acquired after a long apprenticeship. The whole problem of preparation of teachers for medical schools, with special regard to the developing countries where the shortage is most acutely felt, was discussed by an expert committee in 1965.\(^3\)

The improvement of teaching methods was the subject of a number of meetings including, in 1965 alone, an inter-regional conference of medical educators from eighteen countries, a regional meeting on human relations and medical teaching in Chile, and courses on medical teaching methods in Caracas and San Salvador. In the period 1962-1965 a total of 320 teachers from thirty-three countries of the Americas received training in medical pedagogy (human relations and medical teaching). A modest programme of audiovisual aids was started for Latin American countries. In the South-East Asia Region a series of working conferences was held on teaching methods, and a study tour was organized in 1964 to enable deans of medical institutions to visit public health institutes and medical colleges and discuss the organization of curricula and the application of new teaching methods. The Indian Registry of Pathology received help in producing teaching specimens for distribution to medical schools in the Region. To ease the problem of procurement of teaching equipment and supplies, a special revolving fund was set up by the Nineteenth World Health Assembly (see also page 311).

Attention was also paid to the functioning of medical libraries and a third training course for medical librarians from the Eastern Mediterranean Region was held in Geneva in 1966.

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Post-graduate education in public health, including managerial and community research responsibilities, received much attention. Schools of public health are growing in number and, with the increasing sophistication in this field and the diversity in social systems, are developing in widely different ways and at different levels. WHO has endeavoured to foster broad agreement on the key elements of training in public health; on the organization of the curriculum; on a re-emphasis of its contents; on the recognition that public health training should be planned at two levels, basic and advanced, and on the steps towards developing some form of academic recognition of schools or of diplomas of public health.

Post-graduate public health courses were discussed in 1958 by an expert committee, which considered what changes, if any, were required in existing courses to meet more effectively the needs of foreign students. This was followed by a survey of schools and institutions providing such training, which was discussed by a further expert committee in 1960. It recommended a set of requirements which schools of public health should meet, as a step towards reciprocal or international recognition of schools. Such recognition would open to their graduates possibilities of more advanced training elsewhere and would reinforce the perceptible trend towards a wider international basis for training in the health professions.

The types of special training suitable for staff called to senior administrative positions in the health services were examined in 1964 by a study group. Its recommendations cater both for those who have had no previous academic education in public health, and for those who have had such education but would benefit from more advanced or specialized training.

In 1966, directors of schools of public health from some twenty countries (about half of those offering post-graduate education in public health) took part in an inter-regional conference in Geneva. Its report strengthens and elaborates the recommendations made by the preceding series of advisory meetings. It deals with differences and similarities between schools, curriculum content, research, field experience, and programmes other than the basic post-graduate course. It also refers to the question of standards and criteria for accreditation, and the establishment of an international association of schools of public health.

A series of regional meetings contributed to the measure of agreement reached. Conferences of deans of schools of public health in Latin America were held every two years, starting in 1959. Three travelling seminars for deans and professors of North American schools of public health were organized in Europe, the Eastern Mediterranean and Latin America in 1963, 1965 and 1967 respectively.

In Europe, there were meetings of representatives of schools of public health and departments of hygiene and preventive medicine and of schools and departments of tropical medicine and hygiene. Regional associations of schools of public health have been promoted in Latin America, in Europe and in the Western Pacific Region.

WHO’s assistance to individual schools of public health has ranged from the provision of visiting professors, advice on the curriculum and fellowships to assistance in assessing the need for new schools of public health and in establishing them; it has also included help in evaluating the standards of existing schools for purposes of accreditation. Institutions assisted included the High Institute of Public Health, Alexandria, the School of Hygiene, Ankara, the Harvard School of Public Health, Boston, the National School of Public Health, Rennes, France, the School of Public Health, Santiago, and the School of Public Health, Teheran.

Material has been assembled for a world directory of schools of public health which will summarize information on some eighty institutions providing post-graduate public health training in forty countries. Although the situation is changing, the volume shows the elements common to all public health training and the main variations between them.

As will be seen below in the section of this chapter on fellowships, 56 per cent. of the 17,396 fellowships awarded by WHO during the years 1957 to 1966 went to physicians for advanced studies abroad, including attendance at courses organized by WHO. In addition, physicians were the beneficiaries of most of the 6800 special fellowships granted for participation in educational group activities organized by WHO.

TRAINING AUXILIARIES FOR THE HEALTH PROFESSIONS

The economies that can be achieved by a judicious distribution of functions between medical and other health professions, on the one hand, and their respective auxiliaries on the other, were brought out in a study made by the Executive Board in 1963 of the measures for providing effective assistance in education and training to meet the priority needs of developing and emerging countries. The economies are both in the use of trained staff and in the time absorbed in training,

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1 Auxiliaries are paid health workers with less than full professional qualifications in a particular field who assist and are supervised by professional workers. Thus, there may be auxiliaries in medicine, nursing, sanitation and dentistry, and there can be different levels within the broad category of auxiliaries.

by reducing to a minimum the number of persons requiring the longest and most complex forms of higher education.

The personnel needed to carry out mass campaigns against specific diseases has been obtained by training many individuals to carry out very limited health duties. Once the campaigns are over these individuals form a potentially useful source of auxiliary staff for the health services, provided further training is available. The training needed to fit single-purpose health workers for the wider duties of auxiliaries in the general health services was one of the subjects discussed in 1964 by the study group which considered the whole question of the role of mass campaigns in the evolution of the health services.¹

Education and training of health service personnel was the subject of the Supplement to the Second Report on the World Health Situation, presented to the Seventeenth World Health Assembly in 1964. The preparation of this supplement provided the opportunity to bring up to date material on personnel and training, including auxiliaries, in various countries. The data collected were presented schematically to show the relationships of the medical and other health professions and their respective auxiliaries. Auxiliaries to the health professions are not of the same level in all countries even when they have the same essential functions, with primary responsibility in, say, nursing, or pharmacy, midwifery, or in a medical laboratory. They carry different titles in different countries for similar functions, or the same title but quite different responsibilities. WHO has endeavoured to clarify terminology, to review practices, and to draw some conclusions as to the role of auxiliaries and the principles to be followed in their training.

The training of auxiliaries and their part in the public health team have been considered at various meetings. These included an inter-regional conference in Khartoum in 1961, a regional seminar in Manila in 1966 and in the same year a meeting in Mexico City, at which a report on the use of auxiliaries in Latin America was prepared for consideration at the XVII Pan American Sanitary Conference/eighteenth session of the WHO Regional Committee.

Perhaps the most difficult problem with respect to auxiliaries is the type of training to be given to medical assistants who are expected to carry out some simple diagnostic and curative duties, as well as some preventive measures for the most commonly prevalent diseases. Their training should be adequate for the duties entrusted to them but should not be confused with or allowed to lower the standards of proper medical education. Following studies of systems prevailing in various countries, an expert committee reported in 1967 on the training of medical assistants and similar personnel.²

That the need for auxiliary personnel is not confined to the developing countries was brought out at the Twentieth World Health Assembly in 1967, when reference was made to experiments in the United States in training physicians' assistants to perform a number of basic medical services which take the time but not the highest skills of physicians.  

**FELLOWSHIPS AND TRAINING GRANTS, COURSES AND EDUCATIONAL MEETINGS**

As in the first ten years, one of the main methods of assisting governments to train health personnel has been to provide fellowships for study abroad. During the period 1947-1956 WHO had awarded 6379 fellowships. During the following ten years (1957-1966), the total was 17 396, the yearly figures being as follows:

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In 1966 the fellows came from 159 different countries and territories and studied in ninety-three others. (These figures remained practically constant during the whole ten years.) About 60 per cent. of the 17 396 fellows studied within their region of origin and 40 per cent. elsewhere. In the Americas and the European Region more fellowships were awarded for studies within each region, while in the four other regions the reverse was true.

The regular budget financed two-thirds of all WHO fellowships. Twenty-seven per cent. of the total were financed by the Expanded Programme of Technical Assistance (later the United Nations Development Programme), and the balance from other sources. (Fellowships financed by the Pan American Health Organization have not been included.) The monthly stipend rates established for all fellowships granted by agencies related to the United Nations have shown an increase of about 25 per cent.; tuition fees at a great number of universities have increased even more.

Of the WHO fellows 56 per cent. were physicians, 16 per cent. were nurses, 5 per cent. sanitary engineers and sanitarians and 23 per cent. belonged to other types of health personnel or were students. More than 60 per cent. of the fellow-

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ships were granted to persons between 25 and 45 years of age and about 10 per cent. to persons under 25 years, the latter mainly for basic medical studies. The number of fellowships granted to staff of teaching institutions represented between 10 and 15 per cent. of the total, while 3.5 per cent. went to staff of primarily research institutions. Annex 9 shows the major subjects of study.

The average duration of fellowships was six months, but in the European Region the average was only 3.1 months. Fellowships granted to nationals of developing countries tend to be longer.

Especially since 1960, with the advent of many newly independent countries, WHO has given an increasing number of fellowships for basic medical studies, reaching at the end of 1966 about 10 per cent. of the total, including annual renewals for undergraduate studies. This trend has created some new problems of guidance and supervision. The special programme of training organized in 1960 for Congolese fellows gives an example of WHO practice (see page 89).

A system of continuous appraisal of fellowships has been in force since the beginning: a detailed review and appraisal of WHO fellowships awarded during 1947-1957 was discussed by the Eleventh World Health Assembly in 1958; methods and criteria for appraising fellowships were recommended by a study group convened by WHO in 1959 and WHO contributed to a further comparative review of the fellowships awarded in the years 1947-1962 by agencies in the United Nations system. This was prepared for submission to the thirty-sixth session of the Economic and Social Council in 1963.

On the whole, WHO fellows, on conclusion of their studies, are assigned to work corresponding to their training abroad. There are some failures due to difficulties met by fellows on returning home when there has been insufficient planning of the fellowships programme or under-development of the health services; also, some countries have difficulty in selecting candidates really qualified to undertake the proposed studies. Special attention is constantly given to these problems by WHO.

Courses and Educational Meetings

In addition to more than seventeen thousand fellowships awarded for studies abroad during the decade 1957-1966, some 6800 special fellowships were granted to enable holders to participate in group educational activities organized by WHO or with WHO's co-operation — mostly meetings for the exchange of scientific information and the discussion of common problems. There were also a number of group training activities, such as inter-regional, regional or national courses of

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short duration. Details about these activities, totalling over 300 and conducted in many countries throughout the world, are given in Annex 15.

**Research Training Grants**

As mentioned on page 88, a number of WHO fellowships are granted to staff of research institutions. In 1961, WHO also began awarding training grants as part of its programme in medical research (see Chapter 9). In the seven years during which the programme has been in existence, 204 senior grants (to established research scientists) and junior grants (to promising scientists and technically qualified associates) were made to research workers from forty-seven countries. Senior grants are for less than one year, junior grants for up to two years. The distribution of research training grants by subject is shown in Annex 11. The number of awards in each year has increased from eleven in 1961 to thirty-eight in 1967; of the latter about one-third were junior grants. The average cost per grant was approximately $4000.

Apart from the research training grants, the Organization awarded 232 exchange grants between 1961 and 1967 to scientists from forty-four countries. Their distribution by subject is shown in Annex 11. The average cost per grant was approximately $1340.

Since 1960, a number of countries and national organizations have awarded research training grants through WHO.

**Emergency Fellowships Programme for the Democratic Republic of the Congo**

A unique example of the Organization's contribution to the training of a group of professional health workers is offered by the emergency fellowships programme for the Democratic Republic of the Congo.

In July 1960 WHO was requested by the United Nations to take any possible action for the maintenance of the health services in the newly independent Republic. The emergency actions undertaken by WHO in response to this request are described elsewhere (see page 44). One particular problem relevant to this chapter arose from the fact that, along with many other expatriate groups, the majority of foreign physicians had left the country, leaving it bereft of such facilities for medical care as previously existed. The gaps were filled over the next few months on a short-term emergency basis. But the long-term problem remained.

At the time, not a single Congolese doctor had graduated, but about 150 "assistants médicaux" were working in the country. They had had six years' training, including two of practical work. Theirs was a heavy responsibility and
they were sometimes left entirely without direct supervision in running a hospital, practising surgery, obstetrics, internal medicine, etc. The country had also about 1000 “infirmiers” with less training and responsibility.

The “assistants médicaux” offered the hope of a long-term solution, but for this they had to be trained as fully qualified doctors. Possibilities were explored for this training in the Lovanium University in Kinshasa and with French-speaking European countries. It was arranged for a first group of sixty-one “assistants médicaux” to start their studies in the fourth year of medicine in five French universities (Lyons, Bordeaux, Montpellier, Nantes and Rennes). In Switzerland, the Lausanne University Faculty of Medicine accepted another group for the clinical course of study, lasting three and a half years.

In France special tuition was organized to remedy certain gaps in the basic medical knowledge of the “assistants médicaux”. A general counsellor was appointed and also local tutors in the faculties where they studied. The wives of the fellows were offered lessons in home economics and general culture. The children attended French schools and mixed successfully.

At the end of the first year only two fellows failed in their examinations and had to repeat their course. In 1961 a second group of fifty-five “assistants médicaux” started study in the same French universities and in Lausanne. They were followed by a third group of twenty-two who began to study in 1962. A few others started later. Of the 144 former “assistants médicaux” 131 have now qualified and returned home; two died, and two have discontinued their studies; the remainder are expected to return to the Congo shortly as fully qualified doctors. The number of failures has remained minimal.

This success seems to be due to the maturity of the persons selected, the good training and practical experience of medicine they had already acquired, and, not least, to the special attention they were accorded in the faculties which accepted them and the special arrangements made for counselling and tuition. Several of them now hold leading posts in the Congolese health services.

In the meantime the first Congolese doctors have graduated from the Medical Faculty of Lovanium University. WHO has assisted Lovanium in the maintenance of Congolese students. A few fellowships have also been granted for complete medical studies abroad; in addition about twenty “infirmiers” have received fellowships to specialize in laboratory work, X-ray and dental techniques, entomology and pharmacy.

The results of the long-term emergency programme for the Congolese “assistants médicaux” were so satisfactory that it was decided to extend the same facilities to other WHO undergraduate fellows already studying in France and Switzerland. The effect was soon apparent: the studies of these undergraduates have much improved.
FURTHER TRAINING OF WHO PROFESSIONAL STAFF

An international organization such as WHO attracts persons of established technical competence in their own countries to posts of varying responsibility. However, further training is often necessary to enable staff members to achieve their full potential in the service of the Organization, to prepare them for international health work generally and to develop the special skills necessary to carry out the programme of the Organization.

During the first decade provisions for study leave were included in the staff rules and transitional arrangements were made with the Kellogg and Rockefeller Foundations for fellowships for advanced training for selected staff members. Since then staff training as an integral part of the Organization’s activity has developed, as is indicated in the amounts provided in the annual budgets for financing study leave: $30,000 in 1960 (the year it was introduced) and $95,000 in 1967.

Between 1958 and 1967 a total of ninety-one staff members, relinquishing annual leave entitlement and salary, were granted study leave to take courses at universities or other centres, leading in most cases to a master’s degree or a diploma in public health. They included thirty-six medical officers and forty nurses. In addition, between 1960 and 1967, short periods of refresher training were authorized for a further seventy staff members, including thirty-five medical officers, and seven nurses.

A second major step was the organization of training courses at headquarters. Ten such courses, each of six weeks’ duration, have been held since 1962, with a total participation of 120 staff members, mainly WHO representatives, senior regional office staff and senior field officers. Courses covered WHO policy, a refresher element and new aspects of international public health work such as the economics of health, sociology, demography and planning. Courses held in 1967 dealt with systems analysis, operations research, planned programme budgeting and cost benefit analysis; and with the health aspects of population dynamics. A course was organized also in national health planning at the University of the West Indies in Jamaica, dealing with economics, statistics, demography, the behavioural sciences and planning techniques.

Special training in malaria eradication, including eradication techniques, epidemiology, haematology, parasitology and public health administration, was given to 196 professional technical staff at malaria eradication training centres. Advanced training has been provided for French-speaking public health nurses. Similarly since 1962 the University of Naples has provided, with WHO assistance, post-graduate training for French-speaking public health engineers.
A total of 250 staff members, mostly in the professional category and serving at headquarters, attended computer orientation courses. Similar courses were arranged at regional offices. Throughout the decade language courses and group briefing activities were carried out as a routine. The improvement of the briefing of staff has received continued attention.

THE UNIVERSAL PROBLEM OF TRAINED MANPOWER

WHO’s concern about trained manpower has been widely shared with the United Nations, the other specialized agencies and a variety of organizations with differing fields of competence and responsibility. The United Nations General Assembly itself called for a report on development and utilization of human resources. The theme recurs in numerous other instances, such as the studies carried out by the United Nations Advisory Committee on the Application of Science and Technology to Development, the plans outlined for the United Nations Development Decade, and, at the regional level, the first meeting at Addis Ababa in 1964 of the Working Party on Manpower and Training of the Economic Commission for Africa.

Although each agency has its own manpower problems, this common concern has led to growing inter-agency consultation: the Administrative Committee on Co-ordination (ACC) has established a Sub-Committee on Education and Training which has met regularly since 1961. In one year, 1965, WHO participated in meetings which included: the ACC inter-agency Sub-Committee on Education and Training; the UNESCO meeting of Ministers of Education of countries of Asia; the conference on health personnel education and training, East-West Center of the University of Hawaii; the conference on rural health research, Ludhiana, India; and the Conference of the International Association of University Professors and Lecturers, Vienna.

Joint activities include co-operation with the United Nations Development Programme on the education of sanitary engineers, with UNESCO on the training of school-teachers in health matters, with FAO on the organization of courses in nutrition and on the study of veterinary education, with ILO on the revision of the International Standard Classification of Occupations, and with IAEA on training in radiation health. The closest co-operation exists with UNICEF, without whose support many of the WHO-assisted national training programmes could not have been carried out.

Some of the concern of other agencies relates to massive manpower development; this is reflected in the general surveys undertaken to assess a country’s
manpower and education requirements as a preliminary to a comprehensive development programme. The first survey of this kind was organized mainly by ILO and UNESCO in Cameroon in 1962. There was also need for specific manpower surveys in specialized fields, such as health, taking due account, naturally, of the general manpower situation and overall social and economic development plans. Such surveys of health personnel and training facilities were carried out in 1961 in eleven countries of Africa and in 1962 in another six countries. The findings and their implications were discussed at a special meeting held on the occasion of the session of the Regional Committee for Africa in October 1962.

In co-operation with the Milbank Memorial Fund, a conference was held in 1963 to estimate medical education needs in Latin America. A separate, and later, study of health manpower needs in Colombia was one of the reports considered at the International Conference on Health Manpower and Medical Education, held in Maracay (Venezuela) in June 1967. The related question of the “brain drain” has also been studied, for example in a survey of the migration of Latin American health, scientific and engineering personnel. ¹

The Fifteenth World Health Assembly endorsed the Executive Board’s recommendation that one of the chief objectives of ten-year public health programmes undertaken by governments as part of overall plans for accelerated economic and social development should be “to concentrate on the education and training of professional and auxiliary staff for strengthening their health services, with specific measurable targets for expanding each category of staff, depending on predetermined needs for each”.

Sometimes the shortage of personnel is such that action can justifiably be taken without surveys: an example is the special assistance for the training of physicians for the Democratic Republic of the Congo following its accession to independence (see page 89 above).

¹ Pan American Health Organization (1966) Migration of health personnel, scientists and engineers from Latin America (Scientific Publications No. 142), Washington, D.C.
In planning the control of communicable diseases, account must be taken of many factors — the increase in world population and cultivation of virgin lands, rapid and sometimes uncontrolled urbanization, the expansion of international travel and of commerce (including trade in food products of animal origin and animal foodstuffs), as well as disturbed conditions in some areas — all of which have an impact on the ecological situation and on the epidemiological aspects of diseases in many countries.

The last ten years have provided a warning of the persisting and dangerous potentialities of cholera, plague and yellow fever. In addition, new diseases or syndromes have appeared (for example, mosquito-borne haemorrhagic fever), the natural history of some diseases, such as salmonellosis, has changed, and the importance of others has increased (for example, arbovirus infections). The corollary of the successful control and gradual disappearance of some communicable diseases (typhoid fever, diphtheria, poliomyelitis, pertussis, tuberculosis, smallpox, etc.) in developed countries is an increasing danger of their reintroduction from developing countries, especially when immunity is not maintained.

However, mass campaigns and the development of new methods — some with the assistance of WHO — have limited the extent of scourges such as malaria, yaws, poliomyelitis and yellow fever, tuberculosis and typhus. In the field of virus diseases, new vaccines — such as measles and freeze-dried smallpox vaccines — have brought new hope for the future. There have been considerable developments in chemotherapy and chemoprophylaxis. Improved methodology in controlled field trials is permitting better assessment and leading to improvements in techniques — for example, in typhoid vaccination.

The limitations of national systems of notification of communicable diseases are well known. On a worldwide basis, the International Sanitary Regulations deal mainly with the quarantinable diseases (plague, cholera, yellow fever, smallpox, typhus, relapsing fever). A new approach, that of epidemiological surveillance, has been introduced; it aims at providing a broader and more reliable basis for an understanding of the epidemiological situation, for decisions on public health matters and for the planning, implementation and evaluation of control
measures, and a more complete indication of changing patterns in communicable diseases, forecasting epidemic developments.

The Organization has provided various forms of assistance for the training of epidemiologists, who are indispensable for the effective control of communicable diseases. Apart from the award of a large number of individual fellowships, WHO has assisted since 1962 in the organization of a series of special nine-month courses in advanced epidemiology for medical officers from developing countries. These courses, started in 1962 in Edinburgh, have been held in co-operation with post-graduate medical schools in Prague and Zagreb. Since 1966, six months' training in Prague in epidemiology, statistics and control of communicable diseases prevalent in Europe has been followed by three months' practical training in New Delhi in the prevention and control of communicable diseases prevalent in the tropics. In addition, travelling seminars on the organization of epidemiological services and their role in the control of communicable diseases were organized in the Union of Soviet Socialist Republics in 1963, 1964 and 1966.

This chapter reviews progress during the decade in the field of communicable diseases, with reference to activities assisted by WHO in connexion with epidemiological surveillance and the International Sanitary Regulations, smallpox eradication, virus, rickettsial and related diseases, endemic treponematoses and venereal infections, tuberculosis, leprosy and other bacterial diseases, and zoonoses, veterinary public health and food hygiene. Work on malaria, other parasitic diseases and vector control is described in Chapter 5.

**EPIDEMIOLOGICAL SURVEILLANCE**

As applied to communicable diseases, surveillance consists in continuous scrutiny of the distribution and spread of infections, prediction of the development of potentially dangerous situations, and the collection of data of sufficient accuracy and completeness to be pertinent to effective control. It also includes the evaluation of such data and their dissemination to authorities responsible for control measures, but does not embrace actual control.

The new and improved methods that permit this refinement of the old concept of epidemiological intelligence are, in particular, better reporting in respect of specific selected diseases; improvements in statistical processing and analysis of data and the use of laboratories and field studies to supplement basic information on incidence, and to obtain information on the spread and ecology of the infection, on causative agents, animal reservoirs, vectors, etc.
The process implies that rather than waiting passively for reports to arrive, those responsible will reach out for information from various sources, including personal contacts with the professional workers concerned. A corollary is the rapid redistribution of the data collected and analysed by the surveillance service to all who need to be informed.

From its inception, WHO has exercised some surveillance functions with regard to the quarantinable diseases. Increasingly, its work has included surveillance activities for other communicable diseases through its various programmes and expanding network of collaborators, both in the field and in laboratories.

The most interesting development, however, relates to the collection of immunological information. In 1958 a WHO study group on immunological and haematological surveys \(^1\) was convened to advise on the development of multi-purpose surveys, with particular reference to the following aspects: investigation of blood and sera from statistically valid samples of population so that the findings, at least in certain conditions, could be extrapolated to refer to the whole population; investigation of antibodies against different infections to provide information on the past and present exposure of the community; examination of substances other than antibodies, to clarify the epidemiology of non-communicable diseases; and long-term storage of aliquots of sera for future studies.

In 1961, three WHO serum reference banks were established: the World Serum Reference Bank, at Yale University, New Haven (USA), and two regional banks in Johannesburg (South Africa) and in Prague. From the start of their activities, several methodological aspects were studied, especially the influence of various methods of storage of sera on the results of investigation of different types of antibodies. Later, in relation to treponematoses surveys, effective methods were developed for deep-freezing serum collections (see also page 121).

After six years’ work, the Yale Serum Reference Bank had stored 25,000 samples of sera from various parts of the world for future studies, the Prague Serum Reference Bank 60,000, and the Johannesburg Serum Reference Bank 17,000 (until 1965).

Epidemiological/serological surveys of yaws have been developed into broader immunological investigations, and sera obtained in Nigeria, the Philippines, Thailand and Togo by WHO treponematoses epidemiological teams have been used for multipurpose investigations. In 1966 the activities of the Tuberculosis Epidemiological Centre in Nairobi were extended to include other diseases as well as tuberculosis, and the new Epidemiological Centre will play an important part in epidemiological surveillance activities in the African Region.

Antibodies against poliomyelitis, measles, rubella, influenza and other respiratory virus diseases, arbovirus infections, ornithosis, rickettsial infections, pertussis and parapertussis, typhoid fever, treponematoses, toxoplasmosis, African trypanosomiasis, and diphtheria and tetanus antitoxins and antistreptolysin O, etc., have been investigated from more than forty-five countries and territories in Africa, Asia, the Americas and Europe. In addition, in recent years work has begun on the investigation of other aspects of blood samples, such as genetic factors and biochemical changes.

The immunological information thus obtained is valuable not only for confirmation of the reported presence of a disease, but also for assessing needs regarding vaccination and the prevalence of occult infection and for projecting possible future trends in infection.

Reference to surveillance activities on such diseases as influenza, treponematoses, tuberculosis, malaria, smallpox and cholera will be found in the relevant sections of this and the following chapter. To illustrate some aspects of the programme, developments with regard to three other diseases are described below.

**Dengue and Haemorrhagic Fever** (see also page 115)

Surveillance of haemorrhagic fever may be considered as having started in 1964, when a seminar was held in Bangkok. The programme in the South-East Asia and Western Pacific Regions is based on a network of hospitals serving as notification posts, connected with peripheral laboratories and reference laboratories. A minimum of routine investigation is made for every index case. With regard to the vector control aspect, WHO's work on *Aedes aegypti* surveillance includes ecological studies, control trials and the global survey of distribution and densities of *Aedes* (see page 195); the survey permits estimates to be made of the potential for further spread of the disease. Information related to haemorrhagic fever surveillance is disseminated through WHO surveillance reports.

**Salmonellosis** (see also page 146)

Surveillance of this disease was started in 1965 as part of WHO's activities regarding bacterial diseases and veterinary public health. A European network of national reference centres was developed, and linked with the International Salmonella Centre, at the Pasteur Institute in Paris. In 1967 WHO started regular dissemination of the data collected, through surveillance reports.

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Effective salmonella surveillance contributes to early recognition of changing patterns of the infection and prompt adjustment of control measures—for example, in case of appearance of new salmonella types or of an unusually dramatic outbreak caused by an existing type; it may also facilitate international prevention when the spread is due to the importation of an identified type of food.

The expansion of the salmonella surveillance programme in other regions is envisaged, especially in the Americas, where efficient salmonella surveillance already functions in Canada and the United States of America.

Rabies (see also page 150)

The spread of this disease in wild animals in various countries of Europe is causing concern among health and veterinary administrations, and national surveillance programmes have been set up in some countries. In co-operation with FAO and the International Office of Epizootics (OIE), an international programme of epidemiological surveillance has been started, beginning in Europe.

INTERNATIONAL QUARANTINE

The International Sanitary Regulations

The International Sanitary Regulations have continued to govern official action with regard to the six quarantinable diseases: plague, cholera, yellow fever, smallpox, typhus and relapsing fever. The Regulations require continuous attention on account of the problems arising from their application by individual countries and of new developments that make revisions necessary.

The WHO Committee on International Quarantine, which met nine times during the decade, reviews periodically the application of the International Sanitary Regulations and recommends amendments designed to keep them abreast of the changing patterns of international traffic, the progress of science and techniques, the changing epidemiological situation, and the experience gained in the control of the quarantinable diseases. At its latest meeting, at the end of 1967, the Committee recommended a revision of the existing regulations for consideration by the Twenty-first World Health Assembly in May 1968.

Amendments recommended by the Committee at earlier meetings were adopted by the Thirteenth (1960), Sixteenth (1963) and Eighteenth (1965) World Health Assemblies. Some of them had the effect of simplifying the application of the Regulations. For example, the submission of the Maritime Declaration of Health
by a ship on arrival in port from another country is no longer mandatory: the authorities of the country of arrival may now decide whether or not they require such a document. A similar provision applies to incoming aircraft.

Under other amendments, health administrations are required to notify the World Health Organization of imported cases of quarantinable diseases, in addition to cases where infection was acquired in another part of the same country; and health administrations with special problems "constituting a grave danger to public health" may now require a person arriving from another country to give a destination address in writing. A further amendment concerns disinsection of ships and aircraft to prevent the spread of malaria and other mosquito-borne diseases.

The International Certificate of Vaccination or Revaccination against Smallpox was amended to stipulate the use of a freeze-dried or liquid vaccine certified as fulfilling the recommended requirements of the World Health Organization and to record the origin and batch number of the vaccine used. The new form of the certificate became obligatory from 1 January 1967. In 1965 the maximum period of validity of the International Certificate of Vaccination or Revaccination against Yellow Fever was extended from six to ten years.

Other recommendations of the Committee entail no amendments to the Regulations. With regard to malaria, for example, the Committee concluded that for "migrants, seasonal workers and persons taking part in periodic mass congregations" special sanitary measures may have to be taken, but agreed that other international travellers should not be subjected to any special sanitary measures, and that no amendments to the International Sanitary Regulations were needed regarding malaria.

The requirement under the International Sanitary Regulations that every port and airport shall have a supply of pure drinking-water was considered by the Committee, which concluded that "pure drinking-water" should be of a quality not less than that described in International Standards for Drinking-Water,\(^1\) published by WHO in 1958 and revised in 1962.

Certain public health problems relating to air travel, which had been singled out for attention by the Fourth World Health Assembly, were considered in co-operation with the International Civil Aviation Organization (ICAO). They included the protection of the health of air crews at all airports on their route; the control at airports of such diseases as dysentery, food poisoning, gastro-enteritis and malaria; and also the problem of ensuring high standards of hygiene and sanitation at all international airports and direct transit areas, at least on the main trunk routes. Joint action on these matters led to the convening of an expert

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committee on hygiene and sanitation in aviation (1958)\textsuperscript{1} and the publication, after review by the Committee on International Quarantine, of an illustrated Guide to Hygiene and Sanitation in Aviation\textsuperscript{2} for the use of airport personnel.

The development of new methods for the disinsection of aircraft — required under the provisions of the International Sanitary Regulations in respect of yellow fever, malaria and other mosquito-borne diseases — is described on page 200.

The Organization is responsible under the Regulations for both the collection of notifications and the dissemination of epidemiological information. The latter is assured by daily epidemiological radio-telegraphic bulletins transmitted in morse from Geneva. Most telegraphic notifications of quarantinable diseases are transmitted in a WHO Epidemiological Cable Code (CODEPID). The geographical index to the cable code was completely revised in 1966 to take account of the many changes that had occurred since the previous revision, in 1961.

During the latter half of 1961 the responsibilities of the WHO Epidemiological Intelligence Stations in Alexandria, Singapore and Washington were transferred to WHO headquarters in Geneva. Since that time, WHO administration of the Regulations has been completely centralized, with direct communications between WHO headquarters and all health administrations. The Weekly Epidemiological Report of the Singapore Epidemiological Intelligence Station, first published on 1 March 1925, ended with the issue dated 28 December 1961, and the Weekly Epidemiological Bulletin of the Regional Office for the Eastern Mediterranean was discontinued at the end of the same month. The Weekly Epidemiological Report of the Pan American Sanitary Bureau/WHO Regional Office for the Americas, although still published, ceased in 1962 to be used for disseminating information under the Regulations.

The WHO Weekly Epidemiological Record, now in its forty-second year of continuous issue at Geneva, is up-to-date as of Thursday evening and distributed on Fridays by airmail throughout the world. Since 1958 it has contained each week a worldwide list of the infected local areas reported to WHO for each of the quarantinable diseases. This list helps quarantine officers in deciding whether or not to apply sanitary measures to arriving travellers. Current information, designed to facilitate the application of specific provisions of the Regulations (on vaccination certificate requirements of countries,\textsuperscript{3} yellow-fever vaccinating centres,\textsuperscript{4} ports\textsuperscript{5})

\begin{itemize}
\item \textsuperscript{1} \textit{Wld Hlth Org. techn. Rep. Ser.}, 1959, 174.
\item \textsuperscript{2} \textit{World Health Organization} (1960) \textit{Guide to hygiene and sanitation in aviation}, Geneva.
\item \textsuperscript{3} \textit{World Health Organization} (1967) \textit{Vaccination certificate requirements for international travel}, Geneva.
\item \textsuperscript{4} \textit{World Health Organization} (1966) \textit{Yellow-fever vaccinating centres for international travel}, Geneva.
\item \textsuperscript{5} \textit{World Health Organization} (1964) \textit{Ports designated in application of the International Sanitary Regulations}, Geneva.
\end{itemize}
and airports\(^1\) designated under the International Sanitary Regulations), is published separately.

The Singapore Naval Radio Station and other stations in Asia began in the first week of January 1962 to retransmit the worldwide coverage text of the daily epidemiological radio-telegraphic bulletin issued in Geneva. The Abu-Zabal (Cairo) Station retransmitted the Geneva bulletin for the first six months of 1962 until it was ascertained that the States which received the retransmission from Abu-Zabal could easily receive the direct transmission from Geneva.

The second annotated edition of *International Sanitary Regulations* was issued in 1961 and the third (current) edition in 1966. The latter\(^2\) contains the amended text of the Regulations, as in force at 1 January 1966, together with interpretations and recommendations, prepared by the WHO Committee on International Quarantine and approved by the Health Assembly. The volume also contains the text of all reservations made by governments to the Regulations, amended provisions still in force in unamended form for some countries, and other information annexes.

The Organization has continued to advise individual countries or groups of countries on quarantine matters. For example, a regional seminar on international quarantine was organized in Manila during 1967 in view of the concern aroused in the Western Pacific Region by certain quarantinable diseases—particularly cholera and plague—and the fact that the quarantine procedures vary considerably from one country to another. Special emphasis was laid on plague prevention and control, with particular reference to the situation in the Republic of Viet-Nam.

Under Article 104 of the International Sanitary Regulations, special arrangements may be concluded between States having certain interests in common in order to facilitate application of the Regulations. In the African Region, where there has been a growing awareness of the vulnerability of frontier areas to communicable diseases prevalent in neighbouring countries, such an agreement was concluded during 1965 between the Governments of Rwanda and the Democratic Republic of the Congo.

**Quarantinable Diseases**

The following review is based on notifications received and action taken on the six quarantinable diseases with reference to the International Sanitary Regulations. Other information and details of work on these diseases are given elsewhere in this

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chapter; in some instances there are differences between the number of cases notified under the International Sanitary Regulations and those otherwise reported to WHO.

**Cholera** (see also page 140)

In its fifth report, adopted by the Eleventh World Health Assembly in 1958, the Committee on International Quarantine gave its opinion that paracholera due to the El Tor vibrio should not be considered as cholera, a quarantinable disease. Paracholera of the El Tor type had remained an apparently local disease in the Celebes (Indonesia) for many decades. However, as from 1960 it began to appear in other parts of Indonesia, and then spread to other parts of Asia. This led to the convening of the first emergency meeting of the Committee on International Quarantine, in May 1962. Faced with new scientific evidence, the Committee recommended to the Fifteenth World Health Assembly that cholera, under the definition of quarantinable diseases in Article 1 of the International Sanitary Regulations, should include cholera due to the El Tor vibrio.

At the beginning of WHO's second decade it appeared that, except for the endemic area in India and East Pakistan, no other parts of the world had cause to be concerned about this disease. However, in the last decade cases of cholera have been reported by the following States and territories, many of them for the first time in many years: Afghanistan, Bahrain, Brunei, Burma, Cambodia, China (Taiwan), Hong Kong, India, Indonesia, Iran, Iraq, Japan, Republic of Korea, Macao, Malaysia (Malaya, Sabah, Sarawak), Nepal, Pakistan, Philippines, Singapore, Thailand, Republic of Viet-Nam and the USSR. By the end of 1967 the disease had not been reported for several years from most of the newly attacked areas, although it had become endemic in Philippines, Thailand and the Republic of Viet-Nam. Map 2 shows the areas from which cases were reported in 1967. As shown in Chart 1 (page 141) the number of cases reported in the decade has remained low, in spite of the increased number of countries affected.

When cholera appeared after many decades in Iran in 1965 and Iraq in 1966, countries in that area took sanitary measures far in excess of the maximum to which they had agreed under the International Sanitary Regulations. Travellers from cholera-infected countries were prohibited entry by land, sea and air. Airlines, faced with nearly impossible operating conditions, cancelled some flights and re-routed others. Aircraft were subjected to disinfection and disinfestation as a matter of routine. Shipping in the area was partially paralysed. Trade and travel were seriously affected. To help ease the situation WHO convened a conference on international co-operation in the prevention of cholera; held in Ankara early in 1967, it was attended by ministers of health and high-ranking health administrators in countries of the Eastern Mediterranean and European Regions.
MAP 2. REPORTED CASES OF CHOLERA IN 1967

- In a town adjacent to a port or an airport
- Including suspected cases
- Suspected case

Provisional figures based on reports received by WHO by 15 January 1968.
**Plague** (see also page 144)

Plague persists in wild rodent foci in Asia, Africa and the Americas, and occasionally reveals its capacity to attack relatively large numbers of people in these areas. Since 1960 Ecuador and Peru have reported large outbreaks. For the past five years, especially in 1966 and 1967, a considerable increase in cases, including pneumonic plague, has been reported in the disturbed areas of the Republic of Viet-Nam. Infected port cities in that country now present a threat to international shipping.

**Yellow Fever** (see also page 115)

By 1958 the importance of yellow fever had seemingly further diminished. Relatively few cases were reported, and those were jungle yellow fever. But in 1959 an outbreak, with over 100 cases, occurred along the Ethiopian border of southern Sudan, and between 1960 and 1962 there was an exceptionally large outbreak in south-western Ethiopia, causing more than 3000 deaths (one estimate is as high as 15,000 deaths). In an outbreak of urban yellow fever in Senegal, east of Dakar, in 1965, the number of cases reported was 238, with 216 deaths, but the actual number of cases is not known and has been variously estimated at between 2000 and 20,000. In a further outbreak in Ethiopia, near Lake Abaya, in mid-1966, it is estimated that there were 350 deaths.

The areas of Sudan, Ethiopia and Senegal where these epidemics occurred were at some distance from the main international traffic routes. Nevertheless, two of these epidemics were the biggest known in this century, and for some yellow-fever receptive countries this is the most feared quarantinable disease. In Africa urbanization is resulting in additional breeding places for *Aedes aegypti*, and there are inland jungle foci of yellow fever in both East and West Africa which have not been fully studied.

**Smallpox** (see also page 105)

During the decade the total number of reported cases of smallpox generally declined. In the five years 1958 to 1962 the annual average of cases was 124,886, as compared with an average of 78,317 in the succeeding five years (1963-1967). However, because of an unusually high number of cases in India and East Pakistan the total number of reported cases of smallpox reached two peaks — in 1958 and 1963, the total in 1963 being only some 40 per cent. of that in 1958.

As in the past, the large majority of cases (76 per cent.) were recorded in Asia, with some 18 per cent. in Africa, 5.6 per cent. in the Americas, and 0.4 per cent. in

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Europe. For the Western Pacific Region there have been few notifications of smallpox: in the Republic of Korea in 1958, 1960 and 1961; in Malaya, because of imported infection, in 1958, 1959 and 1966; and in Singapore in 1958 and 1959.

By the end of 1967 fifteen countries which had reported smallpox at the beginning of the decade had remained free of the disease for four or five years. These countries—except for Lesotho—were not those which had previously reported large numbers of cases.

In Africa smallpox is usually transmitted between countries by land traffic, in Europe by air from Africa and Asia, in the Americas by land or air, and in Asia by shipping.

**Typhus and Relapsing Fever**

With the advent of effective insecticides, louse-borne typhus and relapsing fever have continued to lose in importance as diseases of international significance and sanitary measures against typhus in international traffic are rarely applied. In 1958 over thirty countries reported cases of typhus as compared with only ten in 1967; Bolivia, Burundi, Ecuador and Ethiopia regularly report the largest number of cases. In the past decade relapsing fever has been essentially confined to Ethiopia, where an average of some 4700 cases are reported annually.

**SMALLPOX ERADICATION**

No infectious disease has been universally regarded with so much concern as variola major, and most countries have conducted some form of vaccination programme for decades. At the beginning of WHO's second ten years, virtually all the more developed countries had eliminated endemic smallpox, but none had been able to relax its vigilance to prevent reintroduction of the disease.

In 1958 the Eleventh World Health Assembly unanimously adopted a resolution initiating a worldwide programme for the eradication of smallpox. The Assembly noted that “funds devoted to the control of and vaccination against smallpox throughout the world exceed those necessary for the eradication of smallpox in its endemic foci and consequently the destruction of the sources from which the infection arises and spreads”, and that “the eradication of smallpox might in future make vaccination and all expenditures involved in its application redundant”.

It was evident from the success of campaigns already carried out in both developed and developing countries that the programme was wholly feasible from the
technical standpoint. The objective of the new programme was to maintain the smallpox-free status of all countries already free of the disease, while intensifying existing vaccination efforts in the endemic regions. WHO endeavoured to provide technical assistance and guidance to the programme without an increase in resources under the regular budget. A special account for smallpox eradication was established, and voluntary contributions were requested. However, the response was limited.

During the two years following the initiation of the eradication programme, WHO provided teams of experts to carry out surveys of existing activities in preparation for the planning and development of eradication programmes in different countries; pilot projects were developed in sixteen areas in India; technical advice and assistance were provided in connexion with laboratory work and the production of freeze-dried vaccine, and fellowships were granted for studies in this important field; national campaigns were developed or extended in seven countries of South America. Equipment for the production of freeze-dried vaccine was provided by UNICEF to a number of institutions in various countries.

Eradication efforts were intensified during the period 1960-1965. Programmes were initiated in Afghanistan, Burma, Nepal, Pakistan, Saudi Arabia, Sudan, Thailand, and Yemen, and in several countries in the African Region and the Americas. WHO provided personnel and other forms of assistance for several of these programmes. Mobile teams conducting treponematoses surveys and resurveys in smallpox endemic areas — for example, Cambodia, Chad, Haiti, Niger, Nigeria, the Philippines, Sierra Leone, Thailand and Togo — included in their activities vaccination against smallpox. With the continuing decline in the prevalence of yaws, field teams were able to turn their attention increasingly to smallpox vaccination, and between 1958 and 1965 alone some 40 million smallpox vaccinations were administered by these teams. The Union of Soviet Socialist Republics provided over 500 million doses of freeze-dried vaccine to India and to other countries in Asia and Africa, and several other countries also made donations of vaccine for the worldwide programme; considerable financial support to the programme in India was provided by the United States of America.

WHO organized conferences and training courses dealing with various aspects of clinical and laboratory diagnosis of smallpox, methods for the development of eradication programmes, and measures to prevent the passage of the disease across frontiers.

The development of the eradication programme was reviewed in 1964 by an expert committee which stressed the importance of international and regional co-operation and the need for independent evaluation of all national vaccination
COMMUNICABLE DISEASES

programmes. The Committee also made recommendations on various technical aspects — for example, in connexion with vaccination methods and vaccines. In particular, it considered that the use of freeze-dried vaccine was essential in hot climates and where communications were difficult.

The Organization has provided technical assistance and fellowships for the development of vaccine production facilities in several countries in Africa, Asia, Oceania and Latin America. Freeze-dried smallpox vaccine is now being produced at three centres in the African Region, and preparations have been made for its production in Guinea and Senegal. UNICEF has provided eleven laboratories in different countries in Latin America with equipment for producing freeze-dried vaccine sufficient to meet the needs of those countries and of the Region of the Americas as a whole. Although freeze-dried vaccine is rapidly becoming the only vaccine in use throughout the endemic countries of South-East Asia, many laboratories continue to be faced with problems of vaccine quality.

The incidence of smallpox declined somewhat (see also page 104). In 1958, 279,000 cases had been reported from all parts of the world. The number fell to 81,000 in 1959, but rose again to a peak of 123,000 in 1963. Of the countries where smallpox had been endemic in 1959, comparatively few had achieved smallpox-free status by the end of 1965. Considerable progress had been achieved in Bolivia, Cambodia, Ecuador, Iran, Iraq, the Republic of Viet-Nam, Saudi Arabia, Senegal, Sudan and Thailand. However, in Peru — once free of the disease — endemic smallpox had been re-established.

Failures in the various programmes were largely attributable to lack of transport and personnel and to inadequate supplies of freeze-dried vaccine. In several programmes better planning and more effective supervision of the vaccinators and vaccination teams were required. In only a few instances had attention been devoted to the development of adequate systems for surveillance and assessment, with the result that failures and weaknesses were not being detected and corrected. In one country, smallpox had been reintroduced and become well-established before being detected, owing to lack of an adequate surveillance system, and a repeat programme of systematic vaccination on a national scale had to be initiated.

There was also clearly a need for a co-ordinated inter-country effort, on account of the movement of tribal groups, nomads and traders across international boundaries, and increasing international traffic of all kinds.

In 1966 new impetus was given to the eradication programme by the decision of the Nineteenth World Health Assembly to intensify the global effort and increase the Organization’s participation — to be financed from its regular budget — including technical guidance, the training of national personnel and the purchase of

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equipment and supplies (such as vehicles, vaccination instruments, camping equipment and health education materials). It was considered that an intensified and co-ordinated global effort, commencing in 1967, could eradicate the disease over a period of ten years. However, this would require substantial additional international support in the form of voluntary contributions to the Special Account for Smallpox Eradication, and other multilateral and bilateral assistance. There was a particular need for adequate supplies of effective and stable freeze-dried vaccine, and it was estimated that at least 200 million doses would be required annually in addition to that already being produced by the endemic countries. Non-endemic countries were requested to provide substantial additional help. The Union of Soviet Socialist Republics has donated 75 million doses of vaccine over a three-year period, and has continued to provide large amounts of freeze-dried vaccine on a bilateral basis to a number of countries in Asia and Africa; the United States of America has provided bilateral assistance to nineteen countries in West and Central Africa; motor cycles have been donated by Japan, and other vehicles by Poland; further offers of vaccine and contributions in cash have been received from a number of other countries.

The first Regional Reference Centre for Smallpox was established in 1966 in Moscow and the second in 1967 at Atlanta, Ga., USA, and plans have been prepared for a network of international, regional and national laboratories to assist programmes in endemic countries through the provision of diagnostic services and assistance in research and evaluation.

Plans were discussed for the United Nations/FAO World Food Programme to provide special food supplements to vaccination teams in some endemic areas, and for the League of Red Cross Societies to assist programmes in various countries.

Map 3 shows the smallpox incidence in endemic and neighbouring countries in 1967, when endemic smallpox was confined to three major areas. In South America, Brazil constituted the principal focus, although the disease was introduced periodically into areas of Argentina and Colombia. In all countries in Africa south of the Sahara smallpox was either endemic, or there was a risk of the disease being introduced by nomads and traders. In Asia, Afghanistan, India, Indonesia, Nepal and Pakistan constituted the third principal focus of endemic smallpox; in Burma, at the end of the third year of an eradication programme, cases were reported only sporadically. The population in these endemic regions was estimated at approximately 1100 million, and some 2000 million vaccinations and revaccinations would be needed to complete the programme over a ten-year period.

Since the resolution of the Nineteenth World Health Assembly, special attention has been paid to the planning and co-ordinating responsibilities of WHO. The planning has included such aspects as health education, the organization of
MAP 3. SMALLPOX INCIDENCE IN ENDEMIC AND NEIGHBOURING COUNTRIES IN 1967

- over 5 per 100,000
- 0.5-5.0 per 100,000
- less than 0.5 per 100,000
basic health services, health laboratory services, statistics and surveillance. Regional seminars have been held in Delhi and Bangkok, and three courses in laboratory diagnosis of smallpox have been held in Latin America. A scientific group met in 1967 to discuss the overall strategy as well as the technical methodology for programmes in endemic areas. A comprehensive manual on smallpox eradication, covering operational aspects of the programme, surveillance, assessment, health education, and technical and scientific aspects of smallpox and smallpox vaccines, has been prepared and widely distributed. A smallpox eradication surveillance report, issued quarterly, provides an appraisal of the global and national smallpox programmes as well as information on recent trends of the disease and other significant developments.

By the end of 1967, eradication programmes were operative in all countries in South America; programmes had been initiated in twenty-five countries in Africa and over twenty million vaccinations had been performed; in Asia, vaccination programmes had been intensified in all countries except Indonesia, where preparatory studies were under way.

In Brazil and West Africa, vaccination has been carried out mainly with jet injectors, which inject vaccine under high pressure into the superficial layers of the skin. With these instruments, as many as 500 to 1000 persons per hour can be vaccinated with a degree of efficacy considerably exceeding that normally achieved. In order to obtain optimum use of these instruments, operational methodology tests have been made within the framework of these programmes.

To prevent the re-establishment of smallpox in non-endemic countries, a programme has been developed by which vaccine and jet injectors from a special emergency stock in Geneva, as well as technical assistance, can be provided to any area within a matter of two to three days. Emphasis has been laid on the development of surveillance and assessment activities and methods on a national, regional and global basis, and a global smallpox surveillance programme has been started.

In order to improve the quality and quantity of freeze-dried vaccine produced in laboratories in the endemic regions, WHO has made arrangements for consultation, training and vaccine testing with a major vaccine producer; this will assist approximately twelve laboratories.

Future progress in the eradication of smallpox depends on the acquisition of further knowledge. WHO has therefore assisted research on various aspects of smallpox and vaccines, including studies on the prophylactic value of gammaglobulin, the infectiousness of early smallpox and the dissemination of virus in

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Outbreaks of smallpox can usually be recognized as either variola major or variola minor, but in Africa there is some evidence of outbreaks of intermediate severity. In a current study, strains from different outbreaks in Africa are being submitted to a variety of tests to determine whether the intermediate strains can be distinguished by laboratory tests from the major and minor strains. If reliable tests can be established, a joint epidemiological, clinical and laboratory study of the significance of the strain differences will be made.

At the end of WHO's second decade, the smallpox eradication programme had taken shape and acquired a new impetus. The progress achieved has been accompanied, however, by increased awareness of the difficulties to be overcome—those associated with the organization and administration of a large and exacting undertaking, as well as the difficulties faced by countries in terms of material and human resources. There are also some technical unknowns, and changing conditions may call for modifications in the programme.

VIRUS, RICKETTSIAL AND RELATED DISEASES

During the first ten years of WHO the principal development in virology was in techniques for the isolation of viruses. As a result of this, a large number of newly identified viruses have been described during the second ten years, particularly from diseases of the respiratory tract. They range from viruses responsible for severe disease in young children—such as the respiratory syncytial (RS) and para-influenza viruses—to those which cause a substantial proportion of the common colds (the rhinoviruses, of which nearly sixty different antigenic types have already been identified).

The number of viruses identified has continued to increase, but in addition great advances have been made in knowledge of their fundamental structure.

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3 This section deals with yellow fever, haemorrhagic fever, poliomyelitis, influenza, viral pneumonia, the common cold, mycoplasma pneumonia, rubella, measles and trachoma. Reference to particular aspects of some of these diseases will be found also elsewhere in this volume. Smallpox is the subject of the preceding section in this chapter. Typhus is mentioned in the section on quarantinable diseases (see p. 105). Reference to rabies is to be found in the section on zoonoses (p. 150).
This varies from viruses in which the infective particle, the nucleic acid, is enclosed in a simple protein shell (the capsid), to those of complex make-up with different chemical, morphological and antigenic characters. Recent work indicates that viruses are not only parasites of cells without which they are unable to reach full development, but that some are dependent on other viruses and have to draw from them the supplies necessary for their full development. Different species of complete viruses may also enter into relationships with each other. One of the adenoviruses has been found in laboratory experiments to be capable of incorporating some of the components of another virus which can cause malignant neoplasms in animals. There is a theoretical danger of incorporating components of a dangerous virus (for example, one which could cause cancer in man, if such exists) into a virus being used as a vaccine; however, there is at present no evidence that this in fact occurs.

Of greatest immediate importance has been the further improvement of vaccines against poliomyelitis, influenza and rabies, and the development of new vaccines, such as those for measles and mumps. Still experimental, but giving good promise of success, are vaccines for some of the more recently recognized respiratory viruses, rubella, and Japanese encephalitis and other arbovirus infections — though in the case of the arboviruses difficulties with antigenic and other characteristics of the viruses make progress relatively slow. Progress in the development of effective trachoma vaccines has also been slow. Typhus being on the wane (see page 105), activities were limited. However a regional reference centre for human rickettsiosis was designated at the Rocky Mountain Laboratory, Hamilton, Mont., USA.

Two most important aspects of the programme developed by WHO are the assistance provided to countries in establishing virus laboratories within their public health laboratory services, and the help and advice given in emergencies. The other principal features are the network of international and regional reference centres and collaborating laboratories (see Annex 12); the preparation, testing and distribution of reagents; the collection and dissemination of information on the virus diseases being diagnosed in reference centres, collaborating laboratories and national virus laboratories; collaborative research on specific subjects, and the training of virologists in diagnostic and research laboratories.

**WHO Virus Reference Centres and Collaborating Laboratories**

A large part of the virus programme of WHO is carried on through the network of international and regional reference centres, of which there are now about thirty (see Annex 12). Their reference activities are only a small part of their work for the Organization: much the greater part is their participation in
the reagents programme and in specific research projects. The work of the centres is facilitated and co-ordinated by regular meetings of the directors.

The international virus reference centres have been selected from among the foremost laboratories in their particular field, and their main function is research. They serve as a focus of technical information and advice for the regional centres and often originate, together with WHO, collaborative studies between the laboratories in the network. They serve as final courts of appeal for the identification of unusual or new viruses, and work closely with the appropriate nomenclature sub-committees of the International Association of Microbiological Societies. In general, they communicate with the regional reference centres and not directly with national laboratories.

The functions of the World Influenza Centre, in London, and of the International Influenza Centre for the Americas, at Atlanta, USA, differ slightly from those of the other centres. Their main task is to collect and examine the strains of influenza virus currently being isolated from cases of influenza-like disease occurring sporadically or in epidemics.

The information obtained is made available to those concerned with the epidemiology and control of influenza; the strains are distributed on request to interested research and vaccine production laboratories. Seventy-eight laboratories in fifty-three countries co-operate in the programme. WHO provides annually a set of reagents — antigens and antisera — for the identification of the viruses isolated. The epidemiological and virological information obtained from all sources is collated by WHO and published in the Weekly Epidemiological Record.

An example of the contribution of the work of these centres and of the information collected by WHO is given in the report on influenza from October 1965 to September 1966,¹ a period in which reports of outbreaks were received from thirty-eight countries. The report provides information on the distribution of influenza in the world during that year and on the antigenic characteristics of the strains isolated and their relationship to previous strains.

The twenty regional reference centres have been chosen after consultation with the directors of the international reference centres and with members of the Expert Advisory Panel on Virus Diseases, expert committees, or scientific groups.

The regional reference centres must have very close contact with national virus laboratories if they are to carry out their functions properly and give the greatest amount of help possible. One of the ways in which these contacts are fostered is through meetings at regional centres for workers in national laboratories. The

first was held at the Regional Reference Centre for Respiratory Virus Diseases other than Influenza, at Atlanta, in July 1967, and was attended by virologists from twelve countries.

The WHO virus collaborating laboratories are located principally in areas where there are no reference centres. They co-operate in specific activities in the virus field, such as the reagents programme, and the surveys of respiratory virus diseases.

*The Reagents Programme*

The identification of viruses is hampered by the shortage of reliable antigens and antisera, the preparation and testing of which are complex and costly and not within the resources of all national virus laboratories. The Organization, through its reference centres and with the collaboration of many other institutes, is helping towards a solution of this problem by setting up stocks of prototype strains of viruses, and by co-ordinating the preparation and testing of antisera.

In countries with only a single laboratory — or very few — the virologists available would have to spend far more time than they can afford in preparing reagents required in relatively small amounts. WHO has been able to meet these limited needs. Large laboratories, or a group of laboratories in the same country, can reasonably prepare their own reagents or obtain them commercially. For this purpose WHO prototype reagents are supplied on request.

*Information Exchange and Training*

Since the beginning of 1963, a standard monthly report has been received from the enterovirus and respiratory virus reference centres concerning the viruses they have isolated and the cases they have diagnosed serologically. This includes information on the nature and extent of outbreaks of virus diseases and on other items of interest arising from observations in the laboratories or the field. A similar scheme has recently been started for the arboviruses. National laboratories are now participating in the scheme, and at present reports are being received from twenty-seven countries.

These monthly reports are collated by WHO into a quarterly report and a consolidated annual report, both issued to all the reporting laboratories.

One of the problems in expanding international collaboration in virology and in strengthening national work in this field has been the lack of virologists for both research and diagnostic work. The virus reference centres, as well as the WHO fellowships programme, have contributed to the training of personnel.
Collaborative Studies and other Activities

Arboviruses. An example of the continuing threat from the arthropod-borne virus diseases is provided by yellow fever (see International Quarantine, page 104). In the Region of the Americas human cases of jungle yellow fever — of which only a small number are actually reported — occur every year; through these cases an epidemic of urban yellow fever might be started in any city infested with *Aedes aegypti*. In Africa, WHO-supported studies following the serious epidemic of yellow fever in Ethiopia between 1960 and 1962 demonstrated that *A. simpsoni* was the main vector. More recently, the Organization has also provided considerable assistance in West Africa where, following an epidemic of yellow fever in Senegal in 1965, a system has been established for early detection of suspected cases and arrangements have been made for the supply of vaccines for emergencies.

Support has also been given to the Regional Reference Centre for Arboviruses at Entebbe, Uganda, for studies of the behaviour of mosquitos, especially in the forests, and studies of insectivorous bats as natural hosts of group B arboviruses. Recently this centre has also carried out epidemiological studies on African lymphomatosis.

Assistance has been given to the Pasteur Institute at Dakar (which is a regional reference centre for arboviruses) for studies of West African bats as hosts and disseminators of arboviruses, and for a long-term study of the ecology of arboviruses in a defined forest area in a nature reserve in Senegal.

In the Region of the Americas the Organization is supporting, in Mexico, a research and training programme mainly designed to determine the role of birds in the spread of arboviruses.

Haemorrhagic Fever. Mosquito-borne haemorrhagic fever is a problem of current importance in countries in the South-East Asia and Western Pacific Regions. During the past decade the disease has spread with great rapidity to India, Malaysia, the Philippines, Thailand, and the Republic of Viet-Nam. In 1964, WHO organized a seminar in Bangkok which was attended by most of the experts on the subject as consultants and lecturers, and by participants from fourteen countries.

WHO is supporting three main lines of inquiry: the collection and dissemination of information on the occurrence of the disease; the study of means of controlling *Aedes aegypti*, the main vector (see pages 187 to 201); and serological studies to determine the present distribution of the disease and trace its spread in future. A system is also being organized for early detection of cases, especially in areas where the disease is not endemic (see page 97).

In the Region of the Americas, haemorrhagic fevers are a serious problem in Argentina and Bolivia. They are due to viruses of the Junin-Tacaribe-Machupo
complex, and rodents are the probable animal hosts. The vectors have not been identified. The Organization is co-operating with national and regional research groups in the study of these diseases.

**Enteroviruses.** A WHO programme on poliomyelitis was set up in 1953, but after the development of effective poliomyelitis vaccines (to which the Organization contributed 1) it was revised and expanded to include all enteroviruses.

Though poliomyelitis has almost disappeared in most of Europe and in North America and Oceania, it is increasing in many tropical countries. A recent survey showed that in forty-four of seventy tropical countries the number of cases diagnosed had increased and was three times greater than a decade previously. WHO has organized means to provide immediate aid in diagnosis and supplies of vaccine for the early stages of outbreaks in countries which request help.

Live poliomyelitis vaccine has been used successfully in tropical countries, but the seroconversion rates are often lower than experience in the temperate countries would lead one to expect. WHO is now supporting investigations into this problem, which is of great practical significance in view of the increasing anxiety about the disease at the present time.

Preparations are being made for another study, to be carried out in four laboratories, on the characterization and classification of “new” enteroviruses, i.e. enteroviruses which cannot be fully identified serologically with the reagents at present available. Experience with similar problems in the rhinoviruses has shown that this type of work is slow and expensive, and that it can only be done successfully when organized on an international basis.

**Respiratory Viruses.** Though it has been suggested that animal influenza viruses may infect human beings, there is no evidence that this has occurred in nature. However, human and animal strains of these viruses are antigenically related, and in view of the importance of influenza epidemics and pandemics WHO is assisting in studies of the problem (see page 156).

Respiratory virus diseases are among the leading causes of morbidity in all regions. WHO organized a collaborative study to define the viral etiology of severe respiratory infections in children, particularly in tropical areas. Laboratory workers and paediatricians in Hong Kong, India, Jamaica, Lebanon, Peru, Portugal, Senegal, Singapore, Trinidad, and the United Arab Republic collected pairs of sera (one sample being taken in the acute stage of illness and one in the convalescent stage) from children up to five years of age suffering from severe acute respiratory infections. The sera were sent frozen for serological examination at the WHO International Reference Centre at Bethesda, Md., USA.

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Altogether, 528 pairs of sera were collected. The results indicate that respiratory syncytial (RS) virus is the most important respiratory tract pathogen of early life in tropical and semi-tropical areas, particularly in the first two months of life, and is often associated with bronchiolitis and pneumonia; the parainfluenza viruses are next in importance, particularly in cases of croup. They are found in a wider age range than the RS virus. Influenza and adenoviruses are of moderate importance, and *Mycoplasma pneumoniae*, *Coxiella burnetii* and the psittacosis/LGV (lymphogranuloma venereum) agents are relatively unimportant. This pattern is similar to that which has been observed in temperate climates.

**Rhinoviruses.** The two WHO international reference centres for respiratory virus diseases (at Bethesda, Md., USA, and Salisbury, England) prepared a study in which regional reference centres and other laboratories collaborated to determine whether each of the numerous serotypes of rhinoviruses so far reported were separate types. Of the sixty-eight strains examined, only fifty-six were separate types. Forty more strains are now being studied.

**Mycoplasmas.** Some of the non-coccal pneumonias originally considered as viral are now known to be due to the mycoplasmas. Mycoplasmas occur in animals as well as in man, and numerous types have been isolated. The need for reference centres has been recognized, and a WHO international reference centre for human strains has been established at Bethesda, and a FAO/WHO international reference centre for animal strains at Aarhus, Denmark.

**Rubella.** The risks of congenital defects in babies whose mothers are infected in the early months of pregnancy are well known. A collaborative survey to determine levels of antibody to rubella virus in different age-groups (especially women of child-bearing age) in different countries has been carried out under the guidance of the WHO International Reference Centre for Enteroviruses, at Houston, Texas, USA. Laboratories in Australia, Canada, Czechoslovakia, Denmark, France, Jamaica, Japan, Singapore, Switzerland, Trinidad, the United Kingdom, and the United States of America participated in the survey which has now been completed. About 80 per cent. of women of child-bearing age had antibody in each of the survey areas, except in a rural area in Japan and a rural area in Trinidad, where the incidence was lower.

**Measles Vaccines.** Vaccines have been developed against measles — an important cause of death in many tropical countries. Two series of investigations of measles vaccines have been made with WHO's support. The first series of studies was carried out in Chile, India, Japan, Nigeria, South Africa, the Union of Soviet

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Socialist Republics, and Yugoslavia. In the second series,¹ a number of attenuated vaccines were compared with one another for the severity of reactions and the levels of antibody they produced in controlled trials carried out mainly in children between eight months and three years of age in five countries: Canada, Czecho-
lovakia, Nigeria, Switzerland and Yugoslavia.

One valuable general conclusion to be drawn from the studies is that the variations in the proportion of reactions which observers in different trials may record with the same vaccine can be at least as great as the variations observed between different vaccines in the same trial. It is therefore impossible to compare the reaction rates provoked by different vaccines, except when the vaccines are given to similar groups of the same population simultaneously.

Similar studies are now being made with new vaccine strains as they are developed, and other WHO-supported work includes trials of intradermal administra-
tion of vaccines and the administration of mixed measles/smallpox vaccines. It would be advisable for countries with high death rates from measles to consider the establishment of programmes for the routine vaccination of children as they reach nine to twelve months of age. However, the implementation of such programmes is greatly hampered by the present high cost of the vaccine and, frequently, the lack of adequate health services to carry out regular vaccination programmes.

Trachoma. WHO's second decade coincided with the development of a new era of trachoma research which began with the isolation of the agent. During this period WHO has convened meetings of four scientific groups (1959, 1961, 1963, 1965) ² to review advances and to advise on future programmes and priorities. In 1965, the Francis I. Proctor Foundation for Research in Ophthalmology, in San Francisco, USA, was designated as the WHO International Reference Centre for Trachoma. WHO has also assisted selected laboratories in carrying out studies, and has provided grants for training research workers in this specialized field.

However, the development of vaccines has been disappointingly slow, and the most effective so far reported has given only partial protection of rather short duration. Nor has there been any important progress with regard to drugs or treatment regimens suitable for mass application.

WHO has assisted studies being carried out in Jerusalem on the metabolism and growth requirements of PLT (psittacosis-lymphogranuloma-trachoma) agents and the mode of action of antibiotics and other inhibitors. It has also assisted

studies in Tunis and, more recently, at the International Reference Centre for Trachoma, for the development of laboratory methods for differential screening of new therapeutic agents and the detection of resistance to drugs currently in use; as well as investigations on the possible occurrence and epidemiological significance of TRIC (trachoma-inclusion-conjunctivitis) genital infections in trachoma endemic areas.

WHO has assisted twenty Member States in developing programmes for the control of trachoma and other communicable eye diseases, ten new projects having been started during the past decade — in Afghanistan, Burma, Ethiopia, Iran, Iraq, Jordan, Sudan, Syria, Thailand and the United Republic of Tanzania.

In some areas of low trachoma endemicity and relatively good standards of living and health services, an intensive programme of case-finding, selective treatment, health education and surveillance has led to a steady reduction in the prevalence and incidence of the disease. In areas of high endemicity and poor resources, however, treatment programmes have so far had little effect in reducing the incidence of trachoma, although, when actively pursued, they have materially diminished the rate of disabling consequences of the disease in rising generations.

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In the past decade a network of virus reference centres has been established, through which it is now possible to carry on an extensive programme of service to national virus laboratories and of collaborative research. Experience with the rhinoviruses and mycoplasmas, the importance of both of which was recognized only recently, has shown that if an effective network of reference and research centres exists it can readily be adapted to deal with new problems, either by extending the work of existing centres or by establishing new ones.

In the next decade many new activities will have to be undertaken. It is hoped that there will be some success in identifying the cause of viral hepatitis, in view of the high morbidity and long-term illness associated with this disease in most parts of the world.

The possibility that human malignant neoplasms could be associated with viruses is receiving great attention in research institutions and the WHO programme may well have to include this subject in future (see also page 211). If agents similar to that responsible for "scrapie" (a transmissible disease of the nervous system in sheep with an incubation period of a year or more) are identified as the cause of some of the chronic diseases of the central nervous system in man (for example, multiple sclerosis), these so-called "slow virus" diseases will also have to be included.
An immediate development of the programme is the proposed establishment in Africa of a team for special studies in virology. This team will carry out research to identify which of the viruses are the commonest causes of severe disease or death, and then study practicable means of control. It will remain in one area long enough to train local personnel to take over the work and, in addition, it is hoped that it will provide opportunities for visiting scientists to work on specific problems. Its activities will add greatly to the information now available on virus diseases in Africa, and will thus provide valuable data for the health services in the Region.

ENDEMIC TREPONEMATOSES AND VENEREAL INFECTIONS

Endemic Treponematoses

During the first ten years of WHO, attention was focused on promoting the widest possible use of effective new drugs and epidemiological methods against the endemic treponematoses (yaws, pinta and endemic non-venereal syphilis); with technical guidance from WHO and material support from UNICEF, mass penicillin campaigns were carried out by health administrations in a co-ordinated worldwide attack on these diseases. In the second decade new campaigns were instituted, with emphasis on orientation towards their integration into developing local health services. Technical policies have been guided by WHO expert committees and other advisory meetings, and have been widely discussed at inter-regional and regional conferences. In May 1964 the Executive Board, at its thirty-fourth session, reviewed a comprehensive report on the Organization’s programme in endemic treponematoses and venereal infections during the period 1948-1963.

Up to 1965 some 363 million medical examinations of 152 million individuals had been undertaken in campaigns against the endemic treponematoses in forty-nine countries, and 46.1 million clinical cases, latent cases and contacts had been treated with long-acting penicillin (procaine penicillin with aluminium monostearate (PAM) or Benzathine penicillin). Through these campaigns the prevalence of clinically active lesions in rural populations fell from between 20 and 30 per cent. to between 0.5 and 0.1 per cent., with few infectious lesions remaining (for example, yaws in Haiti, Nigeria and Western Samoa). In Fiji, the prevalence of active yaws dropped from 28.18 per cent. in 1957 to 0.008 per cent. (nil for infectious yaws) in 1966.

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With the rapidly declining prevalence of clinical lesions in endemic treponematoses, WHO-assisted projects were broadened to become polyvalent, so as better to utilize resources. In Cambodia, Haiti, Nigeria and Togo, for example, the yaws campaign organization made it possible to extend the smallpox programme. During the yaws consolidation and surveillance activities in Thailand between 1959 and 1963, 1.7 million primary smallpox vaccinations and 11.3 million revaccinations, and some 250,000 combined cholera and typhoid immunizations were undertaken; 163,000 treatments for conjunctivitis were given, and some 2000 cases of leprosy were diagnosed. Leprosy case-finding was also carried out by yaws surveillance teams in the British Solomon Islands Protectorate, Indonesia and Malaya. The epidemiological surveillance needed to prevent recrudescence of the endemic treponematoses after the end of mass campaigns could not be met indefinitely through repeated surveys by mobile teams, even where these teams had been serving several purposes. Studies were therefore made to ascertain how the slowly developing rural, school or other health services might assume these functions in countries where there had been mobile yaws teams (for example, Thailand); or to determine the orientation required where mass campaigns had from the beginning been integrated into, and co-ordinated through, the local health services (for example, Indonesia).

However, the transition from the attack phase of mass campaigns against the endemic treponematoses and other diseases (for example, tuberculosis and malaria) to the phase of consolidation, integration and development of the local health services raises complex problems. An effective methodology has to be formulated in relation to costs, personnel resources, etc. These preoccupations have been reflected in WHO's successive general programmes of work,¹ and have been considered by several scientific groups and expert committees (see also page 41).

Particular attention has been paid to the assessment of results in penicillin mass campaigns. With the declining prevalence of clinical lesions, the use of laboratory methods has become increasingly necessary to determine possible low-level continued transmission of infection. Since such evaluations cannot be based on laboratory examinations of specimens taken from millions of people, serological sampling methods were developed in which a small but statistically representative portion of the population was examined in rural field surveys. One problem encountered in such studies was the difficulty of preserving serum collections for shipment to local and distant laboratories without denaturation and contamination of specimens. Methods and equipment were developed for deep-freezing serum collections in liquid nitrogen at −196°C and for drying blood in absorbent paper in the field.

The decline in the prevalence of overt lesions following treponematoses mass campaigns has emphasized the need for specific treponemal laboratory tests (for example, the fluorescent treponemal antibody test (FTA) and the Treponema pallidum immobilization test (TPI), as compared with the standard, less specific cardiolipin flocculation tests (such as VDRL). Specific treponemal tests have shown that as much as one-third of cardiolipin seroreactors in some areas (for example, in Thailand) are not infected with treponematoses. WHO's assistance in the development of laboratory services has therefore included the promotion of treponemal tests (for example, in Thailand and Togo), which are also of considerable importance in connexion with syphilis diagnosis in developing countries.

Between 1960 and 1968 a quarter of a million serum specimens were processed in epidemiological/serological surveys for laboratory testing for treponematoses as well as for a number of other conditions, the multipurpose approach to surveys having been recommended by a study group on immunological and haematological surveys,¹ a scientific group on treponematoses research (1959) and the Advisory Committee on Medical Research.

In co-operation with WHO reference centres and collaborating laboratories, epidemiological/serological computer programmes have been developed since 1960 to evaluate yaws campaigns in Nigeria, the Philippines, Thailand, Togo and Western Samoa. Similar surveys were planned at the close of the decade in Brazil (for yaws) and Yugoslavia (for endemic non-venereal syphilis).

The assessment of endemic treponematoses mass campaigns — particularly against yaws — has shown that transmission continues among children in most areas five to ten years after the initiation of the campaigns. The rate of transmission is low in many areas, but new infections are more frequent than is apparent from the occasional clinical infectious cases reported by the rural health services. Moreover, the overall serological regression in rural populations resulting from these campaigns is a long-term process, requiring many years. The latter aspect has been shown in Western Samoa by serological results by age, compared after a ten-year interval. In other instances, small focal clinical outbreaks (as in Nigeria and Thailand), or wider recrudescences (as in Haiti) have occurred following mass campaigns. Only in Bosnia, Yugoslavia, have no new cases of endemic syphilis been found during repeated area surveys in the last ten years.

The experience gained during the second decade suggests that the idea of eradication of endemic treponematoses, and possibly other communicable diseases, by the wide use of an "ideal" drug, was over-optimistic. Research has shown the long-term recrudescence potential of endemic treponematoses and the capacity

for treponeme-survival in changing ecological situations. Nevertheless, there is no doubt that significant results can be obtained through mass campaigns. These have an even more effective impact on public health in developing countries when they are implemented as multipurpose campaigns and are integrated into the local health services and used for their promotion.

The publication of an international nomenclature of yaws lesions \(^1\) was followed by that of *Differential Diagnosis of Yaws* \(^2\) and a complete bibliography on yaws \(^3\).

**Venereal Syphilis**

The use of penicillin was shown in the first ten years of WHO to give excellent individual results in the treatment of the early disease. A WHO study carried out in nineteen countries in 1967 \(^4\) confirmed that results continued to be good after a quarter of a century's experience with this antibiotic. *Treponema pallidum* has so far not developed resistance to it. However, in inadequately treated or untreated disease, the micro-organism has lost none of its capacity for producing congenital disease or late cardiovascular or neurological lesions in adults. Periodic WHO studies \(^5\) have shown that allergic side-reactions to penicillin are not so frequent as to prejudice its continued use, although certain preventive and other routine measures are necessary. Other treponemicidal antibiotics are in reserve.

The dramatic decline in the reported incidence of new syphilis infections between 1950 and 1957 was ascribed to the widening use of penicillin throughout the world, which WHO promoted in a number of countries in all the regions, through venereal disease control demonstrations and training projects. But the effectiveness of penicillin, together with its low cost and easy administration, gave rise to a false sense of public health security, generated indifference to the risk of infection, and reduced the fear of the late manifestations of the disease. Long-term surveillance studies by the Organization on the basis of reported incidence in Member States \(^6\) have shown a worldwide recrudescence of the disease in the


second decade of WHO, notwithstanding differences in methods, facilities or completeness of reporting in the various countries. In some countries the reported incidence has lately approached or exceeded the maximum of the epidemic period during and immediately after the Second World War. Changing codes of behaviour — for example, the development of different patterns in prostitution and homosexuality — have raised new epidemiological as well as social problems. So, also, have industrialization, urbanization, and the migration of workers. As a result of unprecedented and rapid movements of large numbers of tourists and other travellers by land, sea and air, as well as a growing number of calls at foreign ports by merchant ships, venereal disease has become increasingly an international disease. The greater use of contraceptive measures has also been shown to be of epidemiological importance. WHO has co-operated with the International Union against the Venereal Diseases and the Treponematoses in studies on this aspect.

Systematic epidemiological investigations, contact-tracing, case-finding and the provision of free diagnostic and treatment services remain the basic elements of venereal disease control, but in most countries the possibilities for epidemiological investigations remain limited or have not been fully exploited. This has been borne out by WHO studies of the legislative framework within which venereal disease control measures are undertaken in various countries. The lack of uniformity in this field and the need for revision of national and international epidemiological practices were particularly emphasized at WHO regional seminars and symposia on venereal disease control in the Western Pacific Region in 1958, in Europe in 1963, and in the Americas in 1965.

These meetings, as well as WHO expert committees on venereal infections and treponematoses, all emphasized the increasing importance of the many changing ecological factors affecting the epidemiology of venereal infections. These factors could hardly be overcome by "ideal" drugs. True control depends, rather, on the development of an immunoprophylactic agent that could be effective against venereal syphilis as well as endemic treponematoses.

While thirty-five Member States, mostly in developing areas, received long-term technical assistance from WHO for venereal disease control during the Organization's first ten years, only fourteen countries requested services, mostly advisory, during the second ten years. In these projects — often linked with maternal and child health programmes — emphasis was laid on epidemiological and laboratory services and on training aspects. A number of fellowships were provided by the Organization for individual study abroad (see Annex 9) and for group training or participation in regional or inter-regional meetings (see Annex 15).

In the consolidation phase of yaws control, WHO mobile teams carry out epidemiological/serological surveys to evaluate the results achieved in mass penicillin campaigns. The sera obtained are also used for other purposes, for example, examination of antibodies for malaria, arboviruses and poliovirus, and for immunohaematological factors.

On arrival in a village in Nigeria, the team leaders discuss the survey with the authorities.

Blood specimens collected by the teams are screened by laboratory technicians before dispatch to WHO reference centres for detailed analysis.
BCG vaccination during a national campaign in Mongolia.

Examination of a child contact at the Tuberculosis Chemotherapy Centre, Madras.
Recent advances in ambulatory chemotherapy of tuberculosis have opened the way for the setting up of national comprehensive programmes based on simple standard low-cost techniques. Studies carried out by the Tuberculosis Chemotherapy Centre in Madras in a pilot area in South India have demonstrated the effectiveness of supervised domiciliary chemotherapy. BCG vaccination is also an important element in the comprehensive programmes.
Under the worldwide intensified programme to eradicate smallpox many countries have received assistance from WHO, and on a bilateral (country-to-country) basis, to enable them to initiate and develop national programmes. The photograph shows vaccination against smallpox in a maternal and child health centre in the Ivory Coast.

Since man's health may be affected by that of the animals in his environment, veterinary and public health measures need to be closely co-ordinated. FAO and WHO together have organized a number of meetings designed to promote effective collaboration between veterinary and public health services. The photograph was taken during the FAO/WHO symposium held in Ghent in 1966 for veterinarians and health administrators concerned with food hygiene and control of diseases common to man and animals.
WHO also organized an inter-regional travelling seminar in the Union of Soviet Socialist Republics, in 1961. Serologists and technicians were trained at WHO reference centres, particularly at the Serological Reference Centres for Treponematoses at Atlanta, Ga., USA, and Copenhagen and at the Institut Alfred Fournier, Paris.

**Treponematoses Research**

The WHO treponematoses research programme has included immunological, microbiological and biochemical aspects. Reference has been made above (see page 122) to epidemiological/serological research regarding the "disappearing" treponematoses. Bibliographical reviews on the treponemes were published.¹

WHO-assisted studies have led to the acquisition of new knowledge on several aspects of treponematoses: for example, the discovery of a reservoir of yaws in certain wild monkeys in Africa and Asia;² and the demonstration of surviving treponemes in the lymphglands of humans in treated latent and late syphilis in France,³ and in the vitreous humour in late congenital syphilis in the United States of America, which has given new orientation to immunological and clinical research. A study in Sweden of the possible autoimmune origin of the reagin type of antibody — as compared with true treponemal antibodies — is also gradually increasing the understanding of the basic immune mechanism in the treponematoses of primates and other species. Such knowledge is necessary if further progress is to be made towards the development of an immunoprophylactic agent against the treponemal diseases. Research in Denmark, the United States of America and the Union of Soviet Socialist Republics has aimed at defining metabolic requirements of pathogenic treponemes as a basis for their eventual growth in vitro, another prerequisite for bulk vaccine development. Strains of *Treponema pallidum* obtained by cultivation in experimental animals have been attenuated by gamma-irradiation. Such vaccines have been shown to provide limited protection against experimental syphilis in rabbits.⁴ Studies are also being made to define the antigenic make-up of the treponemes of syphilis, yaws and rabbit spirochetosis as a basis for a differential laboratory test between syphilis and yaws.

The WHO International Treponematosis Laboratory Centre at Baltimore, Md., USA, and the WHO Serological Reference Centres for Treponematoses at

Copenhagen and Atlanta have been concerned with making available strains of treponemes, with international laboratory assays (FTA) and with the establishment and renewal of international reference preparations (see pages 238 to 240). Collaborating laboratories in London and Paris have also participated in methodological studies concerned with sera from the tropics. These activities have enabled laboratories in Member States to gauge their methods, reagents and procedures, and made it possible to achieve better international comparability of tests. With the co-operation of the Medical Research Council, London, an international reference preparation for long-acting penicillin — PAM — and an international assay method and a rabbit blood level duration test for penicillin have been established.\(^1\)

This allows production of therapeutic preparations suitable for single-injection procedures in the public health control of treponematoses, preventing high relapse rates due to sub-standard preparations.

**Other Venereal Infections**

Gonococcal infections have become a cause of concern. A WHO expert committee on this subject met in 1962\(^2\) and a joint meeting of microbiologists and immunologists in the fields of *Neisseria meningitidis* and *N. gonorrhoeae* was held in 1964. There has been no evidence that the wide use of antibiotics (particularly penicillin and streptomycin) has made any impact on the reservoir of gonococcal infections. Reported incidence has remained high in most WHO regions, particularly in some countries in Africa, and recently in the South-East Asia and Western Pacific Regions.

An increase of failures in clinical treatment of gonorrhoea with penicillin and subsequently with streptomycin has been observed in all regions. In studies conducted by the WHO International Reference Centre for Gonococci, established at the Statens Seruminstitut, Copenhagen, in 1966, a large number of strains of gonococci from countries in all parts of the world have been isolated. This sampling of circulating strains has proved useful to physicians, health administrators and laboratories in facilitating the selection of the most effective antibiotics and dosages.

Studies of improved culture media and methods have been organized by WHO with the collaboration of laboratories in Denmark, the Union of Soviet Socialist Republics, the United Kingdom, and the United States of America. Highly selective media for rapid culturing of *N. gonorrhoeae* are now available.

Other venereal infections (chancroid, lymphogranuloma venereum, granuloma inguinale, non-gonococcal genito-urinary infections), which appear to be much less prevalent, have been accorded only limited international attention.

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Venereal Disease Control in Seafarers

A set of technical definitions and minimum standards to serve as a revised basis for the functioning of the Brussels Agreement of 1924 ¹ was drawn up by the Expert Committee on Venereal Infections and Treponematoses ² following studies by other WHO expert groups and by the Joint ILO/WHO Committee on the Hygiene of Seafarers and after consultation with the International Union against the Venereal Diseases and the Treponematoses. The Thirteenth World Health Assembly (1960) recommended governments to accept these definitions and standards, which provide inter alia for epidemiological services and treatment and hospitalization for international seafarers. WHO published revised issues of the World Directory of Venereal Disease Treatment Centres at Ports in 1959, 1961 and 1967 as part of its obligation under the Agreement. (Other aspects of health services for seafarers are dealt with in Chapter 2, page 50.)

TUBERCULOSIS

At a conservative estimate, there are ten to twenty million cases of active tuberculosis in the world today, more than three-quarters of them being in the developing countries. Each year two or three million new cases occur and between one and two million persons die of the disease. Tuberculosis is thus still a major public health problem even though its prevalence has been greatly reduced in many countries.

During the Organization’s first ten years, WHO-assisted tuberculosis activities in many countries laid the foundation and provided the training and experience for wider undertakings. But training and demonstration projects alone were not sufficient. Tuberculosis centres established in towns did not extend their influence to the rural areas. The feasibility of mass BCG vaccination campaigns, even in rural areas, had been demonstrated, but it became apparent that, in the long run, their value too was limited, unless they were linked with other control measures.

During the second ten years the technical and operational knowledge acquired has permitted the planning of comprehensive national tuberculosis programmes — particularly in developing countries where expenditure on tuberculosis needs to be adjusted to very limited resources.

¹ WHO assumed constitutional responsibility for the administration of this agreement under the Protocol concerning the Office International d’Hygiène Publique adopted by the International Health Conference in New York in 1946.


Epidemiology

The epidemiological pattern of tuberculosis in the developing countries emerged from a series of WHO-assisted surveys in more than twenty countries in Africa and Asia. The pattern revealed differed in some respects from the expected picture; the age/sex distribution of the disease was very similar in both developed and developing countries, and the differences between urban and rural distribution were fewer than had been thought. Since the vast majority of the populations of the developing countries are essentially rural, it can be assumed that between 70 and 90 per cent. of tuberculosis patients are in rural areas. WHO-assisted longitudinal studies also showed that the pattern did not change much even when considerable efforts had been made for many years to combat the disease, as the majority of new cases arose among people who had been infected several years previously.

Chemotherapy

WHO-supported chemotherapy research has been carried out at the Tuberculosis Chemotherapy Centre in Madras, set up in 1956 under the joint auspices of the Indian Council of Medical Research, the Madras State Government, the Medical Research Council, London, and WHO. This demonstrated that drugs administered over an adequate period were sufficient for the treatment of advanced tuberculosis even in a population living under adverse socio-economic conditions. The first and basic finding was that one year’s well supervised domiciliary chemotherapy with isoniazid plus para-aminosalicylic acid (PAS) was as effective as one year’s hospital treatment with the same combination of drugs, and did not expose the patient’s contacts to any special risk.\(^1\) Another important finding was that the relapse rate was very low among patients who attained bacteriological quiescence after one year’s chemotherapy, whether given at home or in hospital, and that a second year of treatment did not have any major influence on the relapse rate.\(^2\) Trials were also made of the effect of combining isoniazid with a low dose of thioacetazone: the cost of this combination is one-tenth of that of isoniazid plus PAS, and data show that it is practically as effective and only slightly more toxic.\(^3\) The greatest drawback of daily domiciliary chemotherapy was the failure of the patient to follow the prescribed medication; intermittent supervised chemotherapy seemed to be a possible solution, and in the first trials the supervised administration of isoniazid plus streptomycin twice weekly was

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\(^1\) *Bull. Wld Hlth Org.*, 1959, 21, 51-144; 1960, 23, 463-510.


\(^3\) *Bull. Wld Hlth Org.*, 1966, 34, 483-515.
found to be as effective as the standard daily regimen of isoniazid plus PAS.\textsuperscript{1}
Trials of other intermittent treatment schedules are under way — for example, the administration of isoniazid plus streptomycin once a week only, preceded by a short initial period of intensive treatment.

In 1964 the WHO Expert Committee on Tuberculosis reviewed the data available from the WHO-assisted research projects in chemotherapy and recommended, with regard to tuberculosis control in developing countries, that “all financial resources and manpower available for tuberculosis control in the developing countries be confined to organizing efficient ambulatory services and not to constructing new beds”.\textsuperscript{2}

**Chemoprophylaxis**

Chemoprophylaxis seemed to be a possible means of considerably reducing the number of cases arising among people infected many years previously. A WHO-assisted study in Tunisia suggested that the distribution of isoniazid for prophylactic medication to tuberculin reactors with and without abnormal X-ray findings had only a very limited beneficial effect. However, urine tests indicated that less than one-fifth of those placed on prophylactic isoniazid treatment were taking the drug as prescribed. On the other hand, a WHO-assisted supervised control trial of the value of chemoprophylaxis in contacts in Kenya showed that the administration of isoniazid to all contacts, during the year following the discovery of the infectious source, led to a substantial reduction in the incidence of the disease. The conclusion of the Expert Committee on Tuberculosis was that “at the present stage of knowledge, it could not recommend secondary chemoprophylaxis for mass application but only for individuals and groups at special risk. Even this application was justifiable only in a programme that had achieved a high degree of perfection in its case-finding and treatment activities”.\textsuperscript{3}

**Immunization**

Further information has been obtained on the potentialities of mass BCG vaccination for tuberculosis control. An eight-year follow-up of a BCG vaccination trial carried out by the WHO-assisted research unit in Madanapalle, South India, provided direct evidence that BCG vaccination could confer substantial protection in a population living under adverse socio-economic conditions and with a high prevalence of non-specific sensitivity to tuberculin.

\textsuperscript{1} Bull. Wld Hlth Org., 1964, 31, 247-271.
According to accepted practice, BCG vaccination had to be preceded by a preliminary tuberculin test. This two-step procedure represented a distinct operational drawback in the mass application of BCG vaccination. Direct vaccination would greatly reduce costs, improve coverage, simplify training, and make possible the use of other services for BCG vaccination. In the course of several WHO-assisted studies on direct vaccination, no focal or other complications detrimental to the health of the tuberculin reactors among those vaccinated were demonstrated; nor were there any indications that this procedure reduced the acceptability of BCG vaccination by the public.

In many tropical areas considerable economic and operational advantages could be gained by the simultaneous application of different vaccines. WHO-assisted studies on combined BCG and smallpox vaccination have not revealed any contra-indications to such a procedure, no evidence having been found of reduced effectiveness of either vaccine, or of any increase in complications.

The results of many years of WHO-assisted laboratory studies on the properties of different BCG strains led to the adoption in 1965 of a set of Requirements for Dried BCG Vaccine \(^1\) (see page 241). A direct consequence was the establishment of the International Reference Centre for BCG Seed-lots and Control of BCG Products, at the Statens Seruminstitut, Copenhagen. There is, however, a long way to go before a set of laboratory tests providing relevant, sensitive and consistent prediction of the protective value of different BCG strains in human beings can be made available. In this connexion, WHO assisted a major prevention trial in India aiming at the study, among a population of approximately one million, of the protective power in man of the strains found to be most promising in the laboratory.

In reviewing these recent developments in tuberculosis immunization, the Expert Committee on Tuberculosis recommended "the continued and expanded use of this control measure on a mass scale in countries where tuberculosis is a serious public health problem". \(^2\)

**Other Research**

In a systems analysis research project sponsored by WHO, linear programming techniques were applied to a decision model to define an optimum tuberculosis service under severe budgetary and manpower constraints. If the results of computer simulations are proved valid, a thorough reappraisal of the traditional allocation of resources is indicated. In a standardized tuberculosis programme (as is now possible) the largest single item on the budget should be drugs and

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vaccine. In simulated conditions, most developing countries, in order to make the best possible use of the limited staff available for tuberculosis control, would have to spend as much as 40 per cent. of the tuberculosis budget on drugs and vaccines. In many existing budgets, however, it would seem that less than 20 per cent. is so used.

Other research assisted by WHO in developed countries has included studies on the significance of institutional treatment; the efficacy and applicability of supervised intermittent chemotherapy; epidemiology and the operational basis for eradication; and surveillance methodology. The results have already influenced the orientation of activities designed to eliminate tuberculosis as a public health problem in these countries.

The Organization has also assisted studies on the development of sensitins that will afford a much better distinction than present tuberculins between those who are infected with atypical mycobacteria and those who are not infected; on fractions of mycobacteria with a higher immunogenic potency than BCG and, if possible, without BCG's allergizing effect; on the simplification and standardization of bacteriological techniques for diagnosis and drug sensitivity determination, and on serological tests for the identification of risk groups and classification of atypical mycobacteria.

**National Tuberculosis Programmes**

A national programme must satisfy four basic requirements. Epidemiologically, it must be on a country-wide and continuous basis — not sporadic; sociologically, it must be adapted to and satisfy the existing needs of the population before it creates new ones; administratively, the specialized tuberculosis services must be integrated into the general health services; economically, the programme must be such that it can be applied on a national scale with the available resources.

Individual activities may be successful, *per se*, but prove deficient when tested against these basic requirements. For instance, the use of BCG vaccination combines effectiveness with feasibility because of its low cost, but a programme relying exclusively on BCG vaccination would not be fully acceptable because it would overlook the public's awareness of the need for measures to alleviate declared cases of tuberculosis.

The best place for simple diagnosis and treatment of tuberculosis is the nearest dispensary, provided with a microscope and health workers with clear instructions. But the dispensary has to be part of an organized whole. Positive cases, those with tubercle bacilli, can be given a standard treatment. Negative but suspected cases must be referred for further investigations if the dispensary is without a doctor, and this involves permanent contact with hospital out-patient and X-ray
Departments in the area. Continuity of treatment also presupposes a strong domiciliary organization, with nearby health workers, which only the established health services can provide. Otherwise, defaulting from treatment—a feature common to all communicable disease control programmes—would render the best drug combination ineffective.

The concept of an integrated national tuberculosis programme has now been put to the test for several years, and its success has exceeded expectations. In India, for instance, over an area of some 10,000 square kilometres with a population of about 1.5 million, a single team of six workers (a medical officer, a public health nurse, a laboratory technician, an X-ray technician, a BCG team leader, and a statistical clerk) was able to mobilize the resources of the general health services so as to cover every village of the area within a few months of the beginning of operations, and to find over 5000 cases in the first year, and 2500 cases in each of the next two years. Although previously more than 60 per cent. had defaulted from treatment, following this programme over 60 per cent. had completed treatment. The vaccination coverage was more than doubled, to include 70 per cent. of all those eligible, with one team of six technicians vaccinating over 100,000 persons in a year. As a result of this double attack on transmission, the epidemiological situation is definitely being brought under control.

The Expert Committee on Tuberculosis stressed that “the relatively slow decline in the tuberculosis problem observed in many countries seems to be in contrast to the resources expended on tuberculosis programmes”, and considered that “this unsatisfactory situation is due mainly to insufficient realism in selecting priorities for application; lack of national planning, co-ordination, and evaluation; and failure to re-orient traditional approaches to present knowledge”.

A balanced national tuberculosis programme of the type outlined above could go a long way towards remedying this situation, as has been shown in dealing with the widely differing problems encountered in the fifty-nine countries which received direct WHO assistance in the field of tuberculosis control during the period 1958-1967.

**Training**

For national tuberculosis programmes the key personnel who are to operate in a given area need to be trained together, not only in their individual technical responsibilities, but also in the functions of the team within the programme as a whole. The training should take place in the setting in which the work will be carried out, and practical field operations are essential, with in-service training,
continuously assessed. To achieve consistency of performance by different members and different teams, a series of technical manuals describing the functions of each worker in the area has been prepared. Between 1961 and 1967, 273 medical officers, 281 treatment organizers, 272 laboratory technicians, 257 X-ray technicians, 220 statistical assistants and 189 BCG team leaders were trained at the WHO-assisted National Tuberculosis Institute, India, alone.

WHO's assistance to national tuberculosis programmes has most often been given through teams comprising a medical officer, a statistician, a laboratory technician, an X-ray technician and a public health nurse who remain in the country for two to four years until national counterparts have been trained and a national programme can be undertaken. In some of the regions, inter-country teams have assisted governments in assessment of the extent of the tuberculosis problem, the potentialities for developing tuberculosis control, and the operational performance of the national tuberculosis programme. Regional epidemiological and training centres at Bangalore, Singapore and Tokyo have contributed to the pooling of experience, the in-service training of national and international personnel, the centralization of complex statistical work and assistance to individual programmes.

Most of the training activities assisted by WHO in the field of tuberculosis control are undertaken on the spot, in country and regional projects. In view of the demand for physicians trained in tuberculosis organization, a demand that could not be met by existing national and regional training facilities, two WHO-assisted inter-regional training courses (one in English and one in French) on the epidemiology and control of tuberculosis have been held annually since 1961. They have so far been attended by 146 physicians from sixty-seven countries. In addition, many fellowships have been awarded for individual training, and regional seminars have been organized (see Annexes 9 and 15).

Co-operation with other International Bodies

WHO-assisted tuberculosis programmes have received considerable support from UNICEF. After the recommendation by WHO of inexpensive, standard chemotherapy regimens, UNICEF aid was gradually considerably extended to include national tuberculosis programmes combining mass treatment and mass immunization.

The International Union against Tuberculosis has also given valuable support to WHO's work — for example, through research activities undertaken in cooperation with WHO, the dissemination of information about WHO's technical policy, and the encouragement of national tuberculosis associations to supplement the governmental effort.

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The results of systematic research and a rational choice of priorities have brought down the cost of finding and treating a case of infectious tuberculosis in a developing country, if basic health services are available, to between US $10 and US $20, and the cost of each immunization with BCG vaccine to between US $0.10 and US $0.20. The funds at present spent on tuberculosis in many developing countries — between US $0.05 and US $0.10 a head of the population — could finance a national tuberculosis programme as outlined above. However, the maintenance of traditional services such as tuberculosis hospitals means that only a fraction of these funds can be devoted to such a community-oriented programme.

Further research on economical methods of treatment and prevention and efforts to implement the knowledge already acquired, through the establishment of national tuberculosis programmes in all countries, could reduce tuberculosis to a minor public health problem in this century.

LEPROSY

An important change in the approach to leprosy control marked the beginning of the second ten years of WHO. Participants in the seminar on leprosy control organized at Belo Horizonte, Brazil, in 1958,1 were agreed that compulsory isolation of patients should be abolished and replaced by effective control of foci through the treatment of all patients and surveillance of their contacts, hospitalization being restricted to cases in need of special medical or social care. Later the same year, the VIIth International Congress of Leprology, in Tokyo,2 stressed that, from the epidemiological point of view, “it is more advantageous to reduce infectiousness in many patients than to eliminate infectiousness in a few”. This public health approach to leprosy control, reaffirmed by the Expert Committee on Leprosy at its meeting in 1959,3 was accompanied by an expansion of the Organization's leprosy programme in the form of research as well as direct assistance to countries for control projects.

The expansion of the programme began with surveys in various countries in Africa, the Americas and Asia to assess the results of leprosy control programmes and obtain guidance from epidemiological and other data. Map 4 shows the estimated worldwide distribution of the disease. It is believed that there are in

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1 Pan American Health Organization (1959) Seminario sobre el control de la lepra, Belo Horizonte, Brazil, 30 de junio - 7 de julio, 1958 (Scientific Publications No. 41), Washington, D.C.
all some 11 million cases throughout the world. The number of registered patients is over 2.8 million, and the number of treated patients about 1.9 million. Over 2000 million people live in areas with estimated prevalence rates of 0.5 per thousand or higher, and in these areas about one million new cases of leprosy may be expected within the next five years. The estimated number of persons disabled by this disease is almost four million, about half of these being in the higher grades of disability (excluding anaesthesia to pain).

During the decade WHO has assisted a number of countries in leprosy control projects and it has provided technical advice in connexion with projects assisted primarily by UNICEF in each of the six WHO regions. Thus in 1967 such joint assistance was given to thirty-eight countries, two-thirds of them in Africa.

Data obtained by the WHO leprosy epidemiological team in random surveys indicated that between 72 per cent. (Khon Kaen, Thailand) and 100 per cent. (Entre Ríos, Argentina) of the estimated total of lepromatous cases had been already registered and treated. In all areas surveyed, with the exception of Khon Kaen, the proportion was greater than 86 per cent. In general, the proportion of infectious cases has substantially decreased; the proportion of inactive cases was 49.5 per cent. in Nigeria (at Katsina), 44.8 per cent. in Cameroon, 30.7 per cent. in the Philippines, 23.8 per cent. in Thailand, and 12.6 per cent. in Burma. The higher percentages in African countries can be explained by the higher proportion of tuberculoid cases and the longer duration of the campaign. In 1963 the number of patients released from control in the nineteen UNICEF/WHO-assisted projects from which information was available was nearly 170 000, or 14.4 per cent. of the registered cases.

Case-finding has been satisfactory in most of the control projects, and in a few of them the results have been striking. In Burma, for example, the number of registered cases — only 4600 in 1952 — was 176 070 at the end of August 1967. However, poor follow-up and attendance of out-patients for regular treatment continue to be a main obstacle in leprosy control programmes. Leprosy control has been based primarily on chemotherapy with sulfones, and surveys have shown that 73 per cent. of lepromatous patients require more than three years to become bacilli-negative. Unfortunately, the longer treatment continues the less regular it tends to become. If regularity of treatment, at least of infectious cases, is not maintained, the load of infectiousness is not significantly reduced. A further problem is that about 20 per cent. of infectious cases that become bacteriologically negative may become active again within five years.

Various social and economic factors, as well as the lack of an adequate health service infrastructure, of health education and efficient administrative machinery,
often hamper the development of leprosy control programmes and greatly reduce their effectiveness. As campaigns progress, the workload increases significantly with the detection of new cases, follow-up of patients and surveillance of contacts. It becomes necessary to establish costly long-term programmes, which many countries are unable to afford. The importance of establishing priorities according to local conditions was stressed by the Expert Committee on Leprosy at its meeting in 1965; it recommended that in countries with limited resources attention should be concentrated on the treatment and follow-up of infectious cases and surveillance of their contacts.1

The organization of leprosy control programmes was discussed at two WHO inter-regional conferences—in Tokyo in 1958 and in Istanbul in 1961. In addition, a conference on leprosy in Africa, where the disease is a public health problem of the first importance, was organized in 1959; and seminars on leprosy control were organized in Cuernavaca, Mexico, in 1963,2 for countries of the Region of the Americas and in Manila, in 1965, for countries of the Western Pacific Region.

The specialized leprosy control services need the active co-operation of the general health services, and leprosy control should be progressively integrated into the work of the health centres at the local level. Such integration enhances rather than diminishes the role of the well-trained specialist. The Organization has paid particular attention to training both at national and international levels: two inter-regional leprosy training courses (Manila, 1961; Bamako, 1962), two regional courses (Caracas, 1965; Bangkok, 1966) and a travelling seminar in the Americas (1967) have been held.

A guide to leprosy control was produced in 1959 and revised in 1966, on the basis of present knowledge and experience and conclusions derived from WHO advisory and other meetings.

Research

A leprosy research programme has been developed along the lines recommended by a scientific group on leprosy research at its meeting in 1959. The possibility of preventing leprosy by means of BCG vaccination has received much attention. In a hyperendemic area in Burma, with a higher proportion of lepromatous cases than in Uganda, where a study is in progress, a WHO leprosy/BCG team is continuing the trial started in 1964 to ascertain the value of BCG vaccination in the

2 Pan American Health Organization (1963) *Seminario sobre lepra, Cuernavaca, Morelos, México, 12-19 de agosto de 1963* (Scientific Publications No. 85), Washington, D.C.
prevention of leprosy in children. At the end of October 1967, 45,000 persons had been examined and over 18,000 children had been allocated to the BCG-vaccinated and control groups. So far there has been no evidence, after two years of follow-up, that BCG vaccination decreases the incidence of leprosy.

In the chemoprophylaxis trial with diaphenylsulfone (DDS) in progress in India, after three-and-a-half years' observation the incidence of leprosy is 13 per cent. in the control group and 6 per cent. in the group which received DDS. The incidence among contacts of bacteriologically negative cases was similar in the control group and in the group which received DDS, in contrast with the results in the contacts of bacillary cases. The results indicate that the administration of DDS has a protective value for child contacts (up to 10 years of age) of patients with infectious leprosy. Another study is in progress in the Philippines.

Trials of various chemotherapeutic agents have also been undertaken, among them thiosemicarbazone, thiourea and mercaptan derivatives, and long-acting sulfonamides. However, none of these has proved to be as effective as the sulfones, resistance to which appears to be rare. A preparation that could be administered in monthly injections would be valuable for mass treatment. In Venezuela a WHO-assisted trial was conducted to compare the standard dose of oral DDS with monthly DDS injections, and results were similar in both groups. Beneficial results have been obtained by using thalidomide for the treatment of acute leprosy reaction which may occur during the course of the disease in lepromatous patients; a co-ordinated double-blind trial in the Regions of the Americas, South-East Asia and Europe has been started to assess its value. Another trial is being organized to compare the standard dose of DDS with a lower dose in the treatment of lepromatous patients.

Developments in the field of immunology have been handicapped by the lack of mass cultures of *Mycobacterium leprae* as a source of homologous skin-test reagents and of antigens for immunization or for serological work. With regard to the standardization of lepromin, there is evidence that carefully “standardized” batches of lepromin have lower counts after storage, and that these losses are accentuated after the lepromin has been transferred to small vials or during transshipment. A study comparing “standard” lepromin and diluted antigen has shown a correlation between bacillary concentration and the intensity of the early and late skin reactions. In serological studies, it has been widely observed that lepromatous patients produce antibodies that react with mycobacterial polysaccharides, and that significant levels of these antibodies do not occur in tuberculoid patients. Indirect immunofluorescent techniques have shown cross-immunity reactions between *M. leprae* and *M. leprae murium*. This has allowed a quantitative estimation of circulating antibodies in the sera of leprosy patients by
the indirect fluorescent antibody technique, using smears of *M. lepraemurium* as antigen.

In a collaborating laboratory at Campinas, Brazil, it has been demonstrated that the lepromin reaction presents a familial distribution; this suggests the existence of a genetic mechanism responsible for the observed distribution. Studies have also been undertaken on the behaviour of macrophages in the tuberculoid and lepromatous types of the disease. The *in vitro* dimorphism of macrophages of leprosy patients for *M. lepraee* was also demonstrated: those of tuberculoid patients lyse leprosy bacilli completely, while the macrophages of lepromatous patients transform themselves into typical lepra-cells containing numerous bacilli. Another study showed a significantly higher frequency of Australian antigen among lepromatous patients as compared with tuberculoid cases or non-leprosy controls from the same area.

Other WHO-assisted studies have been made with a view to obtaining more fundamental knowledge in the following two areas: transmission to animals, where the local multiplication of *M. lepraee* in the foot-pads of mice has been confirmed in Japan; cultivation of *M. lepraee in vitro*, where no progress has been made, but limited growth in macrophage cultures has been observed.

In one country in the Region of the Americas acid-fast bacilli in very small numbers were found by the WHO leprosy epidemiological team in thirty-eight out of a total of 4107 smears (0.93 per cent.) taken from persons without any clinical sign of leprosy and living in close contact with patients. In follow-up studies on these bacteriologically positive contacts, the longest observation being fifteen months, one person presented signs of leprosy. School surveys in the same population showed that the early cases of leprosy belonged chiefly to the indeterminate group, and there were only a few lepromatous and tuberculoid cases.

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The prospects of controlling leprosy have improved, and resources can now be used more efficiently. Nevertheless, leprosy remains a complex and difficult problem. With the means available and prevailing conditions in endemic areas, leprosy control may be delayed for decades until there is a rise in standards of living and education at all population levels. These difficulties could be overcome by the discovery of an antileprosy drug as efficient as long-acting penicillin in the treatment of treponematoses, or by the development of an immunizing agent. The stimulation and co-ordination of research are essential for future progress in leprosy control.
OTHER BACTERIAL DISEASES

This section describes activities relating to the control of a number of diseases of bacterial origin: food- and water-borne diseases associated with poor sanitation (cholera and the enteric infections), a vector-borne disease (plague), diseases of particular danger to infants and children (tetanus, diphtheria and pertussis), and the cocci diseases (cerebrospinal meningitis and streptococcal and staphylococcal infections). Work on leprosy and tuberculosis is described in the previous pages, and on brucellosis and leptospirosis on pages 152 and 154.

Cholera (see also page 102)

After retreating in the early part of this century to its original endemic foci in the deltas of the Ganges and Brahmaputra, cholera declined in importance even there. From time to time, however, it reached epidemic proportions and invaded neighbouring and other countries, including Thailand and Egypt. In 1960 the cholera-like disease called paracholera (caused by the El Tor vibrio, which, for many years, had remained confined to an endemic area on the island of Celebes in Indonesia) began to invade other islands of the archipelago and then other countries. This was the beginning of the seventh epidemic of cholera (the sixth having lasted from 1899 to 1923). By mid-August 1961, the disease was reported from Macao and Hong Kong, and in September it invaded the Philippines. During the past six years it has occurred in China (Taiwan), the Republic of Korea, Singapore, Malaya, Sarawak, Sabah, West Irian, the Republic of Viet-Nam, Cambodia, Thailand, Burma, Pakistan, India, Nepal, Afghanistan, Uzbekistan, Iran and Iraq. Cholera was introduced into Japan twice during this period, but was prevented from establishing itself.

Cholera has apparently disappeared from some of the newly invaded areas, but has become endemic in others. An important feature of this epidemic has been the replacement of Vibrio cholerae in India by the El Tor vibrio, although the former persists in East Pakistan.

In spite of the increase in the areas affected by cholera, the number of cases reported in this decade has remained low, with two peaks in 1958 and 1964 (see Chart 1, page 141). This is largely due to the marked decline in the incidence of cholera in India.

It was generally believed, before the present epidemic of El Tor cholera, that the Zamzam type of El Tor vibrio did not cause cholera, and that the Celebes-type caused a serious disease with high mortality and low morbidity in the Celebes
CHART 1. CHOLERA, 1958-1967. CASES REPORTED TO WHO.

but did not have a tendency to spread widely; it was therefore not considered as a quarantinable disease. However, when the disease — which is clinically and epidemiologically indistinguishable from cholera — spread and invaded other countries, it became necessary to include it as a quarantinable disease in the International Sanitary Regulations.

Soon after the beginning of the epidemic, with a view to helping countries to control cholera and develop their general health services, WHO established two inter-regional cholera teams — one in South-East Asia and the other in the Western Pacific Region — consisting of epidemiologists, clinicians, bacteriologists and sanitary engineers. Between epidemics, the team members join their national counterparts in cholera research.

During cholera epidemics, *ad hoc* regional cholera control teams are also made available, and WHO assists countries in organizing laboratory diagnosis, treatment and control; it also helps with the training of local workers in various fields, and the procurement of vaccines, rehydration fluid and other supplies.

With a view to training workers in various aspects of cholera, WHO has organized thirteen inter-regional and regional training courses and seminars. They were attended by more than two hundred participants from countries affected or threatened by cholera. The Organization has also assisted several governments with national training courses, providing lecturers and teaching materials.

Developments in the field of cholera have been brought to the attention of health workers through the publication of scientific papers in the *Bulletin*, with two special numbers and a review of recent trends in research.\(^1\) Early information on the results of cholera research is distributed periodically in a mimeographed news bulletin. A treatise on cholera was published in 1959.\(^2\)

Two scientific group meetings (1962 and 1964) and one expert committee meeting\(^3\) have been held to discuss various problems created by the changing pattern of the disease, and to establish priorities for future research.

The WHO International Reference Centre for Vibrio Phage-Typing at Calcutta, India, has examined strains from all the recent cholera epidemics for epidemiological studies, and has provided various countries with standard strains and phages. The centre has developed a test based on resistance of El Tor vibrios to a particular type of cholera phage for the differentiation of cholera and El Tor vibrios, and has also served as a training centre.

The two WHO inter-regional teams have contributed to joint research activities with the Indian Council of Medical Research and the Ministries of Health of

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Japan and the Philippines. These joint studies have made fundamental contributions to the problems of cholera carriers, treatment of cholera and survival of vibrios in various foodstuffs and environments, and to controlled field trials of cholera vaccines.¹

Since 1963, five controlled field trials of eleven different cholera vaccines have been carried out in co-operation with the Governments of India, Japan, the Philippines, and other countries. Even the most effective commonly used vaccines were found to confer only about 50 per cent. protection for less than six months; some have been found to be of hardly any value. Collaborative laboratory studies on cholera vaccine have been promoted in various countries to develop reliable laboratory tests of potency and to promote production of more effective vaccines.

Studies on genetics of choleragenic and non-choleragenic vibrios have also been assisted with a view to achieving a better understanding of their characteristics and mutual relationships and developing an antigenically potent non-pathogenic strain that could be used for oral live vaccine. WHO has assisted experimental studies on immunity to cholera in several laboratories. Cell-free choleragenic material has been obtained from cholera vibrios and an assay procedure developed. Epidemiological studies on carriers revealed a high incidence of short-term carriers among the contacts of cholera cases. The exceptional occurrence of long-term convalescent carriers of cholera in the gall bladder has been recognized. Survival of El Tor vibrios in foodstuffs and the environment has been found to be longer than that of Vibrio cholerae. Extensive and detailed biochemical studies of stool and plasma of patients have enabled clinicians to define the pathophysiological changes in cholera, treat dehydration and acidosis effectively and bring down case-fatality rates from up to 60 per cent. to between 1 and 2 per cent. Clinical trials and laboratory findings have shown that antibiotics are very helpful in the treatment of cholera, making the patients vibrio-free within a day or two, and reducing the fluid loss. However, the disease is still taking a high toll of lives in villages where treatment cannot be obtained, and among children. WHO-assisted studies of the paediatric problem are in progress.

During the past few years, WHO activities concerning cholera had to be adapted to meet the rapidly expanding demands resulting from the epidemic spread of the disease. With a view to providing the necessary additional resources, a Special Account for the Cholera Programme has been established under the Voluntary Fund for Health Promotion; a cholera vaccine bank has been set up under this account to assist countries during emergencies.

Great efforts have been made by Member States and by the Organization to control cholera, but still more remains to be done. Ultimately the control of

¹ Bull. Wld Hlth Org., 1965, 32, 603-625; 1967, 37, No. 5.
cholera, as well as of other enteric infections, depends on the overall improvement of sanitation in developing countries, and there is an urgent need for further international co-operation in this field.

**Plague** (see also page 104)

The incidence of plague had been decreasing steadily during the last ten years until recently, when the number of cases in man again began to increase. In the disturbed areas of the Republic of Viet-Nam, in particular, available data indicate that plague has spread during the past four years from two foci to twenty-seven of the forty-four provinces. While eight cases were reported in 1961, during 1967 the number of cases reported was over 5000. Outbreaks have also occurred in other parts of Asia (Burma, India and Nepal), Africa (the Democratic Republic of the Congo and the United Republic of Tanzania), and in Latin America (Bolivia, Brazil, Ecuador and Peru), where incidence has increased steadily since 1960. However, human cases of plague have not been reported from all areas where natural foci of rodent plague exist and where outbreaks could occur if conditions were to favour the spread of infection to humans.

In 1958 an expert committee reviewed the problem of plague and made recommendations concerning its control.1 While current control and containment measures have been mainly successful, it has become obvious that thorough studies of the various aspects of the disease are necessary before further progress can be made. In the Region of the Americas, the Organization has designed a series of ecological studies.2 In Brazil, Ecuador, Peru and Venezuela — as well as in certain countries in the South-East Asia Region (Burma, India and Indonesia) — WHO has supported studies of the natural foci of plague, including rodents and their ectoparasites transmitting the disease. Following these studies, WHO-assisted national programmes for the surveillance and control of plague have been established, insecticides and vaccines being supplied to combat outbreaks.

The Organization has provided fellowships to enable health workers, including epidemiologists, bacteriologists and zoologists, to receive advanced training abroad. It has also organized two inter-regional travelling seminars on plague control — one in English, in 1965, and the other in French, in 1967 — in the Union of Soviet Socialist Republics, where considerable research and practical field work are carried out in order to keep plague under control in what appear to be the largest potential foci of plague in the world. Special attention was given to the preven-

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2 Pan American Health Organization (1965) *Plague in the Americas* (Scientific Publications No. 115), Washington, D.C.
tion and control of plague at a regional seminar on international quarantine organized by WHO for countries of the Western Pacific Region (see page 101).

The Organization has assisted co-ordinated research on plague in order to determine the location of natural foci, the mode of transmission and the ways in which the disease persists in various parts of the world. Other studies have been made on immune response to various types of vaccine and on immunological and serological techniques that could be used to detect plague in animal reservoirs.

**Enteric Infections**

Enteric infections in this context comprise a variety of clinical syndromes, often associated with diarrhea due to infectious agents or their toxins. They are endemic in areas with poor sanitation, a low level of economic development and inadequate nutrition. While these infections are more common in younger age groups, they afflict the older population as well. In many developing countries they are among the most frequent causes of sickness and death, and contribute most to the high mortality rates in the young, particularly infants; their prevalence represents one of the most direct indicators of the general level of health. The Organization has therefore given particular attention to the study and control of enteric infections and diarrhoeal diseases in younger age groups in developing countries.

A WHO expert committee met during 1963 to review the problem of enteric infections and make recommendations regarding control measures and future research.

Between 1960 and 1965 a WHO diarrhoeal diseases advisory team (composed of epidemiologists, bacteriologists, parasitologists, paediatricians, sanitary engineers and statisticians) carried out, in co-operation with the national health services and collaborating laboratories, cross-sectional surveys in Ceylon, Iran, Mauritius, Pakistan, Sudan, the United Arab Republic and Venezuela. These studies contributed to knowledge of the epidemiology and ecology of enteric infections and showed the relationship between social and environmental factors and diarrhoeal diseases. The main causative agents of diarrhoea could not always be determined in order of importance because of the high incidence of multiple infection. Bacterial and parasitic infection often existed together. Shigellosis was found to be the most common of the bacterial infections, but the studies also

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revealed a very high rate of infestation with various intestinal helminths and protozoa. It was found that proper sanitation and the provision of an abundant supply of safe water on the premises definitely reduced the incidence of diarrhoea; on the other hand, an adequate water supply had no appreciable effect on the incidence of diarrhoea if sanitation remained poor.

On the basis of the results of these studies, the Organization has provided assistance to several countries in the establishment of national programmes for the diagnosis, treatment and control of enteric infections. Emphasis has been laid on improving standards of environmental sanitation, water supply and waste disposal, but relatively few countries have taken full advantage of the assistance available for improving sanitation. With a view to training health workers in the prophylaxis and control of these infections, five inter-regional courses were organized; they were attended by participants from more than fifty countries, and contributed to the development of national programmes and projects in Ceylon, Iran, Sudan and Venezuela.

Five WHO International Reference Centres for Enterobacteriaceae (in Paris, for Salmonella; Copenhagen, for Escherichia; Atlanta, USA, for Shigella; and London, for Shigella and for enteric phage-typing) have provided assistance to more than sixty national reference centres in the identification of enteric infections. This opened the way for the establishment of a system of international surveillance of salmonellosis; countries in the European Region have already begun to co-operate in a surveillance programme (see page 97).

In the field of research, numerous projects and studies have been promoted for the improvement of prophylactic agents and control of enteric disease.1 Epidemiological investigations have been directed towards the study of the geographical distribution, prevalence, mode of spread and sources of salmonellosis and other enteric infections.2 Methods are being developed for the long-distance transport of faecal specimens and sera from areas where laboratory facilities are inadequate.

Studies of etiological agents of enteric infections, their characteristics, antigenic patterns and resistance to antibiotics, as well as studies on the transfer of the resistance factor, have been made by the WHO International Reference Centres for Enterobacteriaceae and national reference centres. Controlled field trials of typhoid and paratyphoid vaccines, covering nearly two million people, have been carried out in Guyana, Poland, the Union of Soviet Socialist Republics, and Yugoslavia,3 as well as in Tonga. Eighteen laboratories in various countries

have co-operated in the evaluation of potency tests of typhoid and paratyphoid vaccines.

These studies indicated that one dose of a potent typhoid vaccine protected between 70 and 90 per cent. of the population in endemic areas, for three or more years. It was also demonstrated that two doses of one type of paratyphoid B heat-killed vaccine gave protection to more than 70 per cent. of those vaccinated.

Live Shigella vaccines, studied in WHO-assisted controlled trials in Yugoslavia,\(^1\) conferred a certain degree of protection. Other WHO-assisted field and laboratory studies are being made in Hungary, India, Tonga, the Union of Soviet Socialist Republics, the United States of America, and Yugoslavia, with a view to improving injectable and oral killed vaccines against enteric diseases and live vaccines against shigellosis.

**Cerebrospinal Meningitis**

Cerebrospinal meningitis continues to be an important health problem, especially in the dry savanna belt in Africa south of the Sahara and north of the equator. Particularly serious epidemics occurred between 1960 and 1962, with case-fatality rates between 8 and 10 per cent. The total number of cases reported in 1962 in Chad, Niger, Nigeria, Sudan and Upper Volta was over 43,000. During 1967 an outbreak of the disease occurred outside this zone, in Morocco, and incidence increased in several other countries in Africa and Asia.

WHO-assisted epidemiological studies have formed the basis for the development of a control programme. With the assistance of UNICEF, stocks of sulfonamides were established at Brazzaville and Niamey for issue on request to countries in the African Region during epidemics for treatment of the population. In 1967 the first regional seminar on cerebrospinal meningitis was organized at Bobo-Dioulasso (Upper Volta) in collaboration with the Organization for Co-ordination and Co-operation in the Control of Major Endemic Diseases (OCCGE).

Epidemiological studies have been made in Africa, and laboratory studies and controlled field trials of vaccines have been carried out.\(^2\) The WHO International Reference Centre for Meningococci at Marseilles, France, has co-operated with several laboratories in Africa and elsewhere in the identification and typing of strains, and in studies on their resistance to sulfonamides.

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Tetanus, Diphtheria and Pertussis

A review of the available data on the geographical distribution of tetanus between 1951 and 1960 indicated that this disease probably causes more than 50,000 deaths each year throughout the world.¹

At an international conference on tetanus organized in 1966 by the Swiss Academy of Medical Sciences with the co-operation of WHO, stress was laid on the universal risk of tetanus, particularly in developing countries in tropical areas where it is a major cause of neonatal death. Because of the high case-fatality rates, special attention has been given to tetanus neonatorum and WHO has supported studies for the evaluation of various tetanus toxoids and vaccination schemes for the immunization of pregnant women.²

WHO has assisted several countries — particularly in the South-East Asia and Western Pacific Regions — in developing campaigns for mass immunization of children against diphtheria, pertussis and tetanus, and has helped to improve their production of vaccines through the introduction of modern techniques. In many countries the necessary laboratory equipment has been provided by UNICEF.

In order to improve the coverage and reduce the cost of mass immunization, campaigns have been combined with BCG, smallpox and other vaccination programmes in many countries.

Streptococcal and Staphylococcal Infections

Streptococcal diseases are still among the most frequent bacterial infections in both economically advanced and developing countries, and, in view of their sequelae, have considerable social repercussions.

In 1966 a WHO International Reference Centre for Streptococcus Typing was established in Prague. In addition to providing sera and reference strains to national reference centres, this laboratory has examined sera from several countries (including Afghanistan, Kenya, Mongolia, Nigeria, Pakistan, Thailand and Togo) for the presence of streptolysin O antibodies.

During 1967 a WHO expert committee met to discuss the problem of streptococcal and staphylococcal infections and to make recommendations for their control.

COMMUNICABLE DISEASES

ZOOONES, VETERINARY PUBLIC HEALTH,
AND FOOD HYGIENE

Even though zoonoses (the diseases which are naturally transmitted between animals and man) are still grossly under-reported and often under-estimated as a menace to human health, awareness of their importance has increased in the recent past. This is attributable partly to a true increase in incidence (as in the case of wildlife rabies and brucellosis), partly to the use of more refined techniques for detection (as in the case of leptospirosis and the viral encephalitides) and partly to greater interest in the health of agricultural workers. In some areas economic losses have been considerable and in others the extension of agriculture in new districts and large development projects have been hampered by the zoonoses. In the developed countries the elimination of the more prominent infectious diseases of man and animals has brought into greater evidence the zoonoses that are usually endemic and insidious.

Much of WHO's work on zoonoses and in other fields of veterinary public health is done in collaboration with FAO: a joint FAO/WHO expert committee reviewed the epidemiology and control of the major zoonoses in 1966¹ and both organizations have had to increase their activities to meet the requests from countries for assistance with field projects and for reference services, standard reagents and literature. FAO also collaborated with WHO in organizing three regional seminars — in Tokyo (1959), Nairobi (1960) and Lahore, Pakistan (1964) — on locally important zoonoses and other related problems, and the veterinary public health measures needed to deal with them; and a regional symposium, in Ghent, Belgium (1966), on collaboration between veterinary and public health services. Examples of field projects are mentioned under individual zoonoses below.

WHO and FAO have sought the application of scientific advances in controlling, and where possible eliminating, zoonoses at their source in animals. Where this elimination of infection is hampered by epidemiological or economic factors (as in the case of rabies and brucellosis) efforts have been concentrated on protecting exposed persons and animals by immunization and other measures.

The problems that arise in dealing with these infections have been the subject of a co-ordinated research programme, and reference centres have been established to assist in epidemiological studies and laboratory work (see Annex 12). Added emphasis is being given to the development of national and international surveillance programmes which are often based on reference centres, as in the case of salmonellosis and leptospirosis.

The Pan American Zoonoses Center in Argentina undertakes research and assists countries in control programmes against brucellosis, rabies, hydatidosis and animal tuberculosis and provides reference services for various zoonoses. It also provides training in zoonoses control, in courses of a year or more for public health personnel from all over the world and in shorter courses for nationals of countries in the Region. Recently, increased contributions from the Technical Assistance component of the United Nations Development Programme and the Government of Argentina have enabled it to expand considerably the scope of its services. In 1966 it was installed in new premises near Buenos Aires.

Besides the zoonoses, the veterinary public health programme of WHO includes food hygiene, comparative medicine, and the education of veterinarians, physicians and others in these fields. The following paragraphs deal with the work on major zoonoses, comparative virology, veterinary education and food hygiene. Comparative research on cancer and cardiovascular diseases is dealt with on pages 211 and 207.

WHO has also organized two symposia on the use of non-human primates in medical research. The special value of these animals in almost all branches of medical research (e.g. communicable diseases, degenerative diseases, psychology, dentistry, reproduction, surgery) has only quite recently been appreciated fully, and few research workers are yet acquainted with the techniques and equipment necessary to make best use of them.

Rabies

There is evidence of an upsurge of animal rabies in Europe, Asia, Africa, and the Americas. Control measures adopted in some areas have reduced morbidity in man and domestic animals, but wildlife rabies continues to spread, and recently cases have occurred in some countries previously free from infection. The situation is kept constantly under review and a world survey is issued annually by WHO of cases of rabies and the measures adopted against it. Most Member States participate in this survey and make use of the information collected. Advice and assistance in setting up field and laboratory services against rabies have been provided to newly invaded or threatened countries, including Belgium, Denmark, the Netherlands and Switzerland. Arrangements to introduce quicker reporting of the progress of infection and the co-ordination of control measures on a regional basis are to be discussed at a WHO conference in the European Region in 1968.

Basic research on rabies and research on control methods have been supported and co-ordinated by WHO with the guidance of two expert committees (1959 and 1965) and two scientific groups (1961 and 1965). Some promising results have

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been achieved in this co-ordinated research programme. For instance, in the treatment of exposed persons, actual or chemical cautery had been employed for centuries without proper evaluation. In a programme assisted by WHO, comparative experiments with a number of disinfectants, detergents and biological agents have shown that the most effective treatment consists of vigorous cleaning and flushing of the wound with soap solution or dilute benzalkonium chloride. Nitric acid is no more effective than these mild chemicals, which do not injure tissues.

Considerable effort has been devoted to the development of vaccines of high immunogenicity, free from the paralytic factor. Although vaccines prepared with virus produced in suckling animals are highly potent and relatively free from the paralytic factor, the future seems to lie in vaccines made from tissue culture in which high-titre growth of the virus can be obtained and physico-chemical methods of concentrating and purifying the virus can be successfully applied.

Not much success has been achieved in experiments aimed at reducing the number of vaccine inoculations in post-exposure schedules, but methods of pre-exposure immunization have been developed to a point where they can be recommended for the protection of occupationally exposed and other persons in endemic areas. In experiments on combined serum-vaccine treatment, recommended in cases of severe exposure, the interfering effect of serum on active immunization has been established. This interference can, however, be overcome by booster inoculations of vaccine given at suitable periods.

Studies assisted by WHO on the morphology of the rabies virus have shown it to be related to viruses of vesicular stomatitis, the sigma virus of fruit flies, the Cocal virus, and the Egtved virus. It is not a myxovirus as was previously considered.

In WHO-assisted work on diagnostic methods a notable advance is the application of immunofluorescence, which enables trained workers to arrive at a relatively reliable diagnosis within a short time. This method is of great help in determining the need for antirabies treatment and also a valuable research tool.

The problem of possible animal carriers of virus has also received much attention, especially as far as bats, foxes and mustelids (weasel family) are concerned. Strains of virus biologically different from the canine virus have been described, though there is no evidence of immunological plurality. The bat virus under certain conditions, for example in caves, becomes airborne and can infect man and carnivorous animals by the respiratory route. In bats and mustelids the virus can be shed by sub-clinical carriers, but in canines this phenomenon is exceptional. Further studies on the behaviour of the virus in wild animal populations are being pursued because it has not yet been possible to apply effective control measures against wildlife rabies.

In view of the increasing research and the need for reference services WHO recently established three International Reference Centres for Rabies, in Paris,
Coonoor (India) and Philadelphia, Pa., USA, and a Regional Reference Centre for Rabies in the Americas in Atlanta, Ga., USA. Reference preparations of rabies vaccine and a standard serum have been prepared and are available to national laboratories, along with reference strains.

In addition to the meetings of expert committees and scientific groups already mentioned, three international seminars — at Moscow (1964), Paris (1967), and Buenos Aires (1967) — were organized to enable rabies workers to discuss and see recent advances in methods of dealing with rabies and in epidemiology and field control. The monograph *Laboratory Techniques in Rabies*,¹ first published in 1954, was revised and new chapters on the fluorescent antibody technique and on the role of the laboratory in rabies diagnosis and prevention were added. Almost all methods described in this manual are suitable for use in laboratories with simple resources. Courses in the use of the fluorescent antibody technique in diagnosis were organized in a number of countries, particularly in Latin America.

Assistance with dog vaccination programmes for rabies control has been provided to a number of countries, including Uruguay where over 400,000 dogs were vaccinated in 1964, and Mexico where vaccination of dogs along the 1500-mile border with the United States of America is being combined, in a programme assisted by the Organization, with the reduction of wildlife.

*Brucellosis*

Brucellosis is a serious hazard to agricultural workers and other exposed persons and causes considerable losses to the livestock industry. Bovine brucellosis has been brought under control in countries that are sufficiently developed economically to be able to apply the test-and-slaughter method, but the more serious infection (*Brucella melitensis*) of sheep and goats continues to be a menace, and in certain areas increased production of these animals has actually led to an increase in the incidence of brucellosis. In many of the sheep- and goat-raising areas it will be a long time before economic development makes it possible to eliminate all infected animals. The WHO programme has therefore concentrated on the testing and improvement of immunization procedures in men and animals — an interim measure, until the risk of infection is eliminated.

Two live vaccines (*Br. abortus* strain 19 and *Br. melitensis* strain Rev. 1) were tested for safety in man. Strain 19 was found to cause a less severe reaction following vaccination. Subsequent tests showed that when administered by scarification, this vaccine caused almost no general reactions, although some of the persons so

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vaccinated failed to show conversion in serological tests. A considerable number of skin-test negative individuals in a highly endemic area have been vaccinated by the subcutaneous route and others by scarification. These and unvaccinated persons are being observed in a study on the protective effect of vaccination. The evidence available so far confirms the protective value of this vaccine, which has been developed for human use at the WHO Brucellosis Centre in Moscow.

Immunization of sheep and goats against *Br. melitensis* infection in collaborative studies sponsored by WHO and FAO has been even more successful and this can now be recommended with confidence as one of the measures to be included in a field control programme. Studies on the comparative immunizing value of the two live vaccines, strains Rev. 1 and 19, and some inactivated vaccines with adjuvant, have shown that strain Rev. 1 produces a relatively strong immunity when inoculated in young animals about three months old. Vaccinated goats have been shown to resist natural (contact) challenge for four-and-a-half years and sheep for three years, the maximum periods of the test so far. This vaccine is being used in the field in WHO-assisted programmes in Iran, Malta, Mongolia and Spain. The vaccine can be used in infected flocks even without prior testing. The inactivated vaccines have their value in the inoculation of adult and pregnant (early stages) animals but they produce an often unacceptable local reaction.

In the standardization of diagnostic procedures collaborative studies were continued on the complement fixation test, using the standard serum already established. Studies at the FAO/WHO Brucellosis Centre at the University of Minnesota, United States of America, showed that sera with mercaptoethanol-resistant antibodies (slow-sedimenting, probably 7S variety) are consistently associated with a focus of infection but not necessarily with a bacteraemia. Sera containing immunoglobulin of the fast sedimenting, mercaptoethanol-sensitive 19S variety are closely associated with inactive disease, ill-defined complaints, sterile blood cultures and low titres of brucella agglutinins. This observation promises a solution of the long-standing problem of diagnosis of chronic brucellosis.

WHO and FAO have collaborated closely with the Sub-Committee on Taxonomy of Brucella of the International Committee on Nomenclature of Bacteria in characterization and speciation of strains of *Brucella*. There is fairly general agreement that *Brucella* strains fall into four quite well-defined groups, each with several biotypes. With a view to further clarification of problems of classification WHO is supporting studies on oxidative metabolism, bacteriophage sensitivity, and determination of genetic homologies.

The foregoing and other research work was reviewed by the Joint FAO/WHO Expert Committee on Brucellosis 1 (1963) and by a WHO scientific group on bruc-
cella vaccine trials in man (1959). WHO collaborated with FAO in convening a meeting on the control of brucellosis in the Mediterranean area (1964) at which the newer methods of control with special reference to *Br. melitensis* infection were discussed.

**Leptospirosis**

With the improved methods of diagnosis now available, leptospirosis is being found almost in all areas where it is looked for. The interest shown in this disease and its widespread distribution have resulted in the isolation and description of a large number of strains and their classification in over 100 serotypes. Eight Leptospirosis Reference Laboratories (in Brisbane (Australia), London, Ness-Ziona (Israel), Rome, Tokyo, Amsterdam, Washington, D.C., and Moscow) assist institutions all over the world in the identification and classification of strains and provide reference material and advice. This work is done in close collaboration with the Taxonomic Sub-Committee on Leptospira of the International Committee on Nomenclature of Bacteria.

The leptospirosis reference laboratories and other collaborating laboratories have also carried out research, co-ordinated by WHO, on diagnostic and typing methods, pathogenesis, epidemiology, immunization and therapy. The results were reviewed by two groups of experts (1962 \(^1\) and 1966 \(^2\)). WHO also circulates reports of unpublished work to those engaged on research in this field.

**Echinococcosis**

Echinococcosis—or hydatidosis—is an important public health and economic problem recognized to a varying degree in every continent. Sheep-raising districts in South America, parts of Oceania and the Mediterranean littoral are areas of highest known prevalence. WHO/FAO programmes have laid emphasis on the role of proper meat inspection and intensive health education in combating it. Programmes based on the long-accepted treatment of dogs with arecolin hydrobromide have failed to achieve elimination of the infection.

WHO has supported research directed, among other things, towards finding methods of accurate diagnosis and trials of anthelmintics to be used in field control. It has been shown that a reasonably sensitive and specific method of serological diagnosis in man is the indirect haemagglutination test, while the bentonite flocculation and latex agglutination tests are also satisfactory. Two collaborating laboratories have found bunamidine hydrochloride, a naphthalene derivative, to be effect-

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\(^1\) *Bull. Wld Hlth Org.*, 1965, **32**, 881-891.

ive as a taeniacide in dogs but not as an ovacide. This drug is recommended for treatment of individual animals but its usefulness in field control programmes has still to be established. Important advances in laboratory methods include the \textit{in vitro} cultivation of the cestode and maintenance of the larval stages in laboratory mice by serial passage of protoscolices inoculated intraperitoneally. These techniques will greatly facilitate systematic screening of anthelmintic drugs as well as physiological and immunological studies of the parasite, and will not involve the dangerous procedure of maintaining the cestode in dogs in the laboratory.

WHO convened two meetings of research workers in echinococcosis, one in 1963 and the other in 1966, to review the research programme and to plan future collaborative studies. A large pool of serum from surgically proven cases of hydatidosis has been collected and is being tested for use as a reference reagent. The preparation of a reference antigen for the skin test has also been planned.

\textbf{Other Parasitic Zoonoses}

Some other parasitic zoonoses included in the WHO programme of work are toxoplasmosis, trichinosis and taeniasis. For toxoplasmosis, a widespread infection in which interest has increased considerably, WHO has arranged the collection, testing and distribution of a known positive serum and accessory factor. Studies, supported by WHO, on the epidemiology of this infection, showed that the protozoan can survive in an infective form in the eggs of a nematode \textit{(Toxocara)} for several weeks and can infect cats which receive these eggs orally. The mode of transmission of toxoplasmosis in nature remains obscure except for the \textit{in utero} transmission from the mother to foetus.

In other parasitic zoonoses emphasis has been on the standardization of diagnostic methods and on prevention by more efficient inspection and control in the slaughter-house.

\textbf{Comparative Virology}

Viruses infecting human beings and animals are often closely related. Considerable effort is being made to systematize knowledge in this field, particularly with respect to classification and taxonomy. This requires the preparation of specific antisera for the identification of virus strains and their grouping. In order to carry out this work with respect to animal viruses, WHO established Eastern and Western Hemisphere Centres on Animal Virus Characterization at the Animal Virus Research Institute, Pirbright, Surrey, England, and the Institute for Comparative Biology, Zoological Society of San Diego, California, United States of America, respectively. Stocks of reference sera are being prepared for selected
animal viruses, and are being systematically expanded to cover additional groups. The work is closely linked to the similar work on human viruses (see page 111).

**Animal Influenza**

On the occurrence of the 1957 pandemic of human influenza work was undertaken by WHO to clarify the possible relationship of influenza in animals to the epidemiology of human influenza. A serological survey in animals was organized by WHO in 1957 and the results showed clearly that the A2 strain causing the human disease can cause natural asymptomatic infection in swine, and that the A/Equi 1 strain first isolated in Czechoslovakia in 1956 was prevalent in the equine population of many countries of the world. In the following years research assisted and co-ordinated by WHO was undertaken by collaborating laboratories in several countries with a view to defining more clearly the epizootiology of animal influenza and its relationship with human infection. The investigations were based on the hypothesis that human epidemics and pandemics may arise from an animal reservoir; they entailed the working out of standard laboratory techniques and reagents, confirmation of findings in different laboratories, carefully designed laboratory and field investigations, and analysis of isolated strains of influenza virus at the World Influenza Centre, London. The results to date reveal hitherto unsuspected connexions between equine, avian and human strains, apart from the already known close relationship of human and swine strains. Also, avian influenza is now known to affect a large variety of domestic and migratory avian species including chickens, ducks, turkeys, quail, pheasants and terns. It is believed that this work may assist in elucidating some of the inexplicable aspects at present associated with the epidemiology of human influenza and the epizootiological counterparts in animals.

**Veterinary Education**

During recent years several countries have become aware of the acute shortage of veterinarians for both public health and livestock production programmes. A number of new veterinary schools have been started in countries with limited resources of materials and trained manpower. The facilities at some of the older schools have been strained by the admission of a much larger number of students. The teaching of veterinary public health particularly is hampered by the shortage of trained teachers.

In 1960, FAO and WHO collaborated in the organization of an international meeting in London on veterinary education in order to assess the need for international action and assistance in this field. Subsequently two joint FAO/WHO meetings of experts on veterinary education (1962 and 1963) considered the requi-
rements of countries at varying stages of development for veterinarians, and also the minimum acceptable standards of education and training of veterinarians and auxiliary personnel. Their findings and recommendations were discussed at a second international meeting on veterinary education, in 1965 at Copenhagen.

Both FAO and WHO have helped in the training of teachers for veterinary schools and provided internationally recruited teachers for short periods, and essential teaching equipment. WHO's assistance was directed particularly towards the strengthening of teaching in veterinary public health. In the Region of the Americas three seminars on the teaching of public health and preventive medicine in schools of veterinary medicine were held (in Kansas City, USA, Mexico D.F., and Lima). Consultants, fellowships, supplies and equipment were also provided. This assistance and interest at national level resulted in the graduation in the Americas of 386 full-time public health veterinarians in 1966 as compared with sixty-five in 1957. Advice and assistance were also provided to schools of public health in the teaching of veterinary public health at the post-graduate level.

A World Directory of Veterinary Schools was compiled and published in 1963 and a second revised edition appeared in 1967.¹

Food Hygiene

A food hygiene programme dealing mainly with food of animal origin (milk, meat, poultry, fish) is being carried on jointly by FAO, WHO and other international organizations. WHO is concerned chiefly with the health aspects, such as food-borne infections and intoxications, and hygienic standards for food, especially from the microbiological point of view. This work includes the development of laboratory methods of food examination, and simplified techniques for use in developing countries. It is relevant to the food hygiene aspects of the Codex Alimentarius programme (see page 226).

Joint FAO/WHO expert committees on milk hygiene (1959)² and meat hygiene (1961)³ have reviewed the hygienic aspect of production, processing, transport and distribution of these foodstuffs and their more important products. Both committees recommended measures for preventing diseases transmitted by milk and meat. In 1967 a WHO expert committee on microbiological aspects of food hygiene, in which FAO participated, reviewed the public health aspects of food microbiology and evaluated the various methods of examination. It also defined the principles for the development of microbiological standards for foodstuffs.

Other meetings convened on this subject included a European regional conference on food-borne infections and intoxications (1959) with special reference to epidemiological investigation and reporting, and an inter-regional seminar held in India (1967) on the same subject to discuss general principles and the special problems of warm countries. Courses were organized jointly with FAO on abattoir management (1962, 1964 and 1966) and meat inspection (1966 and 1967).

WHO co-operated with FAO and UNICEF in an inter-agency working group on milk and milk products, in international courses on the control of milk and dairy products, and in the preparation of a monograph on milk hygiene dealing in detail with the hygienic production, processing, and distribution of milk.

* * *

In future work in the field of veterinary public health, emphasis will continue to be laid on the control of zoonoses and on co-ordinated research in diagnosis, vaccine development, and the epidemiology of major diseases in this group. Surveillance, quick reporting and co-ordinated international measures, rather than national legislative action alone, need to be developed for such diseases as salmonellosis and rabies. Problems of comparative virology and the role of animal viruses in human disease require further study. Food hygiene and standardization will call for more attention as food industries and communal kitchens develop in countries in course of rapid industrialization.

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CHAPTER 5

Malaria and Other Parasitic Diseases

Vector Control

MALARIA ERADICATION

At the commencement of the decade some two-and-a-half years had elapsed since the Eighth World Health Assembly (1955) had decided on the “implementation of a programme having as its ultimate objective the worldwide eradication of malaria”. ¹ The events leading up to that decision, by which the Assembly assigned priority to the development of malaria eradication programmes in place of control operations, were dealt with in the volume covering the first ten years of WHO activities.²

The development of these ambitious programmes necessitated an administrative structure and an advisory support capable of responding to the requests of governments. It entailed a wide dissemination of concepts and techniques, and the training of personnel. Large sums of money were needed for international support, and the countries concerned had to be responsible for providing the personnel and the operating costs.

To help finance the Organization’s expanded activities, the Eighth World Health Assembly established a Malaria Eradication Special Account to be credited with voluntary contributions in cash or kind. By the end of 1960 donations amounting to over US $12 million had been received. But experience showed that the development of the programme would be jeopardized unless a steady source of funds were assured, and the Fourteenth World Health Assembly (1961) resolved that the costs of assistance to malaria eradication should be incorporated in the regular budget, by stages, over a three-year period. The Malaria Eradication

¹ "Malaria eradication means the ending of the transmission of malaria and the elimination of the reservoir of infective cases in a campaign limited in time and carried to such a degree of perfection that, when it comes to an end, there is no resumption of transmission." World Health Organization, 1957, 123, 4.
Special Account was, however, continued for voluntary donations, which had reached a total of US $21 million by the end of 1967.

The Organization's funds available for the programme were in great part utilized for the provision of advisory services and training and for some limited supplies and equipment. The requirements of the programme in the form of supplies of insecticide, provision of sprayers, transport and other equipment were met, in the main, where the governments themselves could not bear the cost, by UNICEF and from bilateral (country to country) sources of assistance.

It is estimated that during the decade up to 31 December 1967 the Organization and the Pan American Health Organization had expended on the malaria eradication programme over US $84 million, including funds made available under the Technical Assistance component of the United Nations Development Programme. Approximately 89 per cent. of this sum was applied to assisting field operations, including training, 9 per cent. to costs at headquarters, regional and zone offices, and 2 per cent. to malaria research. Nearly 30 per cent. was used for field projects in the Americas, 14 per cent. each in the African and South-East Asia Regions, 10 per cent. each in the Eastern Mediterranean and Western Pacific Regions and 3.5 per cent. in the European Region. Inter-regional activities accounted for the remaining 7.5 per cent.

During the same period UNICEF provided supplies and equipment to a value of over US $60 million for a large number of malaria eradication programmes which had the technical approval of the Organization. A recent development has been assistance in the form of food supplements provided by the World Food Programme to national malaria eradication staff in Turkey. Many governments also received substantial assistance from bilateral sources.

Many countries tried to marshal the necessary funds and resources for an eradication campaign expected to cover a period of approximately ten years. But for others, particularly in Africa, the competing demands for the limited national resources of men and materials have prevented adequate priority from being given to malaria eradication, even where malaria is the most important health problem.

In September 1966 the Expert Committee on Malaria, reviewing the status of the programme, noted the substantial achievements whereby nearly 1000 million people, or 60 per cent. of the population of the originally malarious areas of the world, were currently living in areas where malaria had been eradicated or was no longer a major health problem.

The Committee drew attention to the setbacks that had been encountered, the many difficulties that still remained and the magnitude of the task ahead. It recalled that only eleven years had elapsed since the first acceptance of the prin-

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ciple of eradication, and noted that malaria had already been eradicated from very large parts of three regions (Europe, South-East Asia and the Americas). It pointed out that in two other regions (the Eastern Mediterranean and the Western Pacific) programmes with reasonable prospects of success had been established covering large portions of the population; in only one region, Africa, had no progress been made.

In a number of instances, in the general enthusiasm for this vast public health task, the concept of eradication was adopted without the necessary detailed planning and resources to cover the whole duration of the programme. In many countries, as programmes advanced towards the later phases, the inadequacy of the health services to support the programme and to maintain eradication became a major problem. This factor has, however, also served as an impetus to governments to augment and expand the rural health services in the wake of the fast progressing malaria eradication campaigns.

Some aspects of the development of the programme during the decade and the progress made are reviewed in the following pages.

**Development of the Programme**

The essential elements and principles of malaria eradication were enunciated by the WHO Expert Committee on Malaria in its sixth report, which also gave guidance on the planning and organization of the programme's various phases. As experience accumulated these principles have been systematically elaborated in succeeding expert committee reports. In addition, technical meetings and scientific groups have reported on chemotherapy of malaria and on resistance of malaria parasites to drugs.

The basic concept of malaria eradication is not to exterminate the vector completely but rather to kill mosquitos entering dwellings, and liable to become infected from biting an infected person, by spraying with a residual insecticide all indoor surfaces that provide resting places for the mosquito. If this measure can be continued systematically for three or four years transmission of the disease is interrupted, as most of the parasites will die out in infected individuals within

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2. The successive phases of a malaria eradication programme are: the preparatory phase, characterized principally by geographical reconnaissance and training of staff; the attack phase, during which total coverage house-spraying or other attack methods are carried out; the consolidation phase, during which total coverage spraying has ceased and surveillance is carried out; and lastly, from the time malaria is eradicated in the country, the maintenance phase (World Health Organization (1963) *Terminology of malaria and of malaria eradication*, Geneva, p. 82).
three years and the relatively few remaining cases (mainly quartan malaria) and imported infections can be found by case-detection and eliminated by chemotherapy.

Advance from one phase to the next of an eradication programme is based on the information obtained from surveillance activities, which include the discovery, investigation and elimination of continuing transmission, the prevention and cure of infections, and the final substantiation of claimed eradication. The experience accumulated in the field and confirmed by a number of operational research projects on various aspects of surveillance has led to greater technical refinements, to adjustment of field practices to the epidemiological situation and to the enunciation of epidemiological assessment standards. Eradication projects can now be assessed more objectively before it is decided whether individual areas can safely be assigned to the next phase of the eradication programme. Most of the reverses experienced in eradication programmes originated from an incomplete application of the recommended procedures, and from the non-observance of the established epidemiological standards.

At the request of governments, the Organization provides teams of advisers, their composition varying with the needs of the project; for example, medical officers with special training in epidemiology are required for the later stages of eradication programmes and public health advisers are needed in pre-eradication programmes.

The number of established posts for project advisory staff increased from 226 in 1958 to 391 in late 1967, when there were 136 medical officers — employed as malariologists, public health advisers and epidemiologists — twenty-eight sanitary engineers, fifty-six entomologists, three parasitologists, ten administrative officers, two health educators, 119 sanitarians and thirty-seven technicians.

Inter-country and inter-regional teams are used to assess the development of the eradication programme in different countries and undertake special epidemiological studies of areas with technical problems. Their reports give an objective and impartial evaluation of a programme, and assist governments and supporting agencies by pointing to any weaknesses and to the measures and resources required to complete eradication, and by indicating whether the stage has been reached for progress to a more advanced phase of the programme.

The role of general health services in malaria eradication, and the minimum levels of development required to start an eradication programme and to maintain the eradication achieved, were given special consideration by the Expert Committee on Malaria in its ninth and twelfth reports.¹

It is now recognized that, before a programme starts, firm plans must be made and resources must be available to ensure that the local health services will have

the required coverage during the later stages of the attack phase to enable them to assist adequately in case-detection operations; and also that those services will have developed sufficiently by the end of the consolidation phase to undertake the vigilance needed to prevent malaria from becoming re-established. Without them, either costly attack operations have to be continued or spraying operations have to be terminated prematurely and, in the absence of adequate case detection, malaria becomes re-established.

Action against malaria was also urgently needed in some areas of the world where administrative and operational shortcomings prevented malaria eradication programmes from being implemented. These areas included tropical Africa, where there were also technical reasons why eradication programmes could not be undertaken. A special approach was, therefore, developed in 1960 in the form of pre-eradication programmes, designed to build up gradually the technical, administrative and operational prerequisites for the eventual launching of a full-scale malaria eradication programme. They included the development of the basic health infrastructure, the institution of some antimalaria measures to reduce mortality and morbidity, particularly in children, and the training of staff for a malaria service.

Only three countries out of the thirty undertaking this type of pre-eradication programme have advanced thus far to the eradication stage. The requirements for the concurrent development of the malaria service and the local health services exceeded the human and material resources of most of the countries concerned. It became necessary to devote time and effort to the development of local health services and for the most part to limit antimalaria measures to the provision of treatment for people suffering from the disease.

The undertaking of an eradication programme involves a great deal of organization. In many countries a national malaria eradication service had to be set up at central, zone and sector levels so that the whole malarious areas of the country could be surveyed and mapped, and every house recorded. This entailed the recruitment and training of large numbers of professional and technical staff as well as even larger numbers of auxiliary staff, supervisors and agents to undertake geographical reconnaissance, to carry out entomological activities and to collect blood slides from fever cases, microscopists to examine the slides, and an army of spraymen for the attack operations. (At the height of operations more than 500 personnel may be required per million of the population covered.) Offices, laboratories, stores and vehicle maintenance facilities had to be set up throughout the country. Budget estimates covering the whole span of the programme had to be prepared and accepted by the government, legislation passed and, in most cases, assistance obtained from international or bilateral agencies. In other countries, before malaria eradication programmes could be implemented, the malaria
situation had to be investigated, the most suitable methods of attack had to be determined, and in many cases the health services had to be further developed. These projects covered pre-eradication surveys, pilot projects and pre-eradication programmes.

The progress of the malaria eradication programme as a whole has been substantial, but a number of difficulties — administrative and socio-economic, and also operational and technical — have hindered the development of some programmes. Not all countries planned and provided financing for the full duration of the programme or integrated it into the overall national plan for social and economic development. Nor were all countries able to meet the time-targets set in the original eradication plan, and delays and setbacks occurred, causing disappointment and concern to the governments and to the assisting agencies. Many of the setbacks were aggravated by the lack of flexibility in the governments’ financial regulations, which delayed the tackling of problems immediately they occurred. It is often difficult for governments and the public to understand that every single case of malaria in the country has to be eradicated and that there is no such thing as partial success when eradication is the objective. Frequently when the disease has become a minor public health problem government funds for the programme and public support are reduced with a consequent setback to the programme. In some areas disturbed conditions have prevented the necessary total coverage.

In a programme of such biological complexity, technical difficulties may be expected. The attempts to overcome these are reflected in WHO’s research programme on malaria (see page 172).

**The Progress of the Programme**

In 1958 the eradication programme was mostly in a period of transition from the control activities previously assisted by WHO. The disease had already been reported as eradicated in areas with a population of nearly 300 million in some islands in the Caribbean, in Chile, Cyprus, France (Corsica), Italy, the Netherlands, Singapore, five republics of the Union of Soviet Socialist Republics, and the United States of America. Eradication programmes assisted by the Organization were in operation in many of the still malarious countries in the Americas, in Afghanistan, China (Taiwan), Iran, Iraq, Lebanon, the Philippines, the Ryukyu Islands, Syria and Turkey.

Fifty-seven malaria projects were assisted by the Organization in 1957 as compared with over 100 at the end of 1967. The process of conversion from control to eradication programmes was gradual, with more countries starting eradication programmes in the earlier years. Thus, in 1958, ten programmes became operational, including that of India covering over 400 million people or a third of the
population of the originally malarious areas of the world (excluding mainland China, North Korea and North Viet-Nam, for which information is not available). In 1959 six new eradication programmes were started, in 1960 two, in 1961 four, in 1962 three; in 1963, 1964 and 1965 there were no additional programmes; but there were two in each of the years 1966 and 1967.

The progress of the global malaria eradication programme from 1958 until 1967, in respect of populations affected, is shown graphically in Chart 2 (page 166). Since 1959, when a more strict redefinition of the programme phases was made, there has been a steady increase in the number of people living in areas where malaria has been eradicated (maintenance phase). In 1967 the population of those areas amounted to 654 million, or 39 per cent. of the total population (1692 million) of the originally malarious areas, as compared with 22 per cent. in 1958.

The Thirteenth World Health Assembly (1960) requested the opening of an official register in which areas where malaria eradication had been achieved would be listed after inspection and certification by a WHO evaluation team. The first area to be entered in this register as having satisfied the criteria for malaria eradication was in Venezuela in June 1961; it was followed by Grenada and Carriacou, St Lucia, Hungary, Spain, Bulgaria, China (Taiwan), Trinidad and Tobago, Dominica, Jamaica, Cyprus, Poland and Romania.

In 1967 programmes covering a population of 674 million were in the consolidation, attack and preparatory phases of malaria eradication and areas with a further 67 million were in the process of starting the preparatory phase. Areas with a population of 164 million already have pre-eradication programmes and for areas with 46 million such programmes are being planned; but 87 million people still live in areas where there are no immediate plans for developing antimalaria programmes.

Of the 148 countries which in 1948 were considered to be malarious, eradication has been claimed in thirty-five, sixteen of which received assistance from WHO. A further fifty-four countries were undertaking malaria eradication programmes at the end of 1967 (forty-seven of them have been assisted by the Organization) and another twenty-two countries were undertaking pre-eradication operations. Of the fifty-four countries with malaria eradication programmes, eighteen have areas in the maintenance phase, covering a population of over 470 million. But thirty-seven malarious countries were still without definite antimalaria projects, though some had programmes in the planning stage.

The progress of the malaria eradication programme has, however, varied greatly from region to region (see the table on page 167). In most parts of the African Region, malaria remains the most important public health problem, affecting

\footnote{See footnote 2 on page 161.}
CHART 2. GLOBAL MALARIA ERADICATION PROGRAMME:
POPULATION IN DIFFERENT PHASES, 1958-1967

- Maintenance phase (malaria eradicated)
- Consolidation phase (surveillance after attack phase)
- Attack phase (total coverage spraying and other measures)
- Preparatory phase (reconnaissance, organization and training)
- No eradication activities but including countries with pre-eradication and other antimalaria activities not classified as eradication operations
as it does more than half the children under three years of age and virtually the whole population over that age. Recent data compiled in Togo, for example, suggest that among the wage-earning group the prevalence of clinical malaria is not as infrequent as hitherto considered. Nevertheless there has been little valid progress in the eradication programme in the African Region. There are only five malaria eradication programmes, three on islands and two in the extreme south of the continent. Half of the remaining population of 200 million benefit from WHO-assisted pre-eradication programmes.

### PROGRAMME STATUS OF COUNTRIES WITH ORIGINALLY MALARIOUS AREAS, BY REGION, AT 31 DECEMBER 1967

<table>
<thead>
<tr>
<th>Region</th>
<th>Originally Malarious</th>
<th>Entered in WHO Official Register as Having Eradicated Malaria</th>
<th>Where Malaria Eradication Claimed but Not Yet Registered</th>
<th>With Malaria Eradication Programmes in Operation</th>
<th>With Other WHO-Assisted Anti-Malaria Projects in Operation</th>
<th>With No Anti-Malaria Projects</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Assisted by WHO</td>
<td>Not Directly Assisted by WHO</td>
<td></td>
</tr>
<tr>
<td>African</td>
<td>44</td>
<td>-</td>
<td>-</td>
<td>2</td>
<td>3</td>
<td>12</td>
</tr>
<tr>
<td>The Americas</td>
<td>35</td>
<td>6 (6)</td>
<td>7 (2)</td>
<td>21</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>South-East Asia</td>
<td>8</td>
<td>-</td>
<td>-</td>
<td>7</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>European</td>
<td>19</td>
<td>5 (4)</td>
<td>8 (2)</td>
<td>1</td>
<td>3 (2)</td>
<td>2</td>
</tr>
<tr>
<td>Eastern Mediterranean</td>
<td>23</td>
<td>1</td>
<td>3</td>
<td>9</td>
<td>-</td>
<td>3</td>
</tr>
<tr>
<td>Western Pacific</td>
<td>19</td>
<td>1 (1)</td>
<td>4 (1)</td>
<td>5</td>
<td>2</td>
<td>4</td>
</tr>
</tbody>
</table>

Total: 148, 13 (11), 22 (5), 45, 9 (2), 22, 37 (8)

- Figures in brackets show number of countries previously directly assisted by the Organization but not at present receiving assistance.
- Includes some countries with programmes in the planning stage.
- Excluding mainland China, North Korea and North Viet-Nam, for which information is not available.

Pilot projects and field research projects assisted by the Organization were undertaken in twelve countries in Africa and it has been demonstrated that interruption of transmission is feasible in the forest areas of Cameroon and Liberia, using DDT insecticide, and in Uganda, using malathion in one project and a combination of DDT and mass drug administration in another.

Elsewhere in both east and west Africa, although malaria prevalence was appreciably reduced in pilot areas by insecticide spraying or, as in the case of the project in Ghana, by chloroquinized salt, interruption of transmission was not attained.
Further trials using a combination of methods are being undertaken in the savanna area of west Africa. Even where the technical feasibility of eradication has been proved, lack of resources has prevented the implementation of eradication programmes in tropical Africa.

In the Region of the Americas, response to resolutions of the Pan American Sanitary Conference/WHO Regional Committee (1954) and of the Eighth World Health Assembly (1955) led to the concept of eradication being rapidly adopted by all the thirty-five malarious countries of the Region, the last country implementing a programme in 1962. By the end of 1967, 40 per cent. of the population of the originally malarious areas in the Americas was in the maintenance and a further 27 per cent. in the consolidation phase. Of the twenty-nine countries that have received assistance from the Organization, six have been entered on the WHO register as having achieved eradication over the whole or a large part of their territory, in two others eradication is claimed, and twenty-one countries have programmes still in operation. In three of these the prospects of eradication within the present time-targets are good, in twelve the progress has been slow but the prospects of achieving eradication are still good, provided certain essential modifications are made in the plans of operations and their implementation. In the remaining six countries progress has been seriously handicapped by technical and administrative problems, including lack of adequate resources; however, these countries have recently received additional support from the United States of America.

With the widespread use of insecticides for agricultural purposes in a number of countries, resistance of the vector mosquitoes to insecticides has occurred. This, together with other ecological factors, has led to the development of problem areas in parts of these countries, particularly in Mexico and Central America.

In the South-East Asia Region, seven of the eight malarious countries are undertaking malaria eradication programmes and the eighth (Maldive Islands) is carrying out antimalaria operations as part of a WHO-assisted public health project.

Progress has been continuous in the very large programme in India, where over 80 per cent. of the population of 500 million are now living in areas freed from the transmission of malaria, and the rural health services are developing rapidly in the wake of the malaria eradication campaign. In Ceylon, much progress was made, but recently a number of foci developed in various parts of the country due to imported cases and as a result of inadequate surveillance. In Indonesia, too, the initial efforts gave very satisfactory results in the islands of Java and Bali but progress could not be maintained because of local administrative difficulties and lack of funds and imported commodities.

The rate of progress in South-East Asia, which for most of the decade 1958-1967 was substantial and steady, has, during the last few years, been slowed down
in some programmes, which will not, therefore, meet the targets planned. This has been partly due in some instances to the waning interest of governments and assisting bilateral agencies and to a shift in the priorities for allocation of resources and the consequent lack of support for the completion of the programme.

In the European Region malaria was at one time prevalent in nineteen countries, but is now no longer endemic in sixteen of them. The elimination of endemic malaria from continental Europe was greatly stimulated by the Regional Committee for Europe, which, at its ninth session (1959), urged all the countries in the continent with indigenous malaria to make every effort to ensure that the consolidation phase of their eradication campaigns was reached in 1962. This co-ordinated plan achieved its objective by 1963.

Of the four eradication programmes still in operation in the Region, three have been assisted by the Organization, and only in the Asiatic part of Turkey are there areas still in the attack phase. The two pre-eradication programmes — in Algeria and Morocco — have made good progress and, provided the necessary material and financial support can be obtained, these countries should shortly be able to undertake full eradication programmes within the framework of the public health services.

In the Eastern Mediterranean Region, malaria eradication is registered in one country and claimed in three more of the twenty-three countries with originally malarious areas. WHO assists twelve programmes — nine malaria eradication programmes and three pre-eradication programmes. The eradication programmes in Lebanon and Pakistan are progressing very favourably. The latter programme, which accounts for over half the total population of the malarious areas of the Region, is being undertaken on a staged basis. In Iran, however, serious setbacks have occurred in the southern part of the country because of double insecticide resistance of the vector and a nomadic population. The programme in Tunisia started in 1966, and the others have proceeded satisfactorily, although with some delays.

In the Western Pacific Region nineteen countries from which information is available were originally malarious and eleven of them have received assistance from WHO under the malaria programme. The registration of eradication has been made for China (Taiwan), and in four other countries eradication is claimed. Five WHO-assisted eradication programmes are in progress, including two recently started in Brunei and West Malaysia, and there are four pre-eradication programmes.

Factors retarding progress of some programmes in the Region are insecurity, logistic problems and ecological factors, particularly in areas where Anopheles balabacensis is the vector. In some areas resistance of Plasmodium falciparum to 4-aminoquinolines has also been reported.
Exchange of Information and Training

The malaria conferences and meetings sponsored by the Organization serve to provide a platform from which new concepts and policies may be disseminated and their application discussed, a forum in which experiences are shared and problems and solutions studied, and a focus for co-ordination. The importance of these activities was emphasized at the Sixteenth World Health Assembly (1963).

Meetings on malaria range from small inter-country border meetings and seminars for the discussion of special problems to large conferences with many countries participating. Examples are the inter-regional meetings held in Bucharest (1958), in Addis Ababa, Baghdad and Brazzaville (1959) and Teheran (1962); and those for Africa, in Yaoundé (1962); for Asia, in New Delhi (1959), Manila (1962) and Colombo (1965); for Europe, at Palermo, Sicily (1960) and Tangier, Morocco (1962); and for the Americas, the annual meetings of the directors of national malaria eradication services. Another important co-ordination meeting is that held annually between WHO and UNICEF and the United States Agency for International Development, which both provide assistance for malaria eradication. The UNICEF/WHO Joint Committee on Health Policy in 1959, 1961, 1963 and 1967 discussed malaria eradication with a view to formulating a policy of assistance for this programme.

Technical information and advice are also furnished by means of technical literature, both printed and mimeographed. The publications include Age-Grouping Methods in Diptera of Medical Importance, a revised and expanded version of a series of lectures given during a WHO-sponsored course in London in 1959; 1 Terminology of Malaria and of Malaria Eradication, 2 which brings up to date a previous work published in 1953; and Statistical Methods in Malaria Eradication, originally issued in mimeographed form and revised and published in 1966. 3

A number of manuals on malaria eradication techniques and procedures, issued in mimeographed form, have dealt with: the use of medicated salt, examination of blood slides, preparation of programmes, epidemiological evaluation and surveillance, practical entomology, geographical reconnaissance and health education. In addition, nearly 500 mimeographed documents covering various aspects of malariology, providing up-to-date information on advances in techniques, new discoveries and fresh approaches in malaria eradication, were circulated during the decade, each to over 1000 national institutions, senior officials of

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national malaria eradication programmes and public health and research workers with particular interest in malaria. Many of these documents were subsequently published in the Bulletin.

Information on the epidemiological status of malaria eradication programmes in the world is published twice a year in the Weekly Epidemiological Record with a map appearing annually.¹ This information includes the countries of origin of imported cases, and international ports and airports free from the risk of malaria transmission. It helps countries where malaria has been eradicated to formulate measures for preventing its re-establishment in the freed areas. A coordination meeting was convened in Washington, D.C., in 1966 to study international preventive measures against the re-establishment of malaria.²

Training has been provided for both national and international staff. The latter had traditionally been sought among leading professionals of the national services. However, the rapid expansion of the malaria eradication programme demanded so many specialized personnel that specific training had to be provided to enlarge the sources of recruitment.

In general the more senior categories of national staff, responsible for the planning, top supervision and assessment of the programme, have been trained at international centres, and the junior grades have been trained within their own countries.

Initially courses were run at established centres such as those in Amsterdam, Basel (Switzerland), London, Moscow and Rome. But training has to be provided in areas where malaria existed: the facilities of the School of Malariology, Maracay (Venezuela), were used in the early stages for this purpose, and assistance was given to the national authorities for their increased training needs in Brazil (at the School of Hygiene and Public Health, São Paulo), in India (at the Malaria Institute, Delhi) and in Iran (at the Institute of Parasitology and Malariology, Teheran).

It also became necessary for the Organization to set up special international malaria eradication training centres with the co-operation of the governments concerned and with, in some cases, assistance from the United States Agency for International Development. The first of such centres to be established was that in Kingston, Jamaica (in operation from 1958 to 1963), followed by those in Tala, Philippines (1959-1961), Cairo (a regional centre) (1959-1962), Belgrade (1961-1963), Lagos (opened in 1962), Manila (in 1963, replacing the Tala centre) and Lomé (in 1964). The activities of the international training centres can be illustrated by the Kingston centre, where eighteen courses were held for professional

and six for technical staff; they were attended by 405 trainees from sixty-nine countries in the six WHO regions.

In addition special fellowships were awarded each year — 159 during the decade — under the exchange of malaria workers scheme for senior staff of national programmes. These fellowships enabled selected staff to visit other countries, study the methods used, and discuss their own problems with other workers in the same field.

The greater part of national staff training, however, is carried out within the country. By the end of 1967, the Organization was assisting in the planning and conduct of courses at eight specially established national centres — in Algeria, Brazil, Ethiopia, West Malaysia, East and West Pakistan, the Philippines and Sudan. These national centres provide training principally for the middle and lower supervisory staff for field operations, and for microscopists, entomological assistants and surveillance inspectors. In other countries WHO assists courses organized at national institutes and laboratories or at programme headquarters.

Two meetings were convened by WHO in 1966 and 1967 to standardize curricula for various types of courses, including refresher courses, given at the malaria eradication training centres, and to improve teaching methods. A guide has been prepared to assist the instructor in planning and carrying out his teaching and in assessing the progress of his students. In a number of countries WHO has also assisted in training the general public health service staff to take over malaria vigilance responsibilities in the maintenance phase and in training malaria eradication personnel in general public health activities. An indication of WHO’s increasing assistance to training connected with malaria is the number of the Organization’s staff engaged full time in this work: thirty-three at the end of 1967, as compared with only two in 1958 and eighteen in 1962.

**Malaria Research**

Research activities in the field of malaria have continued to expand along the lines recommended by a WHO scientific group in 1959. An account of the scope and results of research in the earlier years is given in *The Medical Research Programme of the World Health Organization, 1958-1963.* One of the characteristics of the co-ordinated malaria research is its flexibility and rapid adaptation to new, sometimes unexpected, happenings in the field.

Field research on malaria is generally carried out by WHO research teams but the bulk of applied and fundamental research is undertaken by national and other

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Vaccination against poliomyelitis in Nigeria.

Health education plays an important part in the campaign against trachoma in Taiwan.

VIRUS DISEASES

In the vast field of virus diseases WHO assistance includes the organization of control programmes and eradication campaigns as well as research.

Research is being done under WHO auspices to increase knowledge about the role of migratory birds in the dissemination of certain tick-borne virus diseases.
The decade has seen substantial achievements in the worldwide malaria eradication programme, and by the end of 1967 about 1000 million people were living in areas, originally malarious, from which the disease had been eradicated, or where it was no longer a major health problem. Some operations in the different stages of the eradication programme are illustrated on these pages.

Residual insecticide spraying of all indoor surfaces to break the infection link between the mosquito vector and man is the basic aim of the attack phase. Teams in Mexico and (below) in the jungle in Borneo.
During the subsequent consolidation phase, the malaria parasite is eliminated from the remaining human carriers discovered through regular surveillance operations. Members of an inter-country experimental malaria surveillance team collect blood samples during a follow-up survey in Mysore, India.
The irrigation schemes associated with economic development may help to spread schistosomiasis by providing conditions that favour the increase of the snail hosts. In a campaign in Brazil infected snails are examined under a microscope.

Onchocerciasis, which results in blindness, is prevalent in tropical areas of Africa and the Americas close to rivers since the blackfly that transmits the disease breeds in running water. Here a health assistant tests the sight of villagers in the Niger river basin in Mali.
scientific institutes, with some financial assistance from WHO, on the basis of a formal agreement. In the past ten years a total of 260 agreements were established for such research projects at a cost of over US $750,000. Forty-five of these were for work in parasitology, fifty-seven in chemotherapy, eighty-one in entomology, twenty-one in immunology, forty-seven in epidemiology and nine in methodology of attack operations. In 1958 four research agreements were in operation, as compared with an average of forty over the past three years.

In the early years attention was focused on the technical problems connected with the application of residual insecticides, the assessment of the duration of activity of various formulations, the absorptive action of surfaces on which the insecticides were sprayed and the development of efficient spraying equipment. Later, attention was given to studies on the resistance of malaria vectors to residual insecticides and the development of a standardized technique for assessing susceptibility (see also page 189).

There is an increasing interest in the quantitative epidemiology of malaria, the epidemiology of disappearing malaria, new immunological techniques that might be valuable for case-detection, genetic aspects of malaria infection in man, the vectorial capacity of Anopheles, genetic studies on systematics of Anopheles, the physiology and genetics of the pattern of response of malaria vectors to insecticides, newer imagocides and larvicides that have passed the preliminary screening, and studies on genetic control of some anopheline vectors (this work is described in greater detail in the section of this chapter dealing with vector control, pages 187 to 201).

The Organization has assisted in the development of fluorescent antibody techniques for the assessment of taxonomic relationships between various species of malaria parasites. This method is now a valuable pointer in screening potential carriers of malaria infection among blood donors. It has also served to identify species of sporozoite infections in the salivary glands of mosquitoes, to study the tissue phase of experimental infections in rodent malaria and to estimate the degree of malaria immunity in a community.

For the study of feeding preferences of malaria vectors, the method of precipitin tests on the blood meals has been extensively used and during the decade 124,000 such tests were carried out on ninety-two species of Anopheles from various parts of the world with assistance from WHO.

The resistance of Plasmodium falciparum to 4-aminoquinolines, observed in some areas of South-East Asia and South America, has led to increased experimental chemotherapy and to the development of laboratory models for screening of new antimalarial drugs. The chemotherapeutic evaluation and toxicity testing of new potential antimalarial compounds entail screening with avian malaria parasites, followed by trials against plasmodia of small mammals and eventually
against simian malaria, before the compounds can be tried in man. The discovery of the experimental transmission of *P. berghei* and *P. chabaudi* through anopheline vectors and the study of primary tissue phases of these parasites in small mammals have increased the possibilities of their utility in experimental chemotherapy.

A potential antimalarial, a 4-amino-pyrocatechol derivative with a dialkyl-aminoalkyl substitute, known as RC12, was developed in the Federal Republic of Germany with the assistance of the Organization and has shown some promise as a prophylactic or radical curative agent on monkey malaria.

While essential in the consolidation phase, drugs are also employed during the attack phase as a complementary measure to reduce the parasite load of the community and hasten the interruption of transmission. This has been studied in a mathematical model, based on epidemiological factors, and its practicability is being assessed by a WHO research team in Nigeria.

Medicated salt trials have been assisted in various parts of the world where special circumstances indicated that they might be of value. Field trials have been carried out of an injectable repository drug having a potential long-acting protective effect — a cycloguanil embonate, a dihydrotriazine metabolite of proguanil, used alone or in combination with a sulfone. Further work has also been stimulated on sulfones and sulfonamides, used alone or with pyrimethamine, for the treatment of falciparum malaria resistant to 4-aminoquinolines.

International research on malaria is further aided by the work of the WHO malaria reference centres: the International Reference Centre at Bethesda, Md., USA; and the two regional centres at New Delhi, India, and Epsom, England.

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The attainment of eradication of malaria throughout the world is still distant. The ultimate success of the programme depends: first, on the sustained efforts of governments to pursue their eradication programmes to final achievement, and to maintain — through the development of health services — the vigilance necessary to prevent the disease from being re-established and, secondly, on technical advances to facilitate the solution of some special problems. Both aspects depend to a great extent on continued assistance from international and bilateral sources.

One of the causes of prolongation of programmes has been their unequal development in neighbouring countries with common epidemiological features. In the future development of programmes, especially in Africa, eradication plans need to take account of epidemiological areas covering groups of countries.
OTHER PARASITIC DISEASES

Hundreds of millions of people are estimated to be affected in varying degrees by one or several parasitic diseases: there are about 200 million with schistosomiasis, 190 million with filariasis, 450 million with hookworm, 50 million with onchocerciasis, 650 million with ascariasis, and 7 million with Chagas’ disease. In addition, there are all those affected by mycotic infections and various other parasitic diseases.

These infections are important causes of morbidity and mortality and a heavy burden on the economy of developing countries, but the obstacles to their control are numerous. Most parasites pathogenic for man have extremely complicated life cycles, with obligatory passage through one or several intermediate hosts or in the soil. Gaps in fundamental knowledge undoubtedly account for some of the frank failures or only partial successes met in past control efforts, since the epidemiology of these diseases must be fully understood in order to detect the easiest and surest point of attack and to develop specific, inexpensive methods of control for use on a large scale. Furthermore, most developing countries which bear the brunt of these diseases are as yet insufficiently equipped in medical and laboratory services, and lack financial resources and trained personnel.

The Organization’s programme has been directed towards assessing the public health importance of the major parasitic infections, so that the proper priorities may be assigned to them in public health programmes; assisting countries by giving technical advice in the planning and implementation of surveys and control projects and by providing help with the training of personnel, and sponsoring and co-ordinating field and laboratory research.

There has been close co-operation with other agencies in the United Nations system. In some cases UNICEF has given assistance to projects for the control of diseases affecting particularly the health of children. Since large-scale economic expansion programmes aimed at developing irrigation and agricultural resources may be hampered by the presence of the so-called “water-related” diseases such as schistosomiasis or onchocerciasis, or may favour their spread if appropriate measures are not taken, WHO has co-operated with FAO in such programmes, especially those financed under the Special Fund component of the United Nations Development Programme.

Schistosomiasis

Interest in schistosomiasis (or bilharziasis) has been stimulated by some of the striking clinical findings made recently and the development of new or improved
epidemiological and control techniques. This has been reflected in the expansion of the programme, especially since 1958, in relation to research. The programme has been reviewed by a number of expert committees and scientific groups. In 1960 the second conference on schistosomiasis in Africa was held under the joint auspices of WHO and the Commission for Technical Co-operation in Africa (CCTA) at Lourenço Marques, Mozambique.

Surveys by WHO, together with information supplied by governments, showed that except in a few countries the infection was either static or spreading. Foci of the disease have recently been discovered in South-East Asia, which had so far been considered free of schistosomiasis. Plans have been made for extensive surveys in Laos and the neighbouring areas along the Lower Mekong River to identify the intermediate host and the parasite (presumably *Schistosoma japonicum*).

In 1958 the Organization set up an inter-regional bilharziasis advisory team which during the six years of its existence visited thirty-six countries, investigating the part played by irrigation in the spread and increased severity of schistosomiasis and advising governmental services on appropriate preventive measures. Since 1964, this work has been carried on by ad hoc teams whose investigations in connexion with irrigation schemes have extended to all health-related aspects of such projects.

The question of the severity of the disease has long remained an open issue, especially in the case of urinary schistosomiasis caused by *S. haematobium*. It was referred in 1960 to a WHO scientific group which made suggestions for various studies. With WHO's support, the Ross Institute of Tropical Hygiene, London, undertook a number of cross-sectional studies in the United Republic of Tanzania, using combined parasitological, clinical and radiological methods. The most unexpected finding was the high incidence of severe urinary lesions revealed by intravenous urography in more than 20 per cent. of the child population and in over 10 per cent. of adults, which was corroborated by similar findings in Nigeria and Senegal. Such evidence of serious lesions occurring in adolescents and children, but with lesser frequency in adults, suggested that schistosomiasis might be the cause of considerable mortality, unsuspected so far, in young people, in addition to being an important cause of morbidity in the general population. Additional guidance concerning the methodology for testing this new working hypothesis was provided by another scientific group in 1965, which further recommended investigating the relationship between schistosome infections and certain other

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conditions, notably bladder carcinoma, cardiovascular disease, cirrhosis of the liver and urinary infections.¹

In 1966 a programme was set up, including longitudinal studies of communities, supplemented by parallel studies using histopathological, post-mortem, radiological, surgical, serological and biochemical procedures, to be carried out over several years by a WHO research team in collaboration with the Department of Preventive Medicine at the University of Ibadan, Nigeria.

The investigation of schistosomiasis in any area, the subsequent decisions regarding control, and the application and evaluation of the control measures are entirely dependent upon the meticulous collection of reliable data on the disease in the human population, on other vertebrate hosts, and on the snail population. Techniques are constantly improved and tested in WHO-assisted projects and are also periodically reviewed by expert committees and scientific groups.

WHO-assisted research on the diagnosis of schistosomiasis included the development and application of immunological techniques, as recommended by two scientific groups (1961, 1962) and by the Expert Committee on Immunology and Parasitic Diseases (1964).² One aspect of this programme concerned the preparation and evaluation by collaborating laboratories of a WHO S. mansoni reference antigen for skin testing which, in surveys conducted in various endemic areas, proved to be a useful, simple tool in large-scale screening operations. A comparative study demonstrated that this antigen can also be used in a serological test — the complement-fixation test.

One of the two models developed for the mathematical analysis of the factors involved in the transmission of schistosomiasis is being tested by the WHO research team for possible use in predictive epidemiology and orientation of control operations. Meanwhile, the Organization is supporting research to elucidate little-understood aspects of the dynamics of transmission — for example, studies on human exposure patterns; on the ecology of the parasite in the human host, including the survival of adult worms; on snail population dynamics, and on the resistance of snails to infection.

At present, snail control is the most effective single measure for reducing schistosomiasis; however, successful control of the disease in many foci can be achieved only by the successive use, carefully timed, of snail control techniques and chemotherapy.

In the last decade WHO has provided advisory services to nine pilot projects — two of them undertaken with the assistance of UNICEF — in Brazil, Ghana, Iran, Iraq, Lebanon, Libya, the Philippines, the United Arab Republic, and the

United Republic of Tanzania. These projects have also contributed to progress in epidemiology and control techniques. The project in the Philippines, for instance, has demonstrated the importance of engineering control methods in irrigated areas and the economic feasibility of a control programme, and the project in the United Arab Republic has provided confirmation that schistosomiasis can be interrupted by molluscicide applications.¹

Continued search has been made for better molluscicides and more efficient formulations and methods of application. Recommendations concerning snail control techniques have been published in reports of expert committees, and detailed information was given in the publication *Snail Control in the Prevention of Bilharziasis.*² After chemical companies have screened compounds for molluscicidal activity, WHO-assisted research and control units in various countries help in the further evaluation of promising compounds.³

The respective advantages and disadvantages of molluscicides currently in use and of candidate molluscicides have been evaluated. Work has also proceeded on plant extracts and cercaricidal agents. The harmful effects of molluscicides, for instance on young rice-shoots and on fish, have been evaluated in field trials. There is still need for molluscicides that are highly selective for snails; in this connexion, WHO has supported fundamental studies on snail physiology, in particular on the mode of action of molluscicides and on the defence mechanisms of the different snail species and strains.

Two WHO scientific groups (1959, 1964⁴) assisted in the standardization of drug evaluation procedures used in experimental chemotherapy and in clinical trials.

In 1963 the Government of the United Republic of Tanzania, the Medical Research Council, London, and WHO established the Bilharziasis Chemotherapy Centre at Tanga, where clinical trials have been performed with various drugs and dose regimens. The Centre has undertaken a number of comparative trials of antimonial drugs used against urinary schistosomiasis, providing an effective series of standards of efficacy by which the antimonials can themselves be assessed and which can be used as a yardstick for the evaluation of other drugs. A series of field trials with niridazole (Ambilhar) has also been conducted at the Centre at Tanga. There is hope that this — or a similar drug — may be of value in control programmes, but a careful assessment of toxic effects still has to be made. Trials of other new drugs are currently being assisted by WHO.

In support of the collaborative programmes on the chemotherapy, pathogenesis and immunology of schistosomiasis, the Organization has assisted in the laboratory maintenance of schistosome strains for distribution to research institutions; studies of schistosome infections in laboratory animals; the collection and distribution of schistosome materials for antigen analysis and production; and the collection, preservation and distribution of serum samples from cases of schistosomiasis.

The Organization has also assisted the laboratory maintenance of intermediate host species and strains for use in studies on the physiology of snail hosts in connexion with investigations on snail-population dynamics and the molluscicide programme.

For ecological studies of snails, the WHO Snail Identification Centre, established in 1964 in Copenhagen, has collected and performed species determination of snails obtained in the African and Eastern Mediterranean Regions. In the Americas, assistance has been given to the International Snail Identification Centre for the Study of Schistosomiasis, at the National Institute of Rural Endemic Diseases, Belo Horizonte, Brazil. Guides have been prepared for the identification of intermediate hosts in Africa 1 and the Americas.2

Services rendered to field and research workers have included dissemination of information by means of various documents and publications — for example, the Bibliography on Bilharziasis.3 Training of national personnel for control and research work has been promoted by means of fellowships and grants. An inter-regional training course on schistosomiasis control was held in Cairo in 1958. Schistosomiasis was included in the curriculum of the course on survey techniques held in Kampala, Uganda, in 1967, and the same year a special training course on malacology was organized at the WHO Snail Identification Centre.

Filariasis

Filariasis is of particular concern to many countries, especially India, where over 120 million people live in endemic areas and it is estimated that over five million people are affected clinically. The disease is spreading wherever rapid, uncontrolled urbanization has created favourable conditions for the breeding of Culex pipiens fatigans, the chief vector in Asia of Wuchereria bancrofti.

In the last decade two expert committees (1961, 1966) and an inter-regional seminar (Manila, 1965) were convened by the Organization to review advances made in the epidemiology and control of diseases due to the *Wuchereria* and *Brugia* parasites. It is now apparent that large-scale efforts to control the disease have not always been successful and, even in areas with the best results, complete interruption of transmission of the infection has not been achieved.

Because of the dynamics of the transmission of filariasis and the long life-span of the adult worm, control of the infection depends greatly on chemotherapy. The Organization has therefore sponsored clinical studies and field trials with various formulations of diethylcarbamazine and has supported the search for new filaricides. It has also assisted two control projects: in Western Samoa, where mass drug administration is being carried out, and in Ceylon, where chemotherapy and vector control are used in combination.

In 1962 WHO established in Rangoon, Burma, a filariasis research unit, which has contributed to the knowledge of the bionomics of *C. p. fatigans*. Assistance has been provided to research institutions for physiological studies of the mosquito vectors and experimental transmission studies to determine, for instance, the transmission potential of various mosquito vectors and the differences in their susceptibility to infection.

Other investigations have been concerned with the mode of entry of infective filaria larvae into the vertebrate host and the fate of infective larvae in susceptible and non-susceptible hosts. Since general biological research and the screening of new drugs are greatly hampered by the lack of a suitable experimental animal, support has been given to several studies with a view to discovering a wild or laboratory animal infected with a filaria species that would behave like human filariae.

Assistance has been given for a study of *W. bancrofti* in Africa, and for research leading to improved techniques for epidemiological investigations, in particular, research on transmission dynamics for the development of predictive mathematical models, and studies for the development of sero-immunological diagnostic tests. Two purified antigens, one for skin test and the other for complement-fixation test, have been recently isolated in Japan from *Dirofilaria immitis*, and are being subjected to further evaluation. This involves the preparation of large amounts of the antigens, the collection of serum samples from known filarial cases for the purpose of comparing serological information with results of skin test, and the assessment of the specificity and sensitivity of these purified antigens.

At its meeting in 1966 the Expert Committee on Filariasis recommended the establishment of parasitological reference centres to which all stages of filarial worms, including larval stages in vectors, could be sent for identification.

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Onchocerciasis

The second WHO conference on onchocerciasis in Africa (Brazzaville, 1961) and the Expert Committee on Onchocerciasis (1965) recognized that onchocerciasis, with its associated blindness, is a major endemic disease affecting the development of large parts of the African continent and of circumscribed areas in the Americas. The direct association between eye lesions and onchocerciasis was confirmed by surveys carried out in 1962 in Guatemala and West Africa.

According to recent surveys, onchocerciasis transmission takes place over wider areas than hitherto suspected, and the problem is aggravated by the many projects of water development that are being undertaken, especially in Africa. WHO has assisted in the assessment of problems raised by onchocerciasis in Guinea, Sudan, Uganda and Venezuela; the survey in Guinea led to the planning of a control project, which was begun in 1967. In 1966 an onchocerciasis advisory team was set up in the African Region to advise governmental services on control measures.

Control of the disease by means of vector control operations has been achieved in some geographically well-defined foci—for example, in Kenya—but elsewhere difficulties have been encountered. WHO has set up a collaborative programme of insecticide evaluation (see page 191) and sponsored studies on the ecology of the blackfly (Simulium) vectors—search for resting places of adult flies, precise determination of flight range, feeding habits, etc.—which are prerequisites for a soundly planned programme of control in any area.

In one study carried out over several years by the Organization for Coordination and Co-operation in the Control of Major Endemic Diseases (OCCGE), the possibility was investigated of controlling larval aquatic stages by means of different designs of dam spillways. Colonization of Simulium vectors in the laboratory provides opportunities to study many of these problems.

Some of these studies are being conducted in connexion with the WHO-assisted inter-country onchocerciasis pilot and demonstration project in the Volta River basin in an area covering contiguous parts of Ghana, Togo and Upper Volta.

One survey, carried out in 1964 in four formerly endemic areas of Kenya where the vector Simulium neavei had been eradicated many years before, helped to establish the course of the disease and of eye lesions in the absence of reinfection, and produced the only conclusive evidence available today on adult worm longevity (from 12 to 18 years). However, many aspects of the natural history of the

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disease are still obscure, hence the importance of WHO-supported experiments on transmission in animals other than man (for example, cattle and chimpanzees).

WHO-supported investigations conducted at the helminthiasis research unit at Kumba, Cameroon, succeeded in establishing the existence of two \textit{Onchocerca volvulus}/\textit{Simulium damnosum} complexes in West Africa, the first extending from the forest into the Guinea savanna where eye lesions are rare, the other confined to the Sudan savanna and associated with a high incidence of blindness. Research is being continued to determine whether more than one strain of \textit{O. volvulus} may be present, and genetic studies are being made of morphological and behavioural variations of \textit{S. damnosum} in Africa.

Regarding the chemotherapy of onchocerciasis, assistance has also been given for the screening of new drugs through animal experiments, and for clinical trials with various treatment schedules likely to simplify the administration of currently available drugs and for assessing the toxic effects of other candidate drugs for use in mass treatment.

A WHO training course on the ophthalmological aspects of onchocerciasis was organized in 1958 at Bamako, Mali.

\textbf{Other Helminthiases}

The soil-transmitted intestinal worms, among them the roundworm \textit{Ascaris lumbricoides}, the whipworm \textit{Trichuris trichiura} and the hookworms \textit{Ancylostoma duodenale} and \textit{Necator americanus}, are, as a group, the most widespread of the helminths affecting man. Nevertheless, their control has lagged far behind measures against other endemic diseases, owing chiefly to the fact that the extent of the morbidity they cause and their economic consequences have rarely been assessed by standardized quantitative methods and techniques.

Following the recommendations made by the CCTA/WHO African conference on ancylostomiasis, held in Brazzaville in 1961,\(^1\) and by the Expert Committee on Helminthiases which met in 1963,\(^2\) WHO sponsored investigations of soil-transmitted helminthiases in several areas, in particular studies on the relationship between anaemia, nutrition and hookworm infections. Pilot trials of ascariasis control conducted in Ceylon and China (Taiwan) demonstrated that mass treatment with piperazine salts, even in the absence of simultaneous improvement of sanitary conditions, can effectively reduce transmission to a low level.

An expert committee convened by WHO in 1967 \(^3\) reached the conclusion that control of ascariasis is urgently needed in many warm countries where the disease

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\(^1\) \textit{Wld Hlth Org. techn. Rep. Ser.}, 1963, 255. \\
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is one of the major causes of morbidity in children, is responsible for many deaths and, moreover, causes severe malnutrition and recurrent illnesses by means that are not yet fully understood. It is considered that the efficacy and freedom from toxicity of therapeutic drugs have made mass treatment safe, effective and feasible.

An international register of living helminth species and strains and an international register of parasite antigens were issued as a service to workers engaged in research, particularly on immunological aspects of helminthic infections. A bibliography of hookworm disease\(^1\) was prepared with the financial assistance of the Rockefeller Foundation.

Towards the end of 1965 WHO organized a seminar on helminthic infections in Manila for participants from the Western Pacific Region, and in 1966 a WHO inter-regional travelling seminar on helminthic diseases was held in the Union of Soviet Socialist Republics.

Assistance has been given to controlled clinical and field trials of promising drugs against other helminthiases, especially paragonimiasis and clonorchiasis.

**Trypanosomiasis**

**African Trypanosomiasis.** African trypanosomiasis, which is particularly lethal to man (sleeping sickness) and to domestic stock (nagana), is widespread throughout the African continent from the southern borders of the Sahara to a latitude of approximately 20° S. Making agriculture and stockraising virtually impossible over more than 10 million square kilometres of fertile land, it is one of the major factors restricting economic development in Africa today, and, as such, has become of concern to various international bodies — in particular, the Economic and Social Council and the United Nations Development Programme. At the request of a number of governments, FAO and WHO decided to take a more direct part in the control of human and animal trypanosomiasis.

In June 1962 a WHO expert committee met to review the situation.\(^2\) In the ensuing five years the warnings sounded by the committee have been confirmed by the occurrence of epidemic outbreaks of human trypanosomiasis in Central and East Africa; as many as 10 per cent. of the population examined in certain areas were found to harbour the disease. There have also been disquieting epidemiological developments, such as the discovery that cattle acted as reservoirs of *Trypanosoma rhodesiense*, one of the two human parasites, and that *Glossina fuscipes*, the chief vector in Central Africa of the other human pathogen, *T. gambiense*, had colonized certain new atypical habitats and was also capable of transmitting *T. rhodesiense*.

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In addition to providing advisory services to African countries engaged in control operations, the Organization sent field missions to areas where a critical situation was developing—for example, along the shores of Lake Victoria and in Burundi in 1965—and surveys of trypanosomiasis were carried out by joint FAO/WHO teams. These activities are now the main responsibilities of the WHO inter-regional trypanosomiasis study team which was established in 1965 to assess the present situation of both human and animal trypanosomiasis, to appraise the extent of damage done by trypanosomiasis to public health, animal health and agricultural production, to make suggestions in relation to surveillance and control, and to stimulate research work. Exchange of information among countries has been ensured by a joint WHO/FAO trypanosomiasis information service.

The delineation of residual foci of infection and the rapid detection of new human cases is essential, in view of the epidemic tendencies of trypanosomiasis. Improvement in diagnostic techniques is therefore vital. A method based on the estimation of the IgM class of immunoglobulin in the serum and cerebrospinal fluid—adapted at the WHO International Reference Centre for Immunoglobulins, at Lausanne, Switzerland—has been tested in the Democratic Republic of the Congo, and proved to increase considerably the number of cases detected (see also page 228). Improvement and assessment of this and other methods will continue—particularly of one technique for differentiating species that are pathogenic for man from non-pathogenic species.

WHO has also promoted research related to vaccines against human and animal trypanosomiasis, including the application of physico-chemical techniques for the preparation of specific trypanosome antigens and the use of adjuvants to enhance the immunogenic properties of these vaccines.

The WHO International Reference Centre for Trypanosomiasis, at Tororo, Uganda, maintains and distributes various strains for studies on the immunology and pathogenesis of the disease and for experimental chemotherapy.

Recent developments in the epidemiology of human trypanosomiasis have emphasized the gaps in knowledge of transmission patterns. Studies are needed on the geographical distribution of pathogenic forms of trypanosomes and of their transmissibility and susceptibility to drugs; on the biology of the important *Glossina* species, particularly aspects relating to vector capacity, large-scale breeding, and control by genetic techniques; and on the biology of the wild animal reservoirs, in relation to residual foci of the disease. Some of these problems are being investigated by WHO in Kenya as part of a three-year operational research project on human and animal trypanosomiasis in the Nyanza and Western Provinces, financed under the Special Fund component of the United Nations Development Programme.
Drugs for the treatment of the early-stage case are generally satisfactory, but those for late-stage cases tend to be toxic and their administration requires careful medical supervision. Resistance to them may develop. There is still need for an easily administered drug, effective at all stages of the disease, and of low toxicity. Pentamidine prophylaxis has undoubtedly been valuable in reducing the parasite reservoir in *T. gambiense* areas, but there is reason to believe that such prophylaxis may mask the disease.

Lack of personnel, particularly field officers, is a most serious obstacle to progress in trypanosomiasis control. WHO organized a training course in trypanosomiasis for French-speaking participants, with the co-operation of the Centre Muraz at Bobo-Dioulasso, Upper Volta, in 1964, and a similar course in English at the Nigerian Institute for Trypanosomiasis Research, Kaduna, in 1965. In 1966 FAO and WHO jointly organized a seminar on African trypanosomiasis at Nairobi, Kenya, to provide an opportunity for those in charge of national trypanosomiasis programmes to discuss their common problems.

A special number of the *Bulletin* was published, containing papers dealing with various aspects of trypanosomiasis in man and domestic animals.

*American Trypanosomiasis.* Chagas' disease, caused by infection with *Trypanosoma cruzi* and transmitted by some species of reduviid bugs, is limited in its distribution to the Americas. Its prevalence varies greatly from country to country and from place to place within countries, ranging from about 5 per cent. in the northern limits of its distribution to 50 per cent. in certain parts of the southern hemisphere. The severity of the infection appears also to vary considerably from one endemic focus to another. It is generally agreed that the disease is of very great importance in Argentina, Brazil, Chile, Uruguay and Venezuela.

The main problems are similar to those associated with African trypanosomiasis. Methods are needed for rapid diagnosis of the infection, which is estimated to have a fatality rate of 10 per cent. in acute cases in children and to cause severe cardiopathies in older people, and studies are required on the immunology and pathogenesis of the disease, and on the ecology and insecticide susceptibility of its vectors. By contrast with African trypanosomiasis, there is no effective drug available for treatment.

In order to establish guidelines for research and plans for co-ordinated control activities in the countries affected, the Organization has convened several meetings and carried out certain preparatory studies. A study group met in 1960 and a Chagas' disease chemotherapy research group was established in 1963. In 1964, the Organization helped to study the status of the problem, especially from the...
clinical and pathological point of view, in several areas of South America. The Department of Parasitology at the School of Medicine of the University of Chile has agreed to prepare an antigen for the complement-fixation test and to distribute it to countries on request. In 1966, a study group which met in San Juan, Puerto Rico, to consider the diagnostic tests available recommended a standard procedure for the complement-fixation test, the one most widely used. Six laboratories in five countries have agreed to co-operate in a controlled evaluation of complement-fixation antigens. Work on other diagnostic tests is also being promoted.

**Leishmaniasis**

Recent reports have indicated an increase in the incidence of visceral leishmaniasis in certain countries of South America and of East Africa. Muco-cutaneous leishmaniasis is also spreading. In the Eastern Mediterranean Region, outbreaks of cutaneous leishmaniasis have occurred.

To ascertain the causes of these outbreaks, the Organization has taken part in studies in several countries on the effects of antimalaria operations, urbanization and other factors on the epidemiology of leishmaniasis. Investigations have also been made to clarify certain aspects of the transmission of the disease, in particular the role of animal reservoirs and the ecology of the *Phlebotomus* vectors, which is still obscure (for example, resting and breeding places, nutritional requirements of larvae and adults).

A collaborative programme has been planned on the development of new serological tests and on immunological problems, especially in relation to immunization with attenuated forms of *Leishmania* species against infections caused by *L. braziliensis*.

Services to research workers have included the collection, maintenance and supply of human and other mammalian *Leishmania* strains by a laboratory in Belo Horizonte, Brazil, and by the WHO International Reference Centre for Leishmaniasis, in Jerusalem, which also undertakes identification of material. A list of strains maintained at the Centre and other laboratories has been issued for use by research workers.

In 1967 a WHO inter-regional travelling seminar on leishmaniasis was organized in the Union of Soviet Socialist Republics.

**Mycotic Infections**

Five laboratories have agreed to collect strains sent by collaborating institutions and assess a proposed *in vitro* technique for estimating the susceptibility of derma-
tophytes to griseofulvin. This work has been co-ordinated by the Communicable Disease Center at Atlanta, Ga., USA.

WHO-assisted clinical field trials conducted by the Institute of Dermatovenereology at Sarajevo, in Yugoslavia, showed that griseofulvin lends itself to mass treatment of tinea capitis.\(^1\)

Mycetoma (Madura foot) presents the most severe mycological health problem in Africa. A study of techniques for the early diagnosis of mycetoma has been made and a programme of investigations set up, including ecological studies of mycetoma agents in Senegal. Plans have also been made to assist in a comprehensive field study designed to compare the effectiveness of available diagnostic procedures and to assess the efficacy of different drugs and procedures in combating this mutilating disease.

VECTOR CONTROL

Vector control is fundamental to the suppression of many of the communicable diseases of man, such as malaria, yellow fever, haemorrhagic fever, plague and filariasis. More than twenty years ago, the transmission of some of these infections had been interrupted by the use of non-persistent insecticides or by environmental improvement, but that was usually done on a limited scale and at high cost. The discovery of long-lasting synthetic organic insecticides, such as DDT, changed the whole concept of vector control and for the first time it was possible to consider the control or even the eradication of some of the major arthropod-borne diseases of man on a worldwide scale.

The development of resistance to insecticides and certain inherent behavioural characteristics of vector species have seriously modified these prospects and have led to the realization that vector control and the resistance problems associated with it require a planned international multidisciplinary effort by geneticists, chemists, engineers, entomologists, biologists, ecologists and others.

To obtain authoritative views on the subject, the Organization expanded the scope of its expert advisory panel on insecticides and convened expert committees and other consultative groups which have helped to define the total needs in research. The information thus obtained has enabled the Organization to advise scientists and collaborating laboratories of the research required, to help thirty-seven laboratories to direct their work to the most important problems, and to indicate to fund-raising agencies suitable institutions requiring support. Every

institute in the world known or believed to be working on resistance and vector control problems has been visited during the last ten years — 119 visits to 110 institutes in thirty-seven countries since 1958. WHO also arranged for senior scientists to visit other laboratories, while for laboratories hampered by the lack of trained personnel it has been able to provide facilities for advanced study for a number of suitable workers. Ten institutions have been designated as WHO international reference centres (see Annex 12).

The need of many laboratories and field research organizations for different types of assistance and services became apparent early in the development of WHO's programme. Such services include the provision of standard test methods and equipment for the bio-assay of insecticide residues and aerosol formulations, and the supply of standard reference and mutant strains of insects, standard isotopically labelled insecticides, and pure standard chemicals. In addition, specialized equipment has been lent to a number of laboratories to enable them to carry out research projects of interest to WHO.

Seminars and symposia have been arranged for the discussion of problems and developments, and the Organization collects and distributes information to research workers in three series of mimeographed information circulars — on insecticide resistance, insect behaviour and vector genetics; vector control; and the toxicity of pesticides to man. The first of these, for example, is distributed every two or three months to over 500 scientists, and by the end of 1967 had reached its sixtieth issue. Pre-publication documents on scientific findings are also distributed.

"Recommended methods for vector control", issued in 1958 and since revised, has become the basis for vector control activities in many parts of the world.

Awareness of the need for more ecological studies on the behaviour of disease vectors resulted in extensive investigations on Culex pipiens fatigans, Aedes aegypti and other important vectors. Field research units, benefiting from the guidance of specialists in a number of collaborating laboratories, have been established by WHO and national governments.

In addition, the Organization has advised national authorities on such matters as vector control procedures at ports and airports and in refugee camps, the establishment of national vector control activities and training in vector control practices. Emergency advisory services have been provided in connexion with accidental poisoning by insecticide-contaminated food.

The activities of the decade are summarized below by major subject. For related activities reference should be made to the earlier sections of this chapter relating to specific vector-borne diseases, especially malaria. The work on molluscicides is described in connexion with schistosomiasis.

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Research on Insecticide Resistance

The problem of insecticide resistance has grown steadily in recent years; in 1967 there were at least eighty-three resistant insect species of public health importance, as compared to twenty-six in 1958. The number of resistant anopheline species has risen from fourteen in 1958 to thirty-two in 1967. Furthermore, the extent of the geographical area where resistant species have been found has also increased.

To provide an accurate appraisal of the problem of resistance throughout the world, WHO has encouraged and supported research on the development of standard techniques for detecting and measuring physiological resistance in arthropods of public health importance and has sponsored their routine use. Test methods have been developed for practically all major insect vectors of disease. Test kits are available for the collection of many important Diptera, among them blackflies (*Simulium*), houseflies, mosquitos, sandflies, and tsetse flies, and for the bedbugs, cockroaches, fleas, human lice and ticks, and the cone-nosed bugs (Triatomidae) that are the vectors of Chagas' disease. During the past ten years, the Organization has distributed more than 5000 such test kits to workers throughout the world. A collaborating laboratory in France has carried out resistance tests on eggs of *Aedes aegypti* sent to it by field workers in many countries.

WHO has from time to time also organized surveys on resistance in some of the main vectors of disease, the most important being human lice, *Aedes aegypti* and the rat flea, *Xenopsylla cheopis*.

During the past ten years, the numbers of species involved, of insecticides in use, and of countries providing information on resistance have increased considerably, and a computer programme has been developed to analyse data made available to the Organization. It has been possible to forecast the trend of the development of resistance in some species and to formulate countermeasures. Studies on lice, for example, have demonstrated that effective control of these insects can be obtained through the use of a series of different insecticides over a long period, thereby avoiding the development of insecticide resistance.

The development of resistant strains in insect populations under pressure from insecticides is due to the survival of insects with resistant genes. Emphasis has thus been placed on studies related to the frequency of resistant genes in insect populations, their locations on chromosomes, and their inheritance and spectrum of cross-resistance to different insecticides. A number of laboratories collaborating with WHO have carried out investigations to determine the speed at which resistance developed to insecticides of different groups.

The mechanisms instrumental in the survival of the resistant individual are, in the main, biochemical. Enzymatic detoxication seems to be the most important
single factor in the phenomenon of resistance. It has been possible to connect the resistant gene allele with the biochemical mechanism operating through enzymatic detoxication. This finding has made it possible to prepare new insecticides to which resistance might not develop, and to which cross-resistance is less likely to occur in insect populations that are resistant to the conventional insecticides.

Genetics of Vectors

In 1963 a WHO scientific group on the genetics of vectors and insecticide resistance reviewed the present state of knowledge on the subject and advised on a programme of work.\(^1\) Research on vector genetics has been concentrated on four general subjects: study of genetic systems operating in important vector species (primarily mutations, marker genes, linkage maps, chromosomes and population structures); assessment of the vectorial capacity of different strains; development of genetically defined strains of insects that can be used for physiological and toxicological work fundamental to the development of new insecticides; and the search for control measures based directly upon genetic mechanisms.

WHO initiated a worldwide programme on the mapping of chromosomes of anopheline species, and during the past few years the mapping of most of the species of the American and European continents has been completed. Knowledge (since 1937) of the existence of a species complex of *Anopheles maculipennis*, of which some species were vectors and some were not, provided the foundation for the eradication of malaria from Europe. Whether similar knowledge about *A. gambiae* will be of help in future malaria eradication in Africa remains to be seen. The recent discovery of sibling species of blackflies has also stimulated work on the mapping of chromosomes of this genus from different parts of Africa and Canada.

The need for strains of known genetic constitution increases as research on the genetics of vectors progresses. Under the auspices of WHO, certain strains have already been synthesized and are made available on request. They include insecticide reference and marker strains of houseflies; inbred insecticide reference, incompatibility and marker strains of the *Culex* complex; and marker strains of *Aedes aegypti* and of some anophelines. WHO designated three international reference centres (in England, Federal Republic of Germany and Italy) as laboratories for the development, maintenance and distribution of standardized strains (see Annex 12).

In order to improve communication between institutes and laboratories engaged in research on vector genetics, a vector genetics information service was

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VECTOR CONTROL

started in 1966. It provides, at intervals, stock lists of vector species and mutants, technical and research notes, a bibliography of published work, and lists of unpublished work and of requests for the supply of genetic material. The first issue included an alphabetical and geographical directory of workers in this field.

Since no comprehensive reference work existed on this new science the WHO Scientific Group on the Genetics of Vectors and Insecticide Resistance\(^1\) (1963) urged the publication of a monograph setting out what is known on the subject. WHO was responsible for the planning and scientific editing of this monograph,\(^2\) published in 1967, which brings together authoritative contributions by thirty-one experts on all aspects of the genetics of insect vectors of disease.

Most of the developments in vector genetics discussed above are very recent. The control of insects by genetic manipulation (see page 198) appears to be so promising that a number of other international organizations, including FAO and IAEA, as well as national organizations, have become interested in the subject. WHO is increasingly engaged in the co-ordination of this work and in 1967 convened a co-ordination group on insect genetic control in which international and national organizations participated to plan further activities.

**Search for New Insecticides**

The adverse effects of insecticide resistance on the worldwide programmes for the control and eradication of vector-borne diseases have left the Organization with no immediate alternative but to seek new compounds to replace those to which disease vectors are no longer susceptible.

A collaborative programme for the testing and evaluation of insecticides for use in malaria eradication was begun in 1960. It has since been expanded considerably to include tests of new compounds against other vectors. Chemosterilants have been included in the programme, and special investigations of rodenticides are also being undertaken by WHO (see page 199).

This collaborative programme is carried out by a group of laboratories serving as WHO international reference centres (see Annex 12). New insecticides contributed by various pesticide manufacturers throughout the world are tested in a seven-stage programme which leads from investigations under carefully controlled laboratory conditions to large-scale trials in the field.

At Stage I the effectiveness on adult and larval mosquitoes, and on houseflies, blackflies and ticks, of all the new compounds submitted by manufacturers and others is screened in the laboratory. Both resistant and susceptible insects are


used in these tests. Compounds that show promise in Stage I are further evaluated by three laboratories on many more species and strains of insects, both in the laboratory (Stage II) and under simulated field conditions (Stage III), and they determine the effectiveness of the materials on houseflies, mosquito adults and larvae, body lice, bedbugs, rat fleas, ticks, blackfly larvae and cone-nosed bugs. In these testing stages, the intrinsic toxicity and the efficiency of the formulations are also determined.

A programme using the computer has been developed to store, retrieve and prepare detailed analyses of the vast amount of data which has accumulated in these tests since the programme began in 1960. This computer programme maintains co-ordination of the results from the reference centres associated with the programme and provides complete documentation of the data and status of test of all the 1249 pesticides thus far tested.

Following this work additional investigations take the form of field evaluation and field trials (Stages IV and V). A subsequent trial on a larger scale (Stage VI) is required to demonstrate that the new insecticide can be manufactured in a stable formulation in large quantities, that it will not deteriorate during storage under tropical conditions, that it can be applied easily, and that it is safe to handle. A full-scale field trial of the insecticide (Stage VII) has eventually to be made to prove its effectiveness in interrupting the transmission of malaria or other vector-borne disease. For example, field trials resulted in the selection of malathion for the control of the human body louse; the effectiveness of fenthion and dimethoate for fly control was confirmed in Denmark and Italy; trials leading to the control of resistant bedbugs and rat fleas with new compounds were completed in five countries; and work on larvicides that could be used in potable and non-potable water was completed in six countries. Special attention has been given to this last subject because of the urgent need for suitable larvicides for controlling Anopheles, Culex pipiens fatigans and Aedes aegypti.

To provide for adequate field testing of insecticides designed primarily for malaria eradication programmes three field research units were set up; the Anopheles control research unit in Nigeria, and two insecticide testing teams, one working in El Salvador and the other in Iran. The Anopheles control research unit was established in co-operation with the Government of Nigeria in 1960, and each year has carried out Stage IV or Stage V trials of three to five insecticides.

Of the dozen or so new insecticides that have been tested by the Anopheles control research unit in Stage IV and/or Stage V, five (dichlorvos, fenthion, malathion, OMS-33\(^1\) and OMS-43) have been recommended for advanced field testing. One of them (malathion) is now recommended as an alternative insec-

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\(^1\) During the trials, products being tested are given code numbers.
ticide for malaria eradication where resistance to DDT and dieldrin have occurred; two others (dichlorvos and fenthion), although found to have limited value against adult anophelines in the local type of hut, are now being used as mosquito larvicides and for the control of other insects.

The experience obtained by this research unit has indicated that many insecticides could be better utilized if more were known of the physical and chemical characteristics of their formulation and of the biology of the vector mosquitoes being attacked.

The WHO insecticide testing team in El Salvador was established to explore the capacity of the new insecticides to interrupt malaria transmission in a problem area where neither DDT nor dieldrin had proved effective.

It has carried out laboratory and field work on a number of new insecticides, the most promising of which is OMS-33, an insecticide that was found to be effective for a few weeks in killing mosquitoes in the vicinity of huts built on poles, a type of construction common in this area. The ability of OMS-33 to kill anophelines involved in peri-domestic transmission of malaria is still under investigation.

Another insecticide testing team was established in Iran in 1966 to provide an adequate operational evaluation (Stage VI) of new insecticides under field conditions. A Stage VI trial of OMS-33 was undertaken during 1967 with the co-operation of the Government of Iran in an area where the major vector of malaria is resistant to both DDT and dieldrin.

An important part of the development of new insecticides is the preparation of specifications, which are used to ensure that the formulations are of high quality and will thus give consistent performance. The WHO manual, Specifications for Pesticides, originally issued in 1956, has had a great influence and has been used to procure almost all the pesticides used in public health vector control programmes. It has been kept under constant review by the WHO Expert Committee on Insecticides, older specifications being revised and new ones added as required. A second revised edition was published in 1961, and a third in 1967. It contains extensive revisions of specifications designed to meet the requirements of public health programmes as distinct from the requirements for pesticides used in agriculture.

With the increasing use of insecticides in public health programmes, problems associated with the safety of persons applying the insecticides and of those living in the areas where they are applied have become more acute. The development of new chemicals includes testing for their toxicity to mammals, first by the manufacturer and subsequently by WHO at all stages of evaluation. Only when the

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tests show that the material can be handled safely is its evaluation in the field authorized.

Since some exposure to insecticides is inevitable, research has been done with a view to identifying the route and degree of absorption, and the mode of action of the compound. These investigations have led to the development of safe handling procedures, safety equipment and new insecticide application techniques, and have thus permitted the testing programme to utilize, with safety, new and extremely effective insecticides.

Work undertaken jointly with FAO included the preparation of model legislation on pesticides. Joint work on pesticide toxicity is mentioned on page 248.

**Biological and Ecological Studies**

As the Organization’s programme to meet the growing vector-borne disease problem developed it became increasingly evident that fundamental information on biology and ecology was essential if satisfactory and economical vector control was to be achieved. Filariasis and *Aedes* research units were set up to carry out biological and ecological studies as a basis for deciding what control measures could most effectively be employed.

The methods for measuring changes in the numbers of *Aedes* and *Culex* are not entirely satisfactory. They are therefore being examined and improved so that any significant changes in the vector populations may be readily recognized and the possible consequences considered. A scientific group ¹ convened by WHO in 1966 reviewed problems in the study of mosquito ecology, advised on current studies and established guidelines for the methodology to be used in future investigations.

For the eradication of malaria it is important to ascertain the factors influencing the ecology of vectors. House-spraying has not interrupted the transmission of malaria in some places — which have become known as “problem areas” — because of the habits of the vector, the habits of the human population, or other ecological factors. Investigations designed to achieve a better understanding of this problem have been undertaken by the *Anopheles* control research unit in Nigeria and by other bodies in Mexico, Central America, Iran and Iraq.

The rapid and unplanned expansion of urban centres in many of the developing countries and the consequent inability of municipal services to deal effectively with the larger amounts of liquid wastes has resulted in an increase in *Culex pipiens fatigans*, the principal urban vector of filariasis. In areas of South-East Asia where urban filariasis was already common, this has been followed by a still greater and

rising incidence of filariasis due to *Wuchereria bancrofti*. Most programmes undertaken in the past to control this mosquito have failed through wrong choice of insecticide, the development of resistance on the part of the larvae or adult mosquitoes to the insecticide selected, or insufficient information on the ecology of the insect.

In co-operation with the Burmese Government, the Organization established a filariasis research unit in Rangoon late in 1962 to study *C. p. fatigans* so as to develop effective and economically acceptable methods for its control. These studies have revealed many aspects of *C. p. fatigans* biology and ecology which were previously unknown or little understood, and have provided essential information for control programmes. Concurrent with the studies, a series of trials was carried out on larvicides that have been screened under the WHO scheme for the evaluation and testing of new insecticide compounds; the best of these, fenthion, has been selected as the larvicide of choice.

A field trial was initiated in March 1966 in the Kemmendine neighbourhood of Rangoon, in an area of high mosquito density. Careful entomological evaluation based on new methods developed from the studies mentioned has shown the programme to be successful in reducing the mosquito population in the treated area by about 97 per cent. An epidemiological evaluation is being undertaken concurrently in the treated area in order to ascertain the extent to which transmission of filariasis has been interrupted.

The insecticide usage and methods developed can be widely applied in urban areas of endemic filariasis throughout South-East Asia and in the Western Pacific Region.

The primary importance of the mosquito genus *Aedes* to public health continues to be the transmission of yellow fever by *A. aegypti*. However, in 1954 haemorrhagic fever, a new disease syndrome since associated with *Aedes*-borne dengue fever, was recognized in Manila and has spread westward (see page 115). As the control of the vector *A. aegypti* and closely related species of the *Stegomyia* subgenus is as yet the only means of prevention, a high degree of priority has been given to research on this vector.

WHO, in collaboration with the Government of Thailand, established an *Aedes* research unit in Bangkok in 1965, to carry out research on the bionomics of *A. aegypti* and *A. albopictus*, to study their insecticide susceptibility and to develop methods for their control. The procedures developed by the *Aedes* research unit should be applicable to other areas in the Western Pacific and South-East Asia Regions.

A global survey of *Aedes* (*Stegomyia*) species, to which a large number of laboratories and individual research workers are contributing, was initiated by the Organization. It is already apparent that *Aedes* vector densities are high in and
around the cities of West and East Africa as well as in the rain forests. Conversely, it is now known that, despite its previously high density in the Mediterranean basin, *A. aegypti* is now rare there. It is still present in some areas of the Caribbean in sufficient numbers to have served as a vector in a recent serious outbreak of dengue.

Similar surveys will eventually be undertaken on other vector species of mosquitoes, the distribution and density of which are imperfectly known, such as *Culex tritaeniorhynchus*, the vector of Japanese encephalitis.

These studies have been extended, in collaboration with FAO, to include tick vectors of human disease in an effort to determine whether they are present in a density sufficient for the transmission of human disease.

The difficulty of eradicating, as distinct from controlling, a species, has again been manifested with respect to *Aedes aegypti*. In the Region of the Americas, by June 1967 the following countries and territories had eradicated *Aedes aegypti*: Argentina, Bermuda, Bolivia, Brazil, British Honduras, Chile, Costa Rica, Ecuador, Guatemala, Honduras, Nicaragua, Panama, Paraguay, Peru and Uruguay. In French Guiana, Colombia, El Salvador and Mexico, however, eradication had been achieved but some localities had become reinfested; and in the Caribbean, the campaign was in its final phase in Trinidad, was making some progress in Cuba, but had been interrupted in Jamaica, Haiti, the Dominican Republic, Guadeloupe, the British Virgin Islands and Dominica. Elsewhere in the area, the campaign had stopped or was progressing only slowly.

Resistance of *Aedes aegypti* to the chlorinated insecticides in all the countries and territories still infested has largely contributed to the delay in completing the eradication of the mosquito in the Americas. Some new organophosphorus insecticides are now available which can be satisfactorily used against the *Aedes aegypti* strains resistant to the chlorinated compounds. Serious financial and administrative difficulties in most of the countries and territories involved will also have to be overcome if the programme is to be successful.

**Biological Methods of Control**

The Organization's interest in the potentialities of biological methods of vector control in public health entomology arose because of resistance to insecticides and ecological side-effects. For example, larviciding operations may so disturb the balance between the aquatic stages of a target vector and its natural enemies as to lead to the early resurgence of the vector population to an even higher level; or other, non-target organisms may be adversely affected.

An early example of vector control by biological methods was the pilot project carried out by WHO in co-operation with the Government of New Zealand on the Tokelau Islands. It led to the successful establishment of *Coelomomyces* fungal
pathogens (derived from *Aedes albopictus* in Singapore) in an isolated and previously disease-free atoll mosquito population of another species, *A. polynesiensis*.

Subsequently field studies were made of high natural mortalities in *Anopheles gambiae* resulting from heavy infection with a strain of *C. indicus* which is locally abundant in rainy-season pools near the Victoria Falls, Zambia. Studies were also undertaken of other possible biological control agents suitable for use in reducing the incidence of *Aedes polynesiensis*, not only in the Tokelau Islands but elsewhere. These other agents included neotropical craneflies of the genus *Sigmatomera*, the aquatic larvae of which prey upon larval *Aedes* (*Stegomyia*) in tree-holes, and some predators of rats which might reduce the numbers of rat-gnawed coconuts that serve as *A. polynesiensis* larval habitats on certain islands of the South Pacific.

Encouraging field results have been obtained with certain larvivorous annual fishes. For example, certain species of the South American genus *Cynolebias* and of the southern African genus *Nothobranchius* are characterized by desiccation-resistant eggs and a rapid life cycle, which render them particularly suitable for use against anophelines and other mosquitoes that breed in temporary pools. The re-awakening of interest in the use of larvivorous fish on a sound ecological basis has also been marked by the issue of an annotated bibliography of the widely scattered literature on the subject. A practical measure has been the introduction into Rangoon of a Bangkok strain of the originally Caribbean larvivorous fish *Lebistes reticulatus*, which is remarkably resistant to high levels of pollution. It is hoped that it may play an important part in integrated control procedures against the filariasis vector, *Culex pipiens fatigans*. A further field experiment receiving WHO support involves the introduction of protozoan (microsporidian) and mermithid nematode parasites of *C. p. fatigans* and *Aedes aegypti* into the Nauru Islands.

Perhaps the most important single activity developed under the biological control research programme has been the Organization's global survey for potential biological control agents. To assist in this work a compilation of the available literature on pathogens, parasites and predators of medically important arthropods was published,1 and a WHO International Reference Centre for the Diagnosis of Diseases of Vectors was designated at Ohio State University, USA. A pocket kit was devised by WHO to help investigators in collecting pathogens and parasites of diseased vectors and mailing such material to the International Reference Centre. By 1967, 791 of these kits had been distributed.

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Genetic Methods of Control

During the last few years, considerable progress has been made in research on the control of insects by genetic manipulation. In 1963, the WHO Scientific Group on Genetics of Vectors and Insecticide Resistance stated that genetic control "implies the use of any condition or treatment that can reduce the reproductive potential of noxious forms by altering or replacing the hereditary material". In practice, genetic control means that insect vectors of disease, after being modified genetically, must be produced in enormous numbers for release in the field in order to achieve a significant reduction in the insect population within a few generations. The genetic approach is selective in the control of a species and carries no hazard for any other living creatures in the area.

Genetic control has so far been limited to the release of insects which have been sterilized by ionizing radiation or chemosterilants. The successful application of the sterile male technique for the control of screw-worm and fruit flies has given impetus to the use of this method of control for many other insect species. Other mechanisms known to geneticists are available and may be adopted for vector control. These include cytoplasmic incompatibility, hybrid sterility and sex-ratio distorting factors.

Of the different methods of genetic control, the greatest emphasis has been placed in the programme on cytoplasmic incompatibility. Within certain species complexes of mosquitos the cytoplasm of the egg causes incompatibility between isolated populations. Crosses between certain strains of mosquitos produce no offspring. Control can be effected by mass-rearing males of one crossing type and releasing them into the area populated by an incompatible crossing strain. This principle of control is comparable to that of the sterile male technique, with the difference however that the inhibiting effects of irradiation are avoided.

Among insect vectors of disease, the incompatibility phenomenon is known to occur in the *Culex pipiens fatigans* and *Aedes scutellaris* complexes. A number of strains of the *Culex* complex are incompatible with each other; for example, a strain of *C. p. fatigans* from Fresno, California, has been found to be incompatible with the Rangoon strain. By further crossing of the Fresno strain with the Paris strain a special strain (D₁) has been synthesized for genetic control of *C. p. fatigans* in Rangoon. When males of this strain are mated with females of the Rangoon strain, no offspring are produced. In cage experiments various proportions of D₁ males were released into colonies of the Rangoon strain. Within a few generations the colonies were eradicated.

In the recent trial conducted by WHO in a small village named Okpo, about 26 kilometres from Rangoon, 5000 D₁ males were released per day. Within three

months no *C. p. fatigans* could be found in the area. WHO is also considering a field experiment for the genetic control of the *Anopheles gambiae* complex, which consists of five sibling species. All the twenty possible crosses between these five species result in hybrid male sterility to a varying degree. A cross, producing all, or nearly all, sterile males, would eliminate the need to segregate the sexes in mass production for purposes of genetic control. In laboratory experiments, sterile hybrid males added to a population of normal males and females appreciably reduced the number of viable eggs laid by the females. Introduction of these hybrids into the wild population can be made at any stage, including the egg.

**Rodents and Rodenticides**

Widespread, unplanned and rapid urbanization has in many areas resulted in an untoward increase in commensal rodents. The problems of controlling them have been complicated by the development of resistance to the anticoagulant rodenticides. This resistance has already been verified in the common rat (*Rattus norvegicus*) in several parts of Denmark and the United Kingdom and has been reported in the cane-field rat in Guyana.

The Organization has therefore carried out, in close collaboration with FAO, a number of field trials of a new rodenticide and is encouraging research on the effects of certain new compounds on different species. A seminar, convened in 1966, to stimulate work on rodent control, discussed standard test methods for the early recognition of rodent resistance to anticoagulant rodenticides and the subjects on which research is urgently needed.

**Application and Dispersion of Pesticides**

Considerable progress has been made during the past ten years in the development of efficient, reliable and safe equipment for the application and dispersion of pesticides (including insecticides). An illustrated manual on equipment for vector control has been issued. The hand-operated compression sprayer which is in wide use for malaria eradication has been improved and has been adopted as standard equipment.

Attention has also been given to the development of equipment for applying molluscicides and for the application of pesticides from the air. However, much remains to be done to improve existing apparatus and to devise components that will reduce waste, regulate dosage and avoid environmental contamination.

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A very small dosage (112 to 450 ml per hectare) of insecticide concentrate sprayed by aircraft is considerably more effective than greater quantities of a more dilute insecticide, and has successfully stopped epidemics of St Louis encephalitis. The use of this “ultra-low volume” concentrate for controlling *Aedes* populations is being tested in a search for an effective method for stopping epidemics of haemorrhagic fever, dengue and yellow fever.

Dichlorvos, a fumigant insecticide which can be released slowly in very low concentration from suitable dispensers, has been given field trials. Good results were attained in killing mosquitos entering treated huts but complete interruption of malaria transmission was not demonstrated in the particular area in which the trial was carried out.

Cheese-cloth impregnated with a carbamate insecticide (OMS-33) and attached to the internal surfaces of walls of huts has been found to give effective mosquito control, but for a shorter period than normal residual spraying. However, the amount of insecticide applied per hut was only 22 to 27 g for the cheese-cloth application, as compared to 135 g for the residual spray. Investigation of this method is being continued, since it may overcome the difficulty of loss of insecticides applied to porous surfaces such as mud walls.

Following research completed in 1960, the “blocks away” method of aircraft disinsection — by the use of aerosol sprays in the aircraft after the doors are closed and before take-off — was recommended by WHO and has been adopted as a routine practice in many parts of the world. Previously the disinsection of aircraft had normally been carried out on the ground or during flight; both methods are of doubtful efficiency and have serious operational disadvantages.

Subsequent investigations have proved that dichlorvos is effective for the disinsection of aircraft. Because of concern for the possible health hazard to crew and passengers, very careful toxicological investigations were carried out over several years, after which dichlorvos was declared safe for use in aircraft by a WHO expert committee on the safe use of pesticides in public health (1966). Apparatus has been devised for distributing small amounts of this fumigant throughout large jet aircraft. Units installed in two commercial aircraft have demonstrated their effectiveness in killing insects which were placed aboard in order to test the system in flight. Several airlines have shown their interest in utilizing this equipment, and large aircraft manufacturers have agreed to install it in new aircraft on request.

Investigations were carried out by WHO in East and West Africa, and in the Western Pacific, Eastern Mediterranean and South-East Asia Regions, on how aircraft disinsection is performed in practice, on how mosquito control is carried

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out in international airports, and on the effectiveness of the International Sanitary Regulations for preventing the transportation of mosquitos by air. A plan for improvements is being developed.

* * *

In attempting to reach a conclusion from the work of the past ten years and to look into the future one is drawn to the findings of a scientific group in 1964. Having reviewed the collaborative programmes on insecticide resistance and vector control, it confirmed that there is no single solution to the insecticide resistance problem, which must be accepted and circumvented in numerous ways. Advances in the next ten years must therefore be made on several fronts, and will require the combined efforts of many disciplines.

The development of new insecticides will require further attention to methods of formulation and application, to toxicological research on hazards to humans, and ecological research on possible side-effects on the environment. The development of entirely new control methods, based on artificially sterilized or incompatible males, requires more research into the genetics, physiology, ecology and behaviour of the insect vectors; such research is also essential for the maximum effectiveness of chemical control. The need will arise for operations against a wider variety of insects such as the vectors of filariasis and of arboviruses. The progress achieved thus far, while not opening the way to a single, simple solution to the problem, offers a reasonable assurance that effective vector-borne disease control programmes can be carried out despite the resistance phenomenon.
CHAPTER 6

Non-Communicable Diseases

This chapter summarizes the Organization's activities in some of the more important chronic non-communicable diseases during its second decade, when, in addition to activities in the fields of mental health, dental health and nutrition, programmes and comparative studies were developed in cancer and cardiovascular diseases. A start was also made in 1966 with respect to rheumatic diseases when a scientific group was convened with a view to establishing internationally agreed diagnostic criteria for the diffuse connective tissue diseases. In almost all these spheres, the main emphasis has been on basic research and relevant co-ordinating activities, but the training of personnel and organization of services have not been neglected.

Much of the research assisted by WHO has consisted of epidemiological studies on population groups in various countries. These studies, based on the concept of multi-factorial etiology, require the simultaneous measurement and handling of many variables, such as personal characteristics, physiological functions and environmental factors; they call for the development and acceptance by research workers of methods suitable for international comparative studies of population groups, and the application of advanced statistical techniques. To open the way for a more extensive use of the experimental approach in research relating to the degenerative diseases, WHO has sought out and investigated spontaneously occurring conditions in animals, comparable to human non-communicable diseases — especially cardiovascular diseases and cancer.

CARDIOVASCULAR DISEASES

Some cardiovascular diseases — arterial hypertension, rheumatic heart disease, cerebrovascular lesions and certain congenital malformations — are commonly found everywhere, though each may differ in clinical manifestations, etiology and pathogenesis. Others, such as coronary heart disease, the Chagas cardiopathy and cardiopathies of unknown etiology, are found in certain geographical areas or among identifiable groups of people. Indications that ischaemic heart disease is occurring nowadays in younger age groups, and the presence of ischaemic heart
PRESIDENTS
OF WORLD HEALTH
ASSEMBLIES
1958-1967

Dr S. Al-Wahbi, Iraq: President of the Tenth
Anniversary Commemorative Session, 1958.

Dr Leroy E. Burney, United States of America:
President of the Eleventh World Health
Assembly, 1958.

Sir John Charles, United Kingdom of Great
Britain and Northern Ireland: President of the
Twelfth World Health Assembly, 1959. Also
Chairman of the Executive Board, twenty-first
session, 1958; and recipient of the Léon Bernard
Medal and Prize, 1962.
Dr H. B. Turbott, New Zealand: President of the Thirteenth World Health Assembly, 1960. Also Chairman of the Executive Board, thirty-fourth and thirty-fifth sessions, 1964-1965.

The late Dr S. V. Kurašov, Union of Soviet Socialist Republics: President of the Fifteenth World Health Assembly, 1962.

Dr A. L. Mudaliar, India: President of the Fourteenth World Health Assembly, 1961.

Dr M. A. Majekodunmi, Nigeria: President of the Sixteenth World Health Assembly, 1963.
Dr Monawar K. Afridi, Pakistan: President of the Seventeenth World Health Assembly, 1964. Also Chairman of the Executive Board, thirtieth and thirty-first sessions, 1962-1963; and recipient of the Darling Foundation Medal and Prize, 1964.

Dr V. V. Olguin, Argentina: President of the Eighteenth World Health Assembly, 1965.

Dr A. Sauter, Switzerland: President of the Nineteenth World Health Assembly, 1966.

Dr V. T. Herat Gunaratne, Ceylon: President of the Twentieth World Health Assembly, 1967.
The Committee in session, June 1964.

CHAIRMEN OF THE ADVISORY COMMITTEE

1959-1963
Dr A. J. Wallgren, Emeritus Professor of Paediatrics, Karolinska Institute, Stockholm.

1964-1967
Dr R. Courrier, Emeritus Professor at the Collège de France; Permanent Secretary of the Academy of Sciences, Paris.
and brain disease with atherosclerosis as the underlying lesion in certain social sections of the population in developing countries, show that these conditions are becoming a universal health problem.

The Organization's programme — which aims to further the prevention and control of the major cardiovascular diseases by applying available knowledge and promoting research on etiology and pathogenic mechanisms through international co-operation — has been guided by the recommendations of various advisory groups, including two study groups and two expert committees which met towards the end of WHO's first decade.¹

**Preventive and Control Measures**

Preventive measures against rheumatic fever,² chronic cor pulmonale,³ arterial hypertension and ischaemic heart disease,⁴ as well as possibilities for rehabilitation of patients with these diseases,⁵ have been discussed by WHO expert committees and at various regional meetings, including a symposium on the pathogenesis of essential hypertension jointly organized by WHO and the Czechoslovak Cardiological Society in Prague in 1960,⁶ and a conference on the prevention and control of cardiovascular diseases held in Bucharest in 1965.

Available knowledge permits the control and prevention of rheumatic fever, chronic cor pulmonale and heart diseases connected with infections; it is also possible to control essential hypertension so as to reduce its serious complications, such as hypertensive heart disease and cerebrovascular disease.

Regarding the prevention of rheumatic fever, the expert committee which met in 1966 recommended the establishment of pilot centres to carry out preventive programmes against rheumatic fever and the expansion of such services as rapidly as possible; the validation by scientific methods of the Jones' criteria for the diagnosis of rheumatic fever in developing and economically developed countries; and the establishment of a network of WHO reference laboratories for bacteriological and serological diagnosis of group A streptococcal infections.⁷

In the Region of the Americas, the Organization co-operated with the Pan American League against Rheumatism and the Chilean Rheumatism Society in convening a meeting in 1963 to consider the problem of rheumatic fever.

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Although it is not yet possible to prevent the occurrence of ischaemic heart disease of atherosclerotic origin, sufficient evidence has been accumulated to indicate that proper care of subjects with acute myocardial infarction may control or prevent lethal complications during the early stages of the disease. The provision of proper care for these patients has therefore been considered as a most urgent necessity. WHO-assisted studies have been carried out in different areas to ascertain how many subjects with acute myocardial infarction die outside the hospitals, and the time that elapses between the onset of symptoms and the fatal outcome. The majority of subjects who recover from acute myocardial infarction may be successfully rehabilitated so as to resume their previous activities.

Research

Two scientific groups were convened by WHO (in 1959 and 1961) to advise on needs for internationally co-ordinated research on cardiovascular diseases. In 1966, following a resolution of the Nineteenth World Health Assembly calling for a study of the modalities for further expansion of the Organization's programme in this field, the Advisory Committee on Medical Research reviewed the first five years of WHO's programme and discussed its future orientation.

A total of forty-six collaborating laboratories and cardiovascular research and training centres situated in twenty-four countries have been engaged at one time or another during the decade in carrying out research projects under contractual arrangements with WHO, or with assistance provided to individual research workers.

Systematic WHO-assisted epidemiological research on ischaemic heart disease and some other cardiovascular diseases was started in 1959. The programme has included selective population studies, the development of internationally acceptable nomenclature, classification and diagnostic criteria, standardization of techniques, training and exchange of research workers, and improvement of communications. Methodological investigations carried out as a preliminary to co-operative epidemiological studies included the assessment of electrocardiographic and other objective measurements such as blood pressure, serum lipids or ocular fundi, habitual physical activity or mental stress.1 WHO also prepared a publication on methods of epidemiological studies of cardiovascular disease.2

The Organization has supported several studies on cardiovascular diseases in various population groups, including longitudinal studies of cardiovascular

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diseases in a rural population in Jamaica, and in Polynesians; investigations of the blood pressure, arterial hypertension and ischaemic heart disease in random samples of the population in Bergen, Norway, and in subjects living at high altitudes in Peru (including some born at high altitudes and some who have come from the lowlands).

In the European Region, following recommendations made by an advisory group in 1958, WHO promoted and co-ordinated epidemiological studies of ischaemic heart diseases in selected occupational groups, and in 1965 the results from the six centres working with a standard methodology were evaluated. During 1967, proposals were drawn up for an expansion of WHO's programme of work on cardiovascular diseases in the Region.

The inter-American investigation of mortality and studies on mortality in several European countries have confirmed a wide variation in the death rates from cardiovascular diseases — especially atherosclerotic heart diseases — but further investigations are required in this field.

Since it is difficult to diagnose atherosclerotic lesions before complications arise, attention has been given to finding ways in which more revealing and precise autopsy diagnosis could be used to improve diagnosis in the living and clarify the etiology of the disease. Following the identification of areas in Europe likely to have good facilities for this kind of study, a team of scientists was formed to carry out research designed to show the relationship between, on the one hand, the type, extent and location of atherosclerosis in coronary arteries and aorta and, on the other, age, sex, cause of death, and social environment.

The study of autopsy material from about 80 per cent. of all deaths occurring in subjects over the age of 10 years in five areas commenced in 1963 and, with the exception of one area, the collection of material was completed in 1966. Results already published show correlation of different types of atherosclerosis in different anatomical sites, the poor relationship between lesions of the aorta and lesions of the coronary arteries, the high value of heart weight and coronary calcification and low value of thickness of subcutaneous fat in the prediction of coronary stenosis and myocardial infarction. One of the communities studied was found to have less tendency to develop severe forms of atherosclerosis and myocardial infarction than the others, but the relevant factors are not yet clear.

Analysis of the first data available indicated that if autopsy findings could be linked with assessment during life—preferably before illness was experienced—it would probably be possible to improve diagnosis during life, clarify etiological factors, identify subjects at great risk and test the value of prophylactic measures with small-scale trials. With a view to achieving these objectives with regard to coronary heart disease and hypertensive disease, a three-year WHO-supported study of 2000 to 10 000 persons was designed in 1964. The following year this linked clinical-morphological study—in which examination of subjects is followed by re-examination at the onset of illness and at autopsy—was extended to include cerebrovascular disease.

A number of pathological laboratories have collaborated in the international atherosclerosis project started in the Region of the Americas in 1960. This has produced a wealth of data on the geographical pathology of atherosclerosis, and the experience obtained in developing an appropriate methodology has proved valuable for other similar studies—in Europe, for example.

Cardiomyopathies of unknown etiology include conditions described under various names, often associated with the assumed etiology or pathogenic mechanisms. The common clinical manifestations appear to be cardiac enlargement with symptoms and signs of myocardial failure, and disturbances in conduction of cardiac impulse.\(^1\) WHO co-operative studies have been initiated in some tropical and sub-tropical areas where these conditions constitute a major health problem.

A WHO-assisted survey of a representative rural population in Jamaica revealed myocardial disease in 13.4 per cent. of males and 15.4 per cent. of females.\(^2\) The WHO Epidemiological Centre at Nairobi, Kenya, has carried out studies measuring the cardio:thoracic ratio in samples of urban and rural populations of West and East Africa; the proportion of X-rays showing enlarged heart shadows was similar to that revealing tuberculosis—ranging from 0.3 to 2.2 per cent. There is reason to suppose that a number of myocardial diseases of non-vascular origin are diagnosed as coronary heart disease.

Standard detailed methods for the macroscopic and microscopic examination of the heart at autopsy have been worked out, including the assessment of the coronary circulation and measurement of the size and weight of the individual ventricles. Clinical as well as anatomical diagnosis of established endomyocardial fibrosis, Chagas' heart disease and cardiomegalies of unknown origin can be made with reasonable certainty. WHO collaborating laboratories in Brazil, India, Israel, Jamaica, Nigeria, Uganda, and Venezuela have carried out studies on

\(^1\) Bull. Wld Hlth Org., 1965, 33, 257-266.

subjects with primary myocardial diseases and on children suspected of having cardiac disease. Preparations have been made for the establishment of cardiac registries of patients with myocardial disease. Biological specimens are being sent to a central laboratory for histochemical, enzymatic and immunological investigations, and a central WHO registry is to assemble material from the collaborating centres.

As part of an inquiry into the importance of cardiomyopathy due to Chagas’ disease, studies have been made in an area in Brazil where the disease is endemic.

**Comparative Studies**

WHO has co-ordinated and provided assistance for comparative studies on cardiovascular diseases in animals with a view to improving the knowledge of similar conditions in man. During the past ten years, much has been learned about degenerative arterial lesions in various animal species. The best models for human atherosclerosis of the aorta and coronary vessels are pigs and certain non-human primates, while some birds also develop lesions that are similar in many respects to those in humans. Atherosclerosis of the cerebral arteries has also been found to be common in old pigs, and often there are associated brain infarcts. In addition, comparative studies have been carried out on congenital and clotting defects, the effect of social stress and certain dietetic factors on the development of atherosclerosis, hypertension and valvular disease. A bibliography on atherosclerosis in animals was prepared by WHO and distributed to research workers.

**CANCER**

In accordance with recommendations made by a WHO scientific group in 1959, the Organization’s work on cancer has been directed particularly to epidemiological and pathological studies; it has also included activities designed to promote the prevention and treatment of cancer.

In pathology, a programme on the histopathological nomenclature and classification of lesions of the more important cancer sites has been developed — an undertaking involving fourteen international reference centres in eleven countries. In epidemiology, analytical studies have been carried out in order to elucidate some of the factors associated with the development of neoplasms, particularly lung and oropharyngeal tumours and lymphomas.

The Organization’s work has been carried out in co-operation with various non-governmental organizations, including the International Union against
Cancer, the International Federation of Gynecology and Obstetrics, the International Federation of Surgical Colleges, the International League of Dermatological Societies, the International Academy of Cytology, and the International Council of Societies of Pathology.

**Epidemiological Studies**

Recommendations regarding research on the epidemiology of lung cancer were made by a study group convened by WHO in 1959.\(^1\)

A WHO-assisted study on lung cancer was carried out by epidemiological research teams in Norway and Finland — two countries with common characteristics — with a view to clarifying the factors accounting for the much higher prevalence of the disease among the Finns. It showed that the differences were not due to lack of comparability of the statistics. An important factor seems to be that extensive cigarette smoking habits were established earlier in Finland than in Norway.

The relationship between breast cancer and the duration of lactation is being studied in seven population groups in various parts of the world known to have very high, medium or low incidence of breast cancer, the data for patients being compared with those for the control groups. The study indicates that there is increased risk in women with a smaller number of children and with shorter durations of breast feeding.

A comparative study on the incidence of cancer in various ethnic groups in Israel indicated that, whereas cancer of most sites is more frequent among immigrants from western countries, cancer of the larynx is more common among immigrants from the east.

The association between the high prevalence of cancer of the oropharyngeal cavity and the chewing and smoking habits in India and the Central Asian Republics of the USSR has been studied.\(^2\) Initial results confirmed a relationship between cancer of the buccal mucosa and betel- and tobacco-chewing, but the role of several components of the quid still needs to be determined to indicate possible preventive measures.

In preparation for an epidemiological study on lymphomas in children in Africa (Burkitt's tumour), pathological material has been collected and circulated among pathologists in order to obtain clinical and histological criteria for the definition of this tumour. A meeting of investigators, convened by WHO in October 1967, discussed criteria for differentiating Burkitt's tumour and other lymphomas, and the definitions have been agreed upon.

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A review of present trends in cancer research published by WHO underlined the increasing application of epidemiological methods and emphasis on the mechanism of carcinogenesis.

The Organization has been responsible for the development of a monograph on epidemiological methods in cancer, to serve as a guide for clinicians and pathologists who have had no epidemiological training, and for other health personnel who might serve as members of epidemiological research teams.  

**Histopathological Studies**

An essential requirement for comparability of studies is a precise definition of neoplastic growths. In 1957, following a resolution adopted by the Tenth World Health Assembly, a WHO study group prepared the basis for the establishment of a series of international reference centres which would contribute to such definition.

The procedure is as follows. A tentative histopathological nomenclature and classification proposed by a group of pathologists is evaluated by an international reference centre and its collaborating laboratories, designated by WHO. The work done is based on the study of histological slides and clinical data. After review meetings, a tentative nomenclature and classification is agreed upon. A second test of this classification is made by sending up to ten sets of histological slides to a second group of pathologists. It is only after this second review that the classification is adopted and recommended by WHO for publication. One hundred sets of histological slides are then prepared by the international reference centre and distributed to the national societies of pathology through the International Council of Societies of Pathology. Training facilities are offered at the international and collaborating centres.

International reference centres have been established for the following: lung tumours (Oslo), soft tissue tumours (Washington), mammary tumours (London), leukaemias and other neoplastic conditions of the haematopoietic cells (Paris), oropharyngeal tumours (Agra), ovarian tumours (Leningrad), bone tumours (Buenos Aires), thyroid gland tumours (Zurich), salivary gland tumours (London), skin tumours (Perth, Australia), genito-urinary tract tumours (Washington), odontogenic tumours, and oral precancerous conditions (Copenhagen), and uterine tumours and related conditions (Stockholm). In addition, international reference centres have been established in Amsterdam and Stockholm for the

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provision — respectively — of tumour-bearing animals and frozen transplantable tumour strains to research laboratories.

The first of the classifications to be published was that for lung tumours, prepared by the WHO International Reference Centre in Oslo. The colour photomicrographs and accompanying colour transparencies, identified according to classification in four languages (English, French, Russian and Spanish), have been made available free of charge to all professors of pathology in medical schools and to national societies of pathology.

A classification of breast tumours was prepared by the WHO International Reference Centre in London, and one for neoplastic disorders of the haematopoietic system is in preparation at the International Reference Centre in Paris.

Control and Treatment

Recommendations on the organization of various cancer control activities have been made by a number of WHO expert committees.

In 1961 an expert committee on the chemotherapy of cancer recognized that, in spite of certain advances, the chemotherapy of neoplastic diseases remained one of the main problems in present-day cancer research. Guidelines for future research on the immunotherapy of cancer were drawn up by a scientific group in 1966 (see page 229). An expert committee on cancer control (1962) advocated the introduction of national cancer control programmes and outlined general principles on which they should be based.

The importance of ensuring adequate facilities for the early detection and therapy of precancerous conditions, including mass screening, was stressed by another WHO expert committee, in 1963. Methods for use in this connexion were discussed at various meetings organized by WHO, including a technical meeting on the public health aspects of exfoliative cytology, held in Copenhagen in 1962, and a seminar in Oslo in 1965. Training was provided in courses held in Teheran for countries of the Eastern Mediterranean Region in 1965 and 1966.

In 1965 an expert committee on cancer treatment reviewed the results obtained in surgery, radiotherapy, chemotherapy and the use of combined therapy, with emphasis on the planning and organization of cancer control services.

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Comparative Studies

In comparative oncology, studies have been directed along two main lines: the histopathological and clinical investigation of animal cancers and the working out of an agreed classification and nomenclature, integrated as far as possible with that being established for human tumours; and the collection of epidemiological information on animal tumours.

Work on the first aspect has been done—in co-operation with corresponding centres for human tumours—by the WHO International Reference Centre for Comparative Oncology, in Washington, and a series of collaborating centres. With regard to epidemiological studies, information has been gathered from various sources on the prevalence of particular types of tumour of special comparative interest, and veterinary schools have been encouraged to establish modern methods of recording clinical and pathological data suitable for computer analysis.

The Organization has also supported etiological studies on certain animal cancers. It has long been known that the prevalence of the various types of cancer and the anatomical sites affected differ greatly from one species to another, and studies of the exogenous and endogenous factors associated with these patterns of incidence should produce valuable information with possible implications for human cancers. A bibliography on the epidemiology of cancer in animals has been prepared by WHO and distributed to research workers.

The type of animal cancer in which most progress has been made is leukaemia. A WHO-assisted study has produced evidence that the disease in cats is caused by a virus resembling that known to cause the disease in mice. Studies on leukaemia in cows have so far produced only equivocal evidence of a virus etiology. WHO has sponsored several meetings to co-ordinate research on leukaemia in animals and man.

International Agency for Research on Cancer

A new approach to the co-ordination of research was the establishment of the International Agency for Research on Cancer in 1965 (see Chapter 11, page 313). The Agency concentrates on environmental biology (carcinogenesis) and cancer epidemiology (etiological aspects), while WHO is expanding its activities on cancer control (prevention, early detection, treatment, rehabilitation, follow-up and evaluation), clinical research (nomenclature and histological classification of tumours, new methods of diagnosis and treatment, precancerous conditions) and training and education in respect of cancer (education of physicians and other professional health workers, and education of the public).
DENTAL HEALTH

Although the Organization’s work during its first ten years included some activities in the field of dental health, it was not until the second decade that a systematic programme of work was elaborated, with emphasis on three main aspects: the epidemiology of dental diseases, the training of personnel, and the development of dental health services.

Epidemiology of Dental Diseases

The results of a series of surveys by WHO on the epidemiology of periodontal disease — carried out since 1957 in Ceylon, India, Iran, Nigeria and Sudan — were discussed at a meeting in 1965. Periodontal disease was found to be highly prevalent in all five countries, and closely associated with poor oral hygiene.

The dental profession has long been concerned with the problem of international comparability of epidemiological studies of dental and oral diseases, and a considerable amount of work has been done in the past by the International Dental Federation’s Commission on Oral and Dental Statistics. In 1961 a WHO expert committee considered the international standardization of the reporting of dental diseases and conditions, and made recommendations regarding the planning, implementation and reporting of surveys and epidemiological studies relating to dental caries and periodontal disease.¹

A scientific group which met in 1965 to consider the question of research in the field of dental health recommended that, initially, the Organization’s programme should concentrate on epidemiological studies, including the classification of dental and oral diseases and the standardization of methods and techniques. Accordingly, work has begun on the preparation of a set of manuals to promote international comparability of dental epidemiological data. They deal with general methodology, the use of the International Classification of Diseases in dentistry and stomatology; a simplified descriptive survey for the evaluation of dental health; intensive studies of dental caries and other tooth tissue lesions; epidemiological studies of periodontal disease and of dento-facial anomalies; and geographic pathology of oral diseases.

In the Western Pacific Region, where the Organization is carrying out an intercountry programme, epidemiological surveys have been undertaken in several countries by the participants in two courses on survey techniques organized by WHO in 1964 and 1965. The surveys will provide a basis for the planning and development of dental health services in the Region.

With the assistance of the Organization, an international centre for dental epidemiology and applied research has been established at the University of São Paulo, Brazil. The functions of this centre, which serves all the countries of Latin America, include the provision of advanced training for public health dentists in dental epidemiology and research methods.

The Organization's dental health epidemiology programme has been assisted by the American Dental Association through the United States World Health Foundation.

**Training of Personnel**

In view of the worldwide shortage of dental manpower, the Organization convened an expert committee in 1958 to review the possibilities of increasing dental services through more efficient utilization of auxiliary personnel. The committee stressed the importance of establishing dental health teams, each working under the supervision of a dentist and comprising chairside assistants, dental technicians, dental hygienists and school dental nurses.\(^1\) In 1962 another expert committee on dental education made suggestions for the rapid development of local facilities, even if these are limited initially to the training of sub-professional personnel, and for the possible establishment of regional dental schools.\(^2\)

In 1961, with the co-operation of the International Dental Federation, WHO published the first *World Directory of Dental Schools*, and a second edition was published in 1967.\(^3\) To provide practical assistance in the training of dental auxiliaries, WHO prepared specimen lecture notes covering the basic medical and dental subjects, and including a comprehensive list of teaching and dental equipment.

Surveys carried out by the Organization revealed a number of problems in dental schools in Latin America in connexion with the teaching of the basic and clinical sciences and the social aspects of dental education and public health, as well as needs in the fields of dental research and the training of dental auxiliary personnel. In collaboration with the W. K. Kellogg Foundation, the Organization therefore sponsored a series of Latin American seminars on dental education — in Bogotá (1962), Mexico City (1964) and Petrópolis, Brazil (1966). With a view to implementing the recommendations of the seminars, the Organization helped to establish the Latin American Association of Dental Schools (ALAFO) and co-operated with the Association in organizing three international courses on

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the teaching of dentistry. The Organization has also assisted in the establishment of departments of preventive and social dentistry in dental schools in several countries in Latin America.

It is now recognized that special post-graduate training in public health dentistry is essential for dentists engaged in public health services, especially those in administrative positions. In the Americas, a regional centre for training in dental public health, at the School of Public Health of the University of São Paulo, Brazil, has been operating since 1958 with the assistance of the Kellogg Foundation and the Organization. The success of this programme is indicated by the fact that dentists with post-graduate training in public health are now working in every country of Latin America as health administrators and teachers in dental schools. In the European Region, the first regional course on dental public health was held in Czechoslovakia in 1967.

A survey of dental manpower in the African Region stressed the acute lack of education and training facilities. As a first step towards meeting this need, WHO has provided assistance for the development of dental education in Lagos (to serve English-speaking countries) and Dakar (for French-speaking countries).

Since 1965 WHO has co-operated with the Royal Dental School, Copenhagen, in the organization each year of three-month courses on dentistry for children. These advanced courses have been attended by teachers of paedodontics and administrators of children's dental health services from all the six regions.

An inter-regional seminar on the training and utilization of dental personnel in developing countries was held during 1967 in New Delhi.

Development of Dental Health Services

The importance of developing dental health services as an integral part of the general public health services was stressed by an expert committee convened by WHO to consider the problem of periodontal disease.\(^1\) In all the regions, WHO has collaborated with governments in the identification of dental health problems and evaluation of resources with a view to the integration of dental health into national health plans. Primary attention has been accorded to the improvement of dental manpower resources and the application of proven methods of prevention — as recommended by another expert committee which met in 1964 to discuss the organization of dental public health services.\(^2\)


Wide variations exist in preventive and curative dentistry in different countries. In 1958 WHO convened a study group to formulate general principles for promoting greater uniformity in dental health services for children in the European Region; this was followed in 1960 by a seminar organized in Göteborg, Sweden, to consider in greater detail the practical organization of these services. In 1964 a pilot survey was made in six European countries to evaluate the progress made in following up the recommendations of the seminar.

In 1959 WHO organized an inter-regional seminar in Adelaide, Australia, to consider the development of dental health services in the South-East Asia and Western Pacific Regions during the five years that had elapsed since the previous WHO seminar, held in Wellington, New Zealand.

The value of water fluoridation as a preventive measure against dental caries has been discussed at various meetings and seminars. At the request of the International Dental Federation, WHO prepared a report on the metabolism of fluorine on the basis of contributions from twenty-four scientists in eleven countries.

The Organization also co-operated with the International Dental Federation in a survey of dental research personnel and projects. In 1965 the Federation established a co-ordinating committee with a view to promoting further close collaboration between the two organizations.

**MENTAL HEALTH**

The outstanding development in mental health work in recent years has been the reorientation of psychiatric services, thanks to the introduction of new forms of therapy. The modern trend is away from custodial care in an institution and towards active treatment, with the aim of returning the patient as soon as possible to the highest achievable degree of normal life in the community. The whole approach of psychiatry is in fact changing, with emphasis on social psychiatry and community care, through expansion of outpatient services, day care hospitals, domiciliary care and follow-up services. The Organization's work in this field has been increasingly concerned with the development of mental health services as part of the public health structure, including the integration of mental health care programmes in the local health services.

With a view to establishing priorities for mental health programmes, WHO carried out a survey of resources and facilities available, and the information obtained was considered by an expert committee in 1960.¹

Mental Health Services and General Public Health

The technical discussions at the Fifteenth World Health Assembly in 1962 were devoted to mental health programmes in public health planning.\(^1\) Several seminars were held on the same subject. In the Region of the Americas, the Organization sponsored a series of seminars on mental health and the integration of programmes into the public health services — in Mexico (1962), Argentina (1963) and Jamaica (1965). Inter-regional travelling seminars were organized in the Union of Soviet Socialist Republics in 1965 and 1967 to enable psychiatrists and public health officers from developing countries to observe the Soviet system of psychiatric care and its link with the general health services. For countries in the European Region, a seminar on public health practice and the prevention of mental illness was held in the United Kingdom in 1964.

Community attitudes to mental illness and psychiatry, as well as advances in social psychiatry, were considered by an expert committee in 1958.\(^2\) The newer methods of treatment can not only reduce the length of stay in hospital but also help to prevent mental deterioration and thus reduce the number of patients who remain chronically incapacitated. Improvement of psychiatric hospital care and rehabilitation techniques have therefore assumed increasing importance; a European regional travelling seminar was organized by WHO in Poland and the United Kingdom in 1967 to consider these aspects.

Modern psychiatric techniques are being increasingly directed to the family as a whole. With a view to clarifying some of the considerable theoretical and practical problems resulting from this trend, WHO organized the first Asian seminar on mental health and family life in Baguio, Philippines, in 1958, and a similar seminar for the European Region in 1962, in Athens.

Information on the epidemiology of mental disorders is, of course, indispensable for the planning of mental health services. In this connexion, WHO has published two numbers of Public Health Papers on epidemiological aspects of mental health;\(^3\) convened an expert committee on the epidemiology of mental disorders;\(^4\) and organized two inter-regional conferences on survey techniques (in Naples in 1960, and in Manila in 1962). In the European Region, a meeting on the epidemiology of mental disorders was organized in 1961, and in 1966 a survey was made of published national statistics on mental illness. In the Region of the Americas, the Organization convened a meeting in Washington, D.C. in

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\(^1\) WHO Chronicle, 1962, 16, 306-311.
The medal and prize of the Léon Bernard Foundation, established in memory of Professor Léon Bernard, one of the founders of the Health Organisation of the League of Nations, are awarded periodically for outstanding service in social medicine. Since 1950 the award has been made by the World Health Assembly.

The late Dr Thomas Parran (1958)

Professor Robert Debré (1964)

Dr Fred L. Soper (1967)

The photographs of other recipients since 1958 — Sir John Charles (1962) and Dr Karl Evang (1966) — appear elsewhere in this volume.
Dr P. E. Moore:
twenty-second and twenty-third sessions,
1958-1959

Professor E. Aujaleu:
twenty-fourth and twenty-fifth sessions,
1959-1960

Dr H. M. Penido:
twenty-sixth and twenty-seventh sessions,
1960-1961

Dr A. O. Abu Shamma:
twenty-eighth and twenty-ninth sessions,
1961-1962

The photograph of Sir John Charles, Chairman of the Board at its twenty-first session (1958), who was also President of the Twelfth World Health Assembly, appears earlier in this volume.
EXECUTIVE BOARD, 1958-1967

Dr B. D. B. Layton:
thirty-second and thirty-third sessions,
1963-1964

Dr Karl Evang: thirty-sixth and thirty-seventh sessions, 1965-1966.
Also recipient of the Léon Bernard Medal and Prize (1966)

Dr J. Watt:
thirty-eighth and thirty-ninth sessions,
1966-1967

Dr K. N. Rao: fortieth session, 1967

The photographs of Dr Monawar K. Afridi, Chairman of the Board at its thirtieth and thirty-first sessions, and of Dr H. B. Turbott, Chairman at the thirty-fourth and thirty-fifth sessions, both of whom were also Presidents of the World Health Assembly, appear earlier in this volume.
The Darling Foundation Medal and Prize are awarded periodically to a malarialogist for distinguished work. The Foundation is in memory of Dr S. T. Darling, who was killed in an accident while working for the Malaria Commission of the Health Organisation of the League of Nations. The award is made by the Health Assembly.

The photograph of Dr Monawar K. Afridi, recipient of the prize in 1964 and also President of the Seventeenth World Health Assembly, appears earlier in this volume.
1965, to draw up general guidelines for epidemiological studies on mental disorders, with special reference to epilepsy. It has sponsored epidemiological studies in Argentina and Chile, and administered a study on the interactions of schizophrenic patients and their families, financed by the Foundations’ Fund for Research in Psychiatry.

Increasing urbanization and industrialization are apt to bring to light certain latent mental health problems that could previously be relatively easily handled under rural conditions. Mental health aspects were considered at the technical discussions on the challenge to public health of urbanization at the Twentieth World Health Assembly in 1967. Little attention has been given in the past to the impact of automation on mental health—one aspect of industrialization and technological development. The various problems involved, including the consequences of strain on individual workers and the repercussions of the accompanying social changes, were reviewed by a WHO study group in 1958.1

In some industrialized countries there has been a considerable rise in admission rates of old people to mental hospitals in recent years: this is due partly to the increasing proportion of old people in many populations, and also to the fact that industrial and urban development encourage social and geographical mobility, while possibilities of home care are limited. These problems were considered by a WHO expert committee on mental health problems of aging and the aged in 1958,2 and the Organization subsequently drew up a programme on geriatric psychiatry.

In the European Region, special attention has been paid to the prevention of psychiatric illness in adults through child psychiatry. WHO has organized a number of meetings on mental health work with children, including a conference on preventive aspects (in Copenhagen in 1958) and a seminar on in-patient psychiatric treatment (in Frankfurt-am-Main, Federal Republic of Germany, in 1963).

In 1962, papers on various aspects of deprivation of maternal care were printed in the Public Health Papers series.3 This was a follow-up of Maternal Care and Mental Health, a monograph published in 1951; some 25,000 copies were sold, and a second edition appeared in 1952.4 It was published by WHO in English, French and Spanish, and has been translated into ten other languages.

Mental retardation raises problems of serious concern to health, social welfare and education administrations—problems that are increasing as a result of rapid urbanization, the splitting up of families, and the increased expectation of life for

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the severely mentally retarded. In 1965 WHO arranged a meeting of a small group of physicians and administrators experienced in this field, and the group’s findings were considered by an expert committee which met in 1967 to discuss the organization of services for the mentally retarded.

In recent years alarming increases in both alcoholism and drug abuse have been noted in several countries, especially among adolescents. The public health problems resulting from dependence on central nervous system depressants and stimulants, as well as on hallucinogens such as LSD, now overshadow the problem of abuse of narcotics. There has been a gradually developing trend towards a combined approach to the problems of dependence on alcohol and other drugs. In 1966 a WHO expert committee met to consider the establishment of services for the prevention and treatment of these conditions.\(^1\) There are several similarities in causation and treatment, and many studies on alcoholism might be applicable to abuse of other drugs; moreover, drugs are often used in combination — for example, barbiturates together with heroin or alcohol — and transfer from one drug to another frequently occurs.

In the Region of the Americas, the Organization sponsored a seminar in Viña del Mar, Chile, in 1960, to consider the integration of programmes of treatment and prevention of alcoholism into overall health plans. In 1966 a symposium on alcohol and alcoholism was held in Santiago, Chile, and the Organization convened a study group meeting on the epidemiology of alcoholism.

With regard to the mental health aspects of crime and delinquency, the Organization has continued to collaborate with the United Nations — for example, in carrying out a study on trends in juvenile delinquency\(^2\) for the Second United Nations Congress on the Prevention of Crime and Treatment of Offenders — and in 1958 the Organization sponsored a seminar on the psychiatric treatment of criminals and delinquents for countries of the European Region.

Suicide is among the first ten causes of death in many countries, and attempted-suicide rates are increasing. In some communities, the establishment of suicide-prevention services appears to have been followed by a lowering of the suicide rate. In preparation for further work on this problem, the Organization has held consultations with a number of experts who have carried out research on suicide or who have organized suicide-prevention services.

**Training of Personnel**

Recognition of the high prevalence of mental disorders, recent advances in psychiatry (including the increased emphasis on social psychiatry and psycho-

pharmacology), and the realization that mental health work is not the task of the psychiatrist alone, have emphasized the need not only for a better preparation of the psychiatrist to meet his growing responsibilities, but also for the training of various categories of personnel.

The importance of including psychiatry in all undergraduate medical curricula was stressed by a WHO expert committee on the undergraduate teaching of psychiatry and mental health promotion ¹ held in 1960. Some of the papers presented to this committee were published in the *Public Health Papers* series.²

The role of public health officers and general practitioners in mental health care was considered in 1961 by a WHO expert committee, which recommended the inclusion of mental health in the curricula of all public health training centres and in post-graduate training for general practitioners.³

One of the problems facing the general practitioner is that of psychosomatic disorders. In 1963 a WHO expert committee met with a view to clarifying the concepts of psychosomatic medicine and psychosomatic disorders, and evaluating present knowledge on etiology, treatment, and prevention.⁴

The acute shortage of psychiatrists was revealed by a survey carried out by WHO in preparation for an expert committee meeting convened in 1962 to discuss the question of training.⁵ Of the eighty-five countries for which data were available, eight (with an aggregate population of 20 million) had no trained psychiatrists, and in a further thirty-five (with an aggregate population of 890 million) the ratio was less than one per 200,000 population. The Organization has provided assistance to several countries in the training of psychiatrists through the provision of fellowships and the assignment of staff for undergraduate or post-graduate teaching in medical schools (in Ceylon, India and Nigeria, for example).

In the Region of the Americas, an intensive course in mental health was held in Barbados in 1964 under the joint sponsorship of the Organization, the Caribbean Mental Health Federation, and the Foundation for International Medical Services, Inc., and in 1967 the Organization sponsored a seminar in Lima, Peru, on the teaching of psychiatry and mental health in medical schools.

Close attention has been given by WHO to the role of various other categories of personnel in mental health work. It has carried out studies on the role and training of the psychiatric social worker and the psychologist, and on the employment of psychologists in the European health services. With regard to the training of

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psychiatric nurses, since 1962 WHO has co-operated with the Asfourieh Hospital for Mental Disorders, Lebanon, in the organization of four training courses for countries of the Eastern Mediterranean Region; it has also provided assistance for training in Burma, Ghana, Iran, Nigeria, Senegal, Thailand and Venezuela. In China (Taiwan) the Organization has assisted in the training of clinical psychologists and social workers as well as psychiatric nurses.

**Research and Related Activities**

Little is known for certain about the etiology, pathophysiology and psychopathology of mental disturbances, and psychiatric treatment is therefore largely empirical. Recent advances in psychiatric practice have nevertheless resulted in shortening the duration of patients' incapacity. A scientific group on mental health research met in 1964 to discuss possibilities for co-ordinated research to provide a basis for the planning of practical programmes of prevention and therapy.

There is an urgent need for the standardization of psychiatric diagnosis, classification and statistics. A series of annual seminars, concentrating each year on a specific category of psychiatric disorder, has been organized. Diagnostic exercises are carried out by the participating psychiatrists on the basis of questionnaires and videotaped and filmed interviews. The topics covered have included schizophrenia (1965), borderline psychoses (1966) and disorders of childhood (1967). In the years 1968 to 1971 it is planned to concentrate on psychoses of old age, mental retardation, personality disorders, drug dependence and neuroses (including physical disorders of presumably psychogenic origin), and to review the material as a whole in the ensuing three years.

The definitions and criteria agreed upon for a particular disease should then be tested in the different cultural settings of various countries. For this purpose, an international pilot study of schizophrenia was started in 1966. Eight centres are collaborating in this research: in China (Taiwan), Colombia, Denmark, India, Nigeria, the Union of Soviet Socialist Republics, the United Kingdom, and the United States of America. The first year was devoted to the preparation and testing of the case-history and interview schedules, translated into the local languages.

To assist in the co-ordination of research on biological aspects of psychiatry, WHO has convened scientific groups to review research on genetics in psychiatry (1965), psychopharmacology (1966) and neurophysiology (1967).

Collaborative investigations are being carried out to follow up the recommendations of these scientific groups. They include analysis of the causes of diffic-

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rences in data obtained in studies on psychiatric genetics in twins; studies on the biological features of patients with familial forms of schizophrenia and their relatives, and also of monozygotic and dizygotic twins concordant and discordant for schizophrenia, with a view to establishing genetically-determined biochemical, immunological and neuro-endocrinological characteristics; research on the mutagenicity of various biologically effective substances (psychotropic drugs and fluids taken from schizophrenics), and on the karyotype of different kinds of cell in primary human and animal tissue culture; and assessments of the clinical effectiveness of psychotropic drugs.

WHO’s work with regard to neurological disorders has been mainly confined to the preparation of a glossary of terminology on epilepsy; this work is to be extended to the compilation of a classification on epilepsy preparatory to collaborative research.

In connexion with comparative studies on neuropathology, a collaborating centre maintains a reference collection for histopathological study of a wide variety of conditions which occur spontaneously in animals.

**NUTRITION**

The problem of nutrition is manifold. One aspect is the fact that population growth threatens to overtake increases in food production. WHO influence in this respect is obviously through health activities, including health promotion, which result in a higher per capita output, and through the control or elimination of diseases, which often permits the farming of previously uncultivated areas.

Another aspect in which the Organization can play a direct role is that of achieving a balance in human diet in order to ensure sound nutrition. WHO’s work in this sphere has been carried out in close co-operation with FAO, the United Nations/FAO World Food Programme, and other agencies concerned with the nutrition of special population groups, particularly UNICEF. Activities have included the search for further knowledge about foods and the prevention of nutritional deficiency diseases, the development of foodstuffs to redress imbalances in diet and supplies, and health education to influence dietary habits.

The Joint FAO/WHO Expert Committee on Nutrition, when it met in 1961 and 1966 to review the organizations’ work and make recommendations for future programmes, considered various special aspects of nutrition — in particular, the problems affecting populations in developing countries.

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The need for international standardization in the assessment of nutritional status was stressed by a WHO expert committee in 1962,\(^1\) and on the committee’s recommendation a monograph on the subject, with special reference to field surveys in developing countries, was subsequently published.\(^2\) During the past ten years WHO has assisted nutrition surveys in more than twenty countries.

Studies on specific nutritional requirements have been carried out in co-operation with FAO, and joint expert groups have been convened to consider human requirements of calcium (1961),\(^3\) proteins (1963),\(^4\) and vitamin A, thiamine, riboflavin and niacin (1965).\(^5\)

Attention has been given to various special aspects of nutrition. Following the recommendations made by a WHO expert committee which met in 1964 to consider the problem of nutrition in pregnancy and lactation, the Organization has assisted research on this subject — a field in which available information is limited.\(^6\) In the European Region, a study was made on the nutrition of the elderly — a problem that is growing in importance with the aging of the population — and in the Eastern Mediterranean Region a seminar on industrial canteen feeding in the Near East was organized by FAO and WHO in Alexandria in 1965.

The public health significance of the inter-relationship between nutrition and infection was discussed by a WHO expert committee in 1965,\(^7\) and a monograph on interactions of nutrition and infection is in press.

**Protein-calorie Malnutrition**

In developing countries, protein-calorie malnutrition in infants and young children during weaning and the post-weaning period is one of the most widespread nutritional disorders. In the child population up to the age of five years, between 1 and 9 per cent. are reported to be suffering from severe deficiency, but a much larger proportion are known to suffer from mild to moderate deficiency. The problem of protein malnutrition in children was discussed at regional seminars organized by WHO in Hyderabad, India, in 1963, for the South-East Asia Region, and in Kampala, Uganda, in 1964, for Africa.

Animal proteins are expensive, and in some areas it is not possible to produce adequate supplies of foodstuffs such as meat and milk. In order to overcome this

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difficulty, considerable attention has been paid to the production and distribution of low-cost vegetable protein mixtures, based on cereals, pulses and protein concentrates from oilseeds and enriched with minerals and vitamins. These mixtures can be used effectively for both prevention and, in certain cases, treatment, of protein-calorie malnutrition. One such mixture — "Incaparina" — was developed by the Institute of Nutrition of Central America and Panama (INCAP — an institute assisted by the Organization), and has been in commercial production since 1960. Other products — such as fish protein concentrates and protein concentrates of sunflower seed, sesame seed, and coconut — are being studied, and efforts are being made to improve processing methods. The FAO/UNICEF/WHO Protein Advisory Group meets regularly to advise on the safety and suitability of new products intended for use in infant and child feeding.

In Algeria WHO has collaborated with UNICEF and FAO in the preparation of protein-rich foods that can be manufactured from local products. Preparations are in progress for the manufacture of similar foods in Morocco and Turkey.

But malnutrition is not a purely economic problem. Particular attention has been paid to instructing mothers attending health centres on the appropriate use of supplementary protein-rich foods and other nutritious foods locally available, and correct feeding practices and methods of infant weaning.

During recent years WHO has encouraged the organization of nutritional rehabilitation centres in areas where the malnutrition of young children is prevalent. The aim is to restore the under-nourished children to health as quickly as possible and at low cost, while at the same time teaching their mothers to use the local foodstuffs. Such centres — which usually take the form of day nurseries or kindergartens, where the children take their three daily meals for six days a week while mothers attend and help to prepare the meals — are now in operation in nine countries in Latin and Central America, as well as in a number of countries in other regions.

Nutritional Anaemias

Following recommendations made by a WHO study group on iron deficiency anaemia,1 collaborative studies were started in 1961 with the aim of focusing particular attention on the determination of tissue stores of iron; the absorption of food iron; dermal and total loss of body iron; the role of hookworm infection; and anaemias associated with pregnancy.

A brief survey was made in order to obtain an overall view of the problem of nutritional anaemias, including those characterized by megaloblastosis. Studies

were carried out in India, Israel, Mexico, Poland, South Africa, the United Kingdom of Great Britain and Northern Ireland, the United States of America, and Venezuela, and progress was reviewed at a meeting in 1963. Subsequently, plans for studies on nutritional anaemia in Latin America and the Caribbean area were outlined at a meeting in Caracas.

In 1967 WHO convened a meeting on iron deficiency and megaloblastic anaemias to review overall progress in the collaborative studies, which use carefully standardized methods, and to discuss other relevant problems such as nutritional requirements of iron, folate and vitamin $B_{12}$.

Avitaminosis A and Xerophthalmia

Xerophthalmia exists as a severe form of nutritional disease in several countries in South and East Asia; milder forms have been reported from countries in Africa and in Central and South America and the Caribbean area. However, little is known of the total prevalence of the disease, including its milder manifestations.

In 1961, WHO carried out a study on its prevalence in different regions of the world on the basis of hospital statistics, census figures on blindness, the results of examinations of a limited number of the child population, and governments' replies to a questionnaire. The data obtained, although incomplete, confirmed that xerophthalmia occurs in varying degrees of severity, often in association with protein-calorie malnutrition, in the majority of developing countries. Previously, a WHO-assisted study had been made in Zambia on the role of parasitism in precipitating acute manifestations of avitaminosis A.

In Jordan, a WHO-sponsored survey on the epidemiology of xerophthalmia was carried out with the participation of local physicians in all parts of the country, and trials were conducted to explore the feasibility of preventing xerophthalmia by the administration of massive doses of vitamin A.

Endemic Goitre

The Organization has provided assistance in the prevention and control of endemic goitre in the Region of the Americas, where a collaborative study has been under way since 1962 and a reference laboratory and training centre has been established in Santiago, Chile. The technical, legal and administrative aspects of large-scale iodization of salt for the prevention of endemic goitre were discussed at a regional seminar held in Salta, Argentina, in 1965.

In Asia, WHO organized a regional seminar in New Delhi in 1967, and has provided technical help in connexion with UNICEF-assisted projects for the production and distribution of iodized salt in areas affected by endemic goitre in China (Taiwan), India and Thailand.
Applied Nutrition Programmes, including Training

In co-operation with FAO and UNICEF, and sometimes with UNESCO, the Organization has assisted countries in the development of applied nutrition programmes with a view to raising nutritional standards, particularly in rural areas, through the co-ordinated action of the authorities for education, agriculture and health. During the past ten years such projects have been implemented in more than sixty countries—the largest programme being in India, where every state is now involved. In the Region of the Americas, where programmes are in operation in sixteen countries, emphasis has been laid on training.

The Organization has given close attention to the evaluation of nutrition programmes. A joint FAO/WHO meeting on methods of planning and evaluation in applied nutrition programmes, held in 1965, was followed by a number of regional seminars—in New Delhi, for countries in Asia and the Far East, in Nairobi, for African countries, and in Popayán, Colombia, for the Americas. In addition, during 1966 an appraisal was made of some of the programmes being carried out with the assistance of FAO, UNICEF and WHO.

Together with FAO and UNICEF, the Organization has assisted in the establishment of several centres for the training of professional and auxiliary personnel. The work of the Institute of Nutrition of Central America and Panama (INCAP) has expanded considerably in the past ten years, and some 500 people have received training during this period. WHO has also provided assistance for research and training in teaching institutions in a number of countries (for instance, in Algiers, in Dakar and in Hyderabad, India), often through the provision of fellowships (as for the courses in London/Ibadan, and in Paris/Dakar). Several ad hoc training courses have also been sponsored by the Organization.

Following a symposium on education and training in nutrition sponsored by FAO and WHO in Bad Homburg (Federal Republic of Germany) in 1959, the two organizations carried out a joint study on nutrition education in six countries in the European Region.

Efforts have also been directed to the dissemination of information on nutrition—for instance, through INCAP in Latin America, and through the joint FAO/WHO/STRC Regional Food and Nutrition Commission for Africa. A booklet on malnutrition and disease prepared by WHO as one of the Basic Studies series supporting the FAO Freedom from Hunger Campaign was widely distributed. Reference to work on health education in relation to nutrition will be found on page 54, and co-operation with the United Nations/FAO World Food Programme on page 282.

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**Food Standards**

An important step towards the development of a system of internationally acceptable standards for food was made in 1962, with the establishment of a joint FAO/WHO food standards programme. A commission was set up to prepare the international *Codex Alimentarius* — a collection of internationally adopted food standards presented in a uniform manner for all the principal foods, whether processed, semi-processed or raw. The *Codex Alimentarius* will include provisions in respect of food hygiene, food additives, pesticide residues, contaminants, labelling and presentation, and methods of analysis and sampling. These food standards aim at protecting the consumer's health and ensuring fair practices in the food trade.

Between 1963 and 1967, four sessions of the *Codex Alimentarius* Commission were held, and draft standards were prepared in respect of a large number of food commodities. The food hygiene aspects of this work have been referred to a special sub-committee. (For work on hygiene of food of animal origin, see page 157.)
CHAPTER 7

Biomedical Sciences
Pharmacology and Toxicology

The discovery of new fundamental knowledge in biology during the last decade has brought about advances on many fronts, particularly in the area which has come to be known as molecular biology. The determination of the structure of biologically active macromolecules such as polysaccharides, proteins, including nucleoproteins, and the interpretation of function in structural terms, as well as the application of newly developed techniques and methods, have opened new approaches to the solution of many problems in the fields of immunology, human genetics and other branches of biomedical (or biological) sciences. The decade has also seen a marked expansion of interest in problems of fertility and sterility and, more generally, in the health aspects of human reproduction. In these fields WHO has initiated new programmes, concentrating in each case on the aspects that can be applied rapidly to the solution of important health problems.

The increased range of pharmaceuticals, although of great value in the prevention and treatment of disease, has also given rise to public health problems: in some cases, access to drugs has led to their abusive consumption; in others, adverse reactions and unforeseen side-effects have constituted serious health risks. In the Organization's programmes in pharmacology and toxicology the common objective is to protect the individual and the community against the avoidable risks presented by substances normally used for the maintenance or improvement of health conditions. WHO's work in promoting the safety and high quality of drugs and other allied substances is developing as these substances become more easily available and as international trade in them increases.

This chapter deals with WHO's activities in these and related matters under the following headings: immunology, human genetics, human reproduction, biological standardization, pharmaceutical substances, drug safety, drug dependence and abuse, and food additives.
IMMUNOLOGY

At the start of this century immunologists were preoccupied with the mechanisms through which animals acquire immunity to infectious diseases; today, the importance of the immune response is recognized in areas as diverse as tissue transplantation, cancer, genetics, allergy and conditions associated with immunologically-produced tissue lesions (immunopathology). In 1962 WHO convened five scientific groups on research in immunology\(^1\) to review the numerous advances made in this discipline and to indicate areas in which internationally co-ordinated research was especially needed.

In view of the potentially short step between the current advances in basic knowledge about the molecular structure and function of the immunoglobulins — the group of serum proteins that includes antibody molecules — and application of this knowledge to public health, WHO established an International Reference Centre for Immunoglobulins (in Lausanne, Switzerland), and a number of other reference and research centres. These centres are concerned not only with the supply of reference reagents but also with research on the structure and biological properties of immunoglobulins. The WHO nomenclature for human immunoglobulins,\(^2\) which is now widely used, has been followed by agreed notations for genetic factors of human immunoglobulins\(^3\) and for human immunoglobulin subclasses.\(^4\)

The WHO International Reference Centre for Immunoglobulins has carried out research on such subjects as antibody purification on insoluble adsorbents and purification and characterization of immunoglobulin A.\(^5\) The public health applications were reviewed by an expert committee which met in 1965 to consider the use of human immunoglobulin.\(^6\) In 1967 a meeting of investigators was organized and a memorandum subsequently published on the suppression of Rh immunization by passively administered human immunoglobulin (IgG) anti-D (anti-Rh\(_0\)).\(^7\)

With a view to promoting research and the teaching of immunology, especially in the developing countries where parasitic and other tropical diseases not only represent pressing public health problems, but also offer opportunities for fruitful investigations, WHO is establishing research and training centres for immunology.

\(^3\) *Bull. Wld Hlth Org.*, 1965, 33, 721-724.
\(^7\) *Bull. Wld Hlth Org.*, 1967, 36, 467-474.
The first was started in 1964 in Ibadan, Nigeria, and the second in 1966, in São Paulo, Brazil. A third centre, in Lausanne, was designated in 1967.

Although the value and usefulness of tissue-typing (leukocyte-typing) in organ transplantation have been clearly demonstrated, there are considerable difficulties in applying this technique to clinical use. The limited availability of human sera with high titres of antibodies to tissue-antigen, the problems of storage and the difficulties that arise in formulating criteria for monospecificity of the antibodies and the measurement of antibody content are the principal obstacles to the establishment of the required standards in this field. WHO helped to organize meetings of investigators on this subject in Leiden in 1965, and in Turin in 1967, and has been assisting research in Italy and the Netherlands.

In 1966 a scientific group on the immunotherapy of cancer reviewed animal and human studies in the field of cancer immunology and drew up guidelines for future research.1 Although there is a firm basis in animal experimentation for the immunotherapy of cancer, and clinical studies are in progress, there have been no definitive developments as yet, and evaluation of results in this field will require much time.

In collaboration with WHO, the Gamaleja Institute of Epidemiology and Microbiology, in Moscow, which was designated as WHO International Reference Centre for Tumour-Specific Antigens in 1967, has been carrying out studies on tumour-specific antigens — the basis for research on cancer immunology. A serum protein of embryonic origin has been isolated in experimental animals with hepatoma; it is antigenically distinct from the serum proteins that are normally present in healthy individuals. In collaboration with the International Agency for Research on Cancer, in Lyons, France, the Institute in Moscow has been investigating a similar protein found in certain cases of human hepatoma.

The Medical Research Council, London, is collaborating with the WHO International Reference Laboratory for the Serology of Autoimmune Disorders in developing reference reagents and standardized techniques for studies in immunopathology. Courses on the techniques used in this field were held at the WHO International Reference Laboratory in London in 1966 and 1967. A meeting at Punta Ala, Italy, held in conjunction with the Fifth International Symposium on Immunopathology, considered the possibilities of treatment of autoimmune disorders through the use of purine and folic acid antimetabolites.2

The close contact that has been maintained between immunology and bacteriology since the beginning of the present century has not been paralleled in the case of parasitology. In 1964 an expert committee considered recent develop-

ments in immunological research and the application of modern immunological concepts to parasitic diseases.\textsuperscript{1} A scientific group on the immunology of malaria which met in 1967 considered, in particular, research which might lead to active immunization, the development of improved diagnostic tests, and a better understanding of the immunopathology associated with malaria.

An expert committee convened by WHO in 1966 recommended measures to ensure that the teaching of immunology in medical schools is kept up to date with the rapid progress being made in this field.\textsuperscript{2}

There is a need for further knowledge of problems of protection against infection, of allergy, of immunopathology, of tissue transplantation and of tumour immunology, and research on the basic immunological mechanisms common to all of these problems offers promise for the future.

**HUMAN GENETICS**

The last ten years have witnessed an increased recognition of the importance of genetics in relation to disease. An expert committee convened by WHO in 1963 pointed out that "genetic considerations add a new dimension to public health work: a concern not only for the health and well-being of persons now living, but also for the genetic endowment of generations yet to come".\textsuperscript{3} This concern is reflected in the Organization's programme in human genetics, which has expanded considerably since 1957. WHO's activities in the field of human genetics have developed out of its interest in the effects of radiation on human heredity (see pages 263 to 267). In 1963, the expert committee defined those subjects on which the efforts of WHO might most appropriately be concentrated. One such area includes the three groups of haematological diseases: haemoglobinopathies, thalassaemias and glucose-6-phosphate dehydrogenase (G6PD) deficiencies. These conditions represent a major public health problem. It is estimated that in tropical Africa alone sickle-cell anaemia is responsible for 80,000 infant deaths annually. At present there are in the world probably as many as 100,000 cases of thalassaemia major that will result in early death; homozygous $\alpha$-thalassaemia, resulting in hydrops foetalis, is lethal antenatally, at least in East and South-East Asia, and is a major problem in some other areas, although frequency data are scanty. In addition, there are millions of individuals with G6PD deficiency,
some of whom may experience acute attacks of favism or fall victim to haemolytic crises if exposed to certain commonly used drugs.

In 1965 a scientific group reviewed knowledge of the world distribution of these defects.\(^1\) Considerable lacunae emerged, regarding not only data on the frequency of these disorders in certain regions, but also the understanding of their clinical symptoms. Moreover, the urgent need to study possibilities of treatment became apparent. The group also outlined the requirements for diagnostic facilities and further genetic studies.

The Organization has contributed to surveys of these diseases in thirteen African countries. As a result, assistance has been given in setting up diagnostic facilities in Cameroon and Upper Volta; genetic studies have been supported in Ghana and Senegal; basic research on the structure of the G6PD molecule and clinical studies of G6PD deficiency have been sponsored in Nigeria; and a clinical study of G6PD deficiency and favism has been assisted in Lebanon. Comparative studies of G6PD deficiency in monkeys and in man have been supported in Brazil. A WHO-assisted survey in a previously malarious area of Chile did not reveal a single case of G6PD deficiency.

In Greece WHO assisted a mass screening programme for thalassaemia, sickle-cell haemoglobin and G6PD deficiency; sickling rates of about 25 per cent., with 20 per cent. G6PD deficiency, were found in the Orchomenos area. Preliminary surveys of thalassaemias in India, Malaysia, Pakistan, Singapore and Thailand indicated that accurate figures on incidence are available only in the last-named country. Following these surveys, WHO supported investigations of the frequency of thalassaemia in India and in Singapore. A collaborative study on the basic defect in haemoglobin synthesis in thalassaemia has been started in Thailand.

WHO-supported studies have been made of populations of particular genetic interest, including some with high incidence of haemoglobinopathies. One such study was conducted in Andhra Pradesh, India, another is under way among three groups (Faditchi, Arabs and Konoze) in Egyptian Nubia, and two others — on different ethnic groups in Surinam and among the Maya Indians of Yucatán, in Mexico — have just begun. The genetic interest of such groups derives from their relative isolation and the opportunities they afford for the study of the effects of inbreeding and for discovering new diseases or concentrations of rare diseases. Other WHO-assisted studies of inbreeding have included the investigation of three isolated groups in eastern Slovakia, and a comparative study of certain population groups in Brazil and Portugal.

A scientific group convened by WHO in 1962 stressed the importance of making similar studies among the few remaining primitive populations, especially nomadic

and pastoral groups, which represent, both in size and level of economy, the closest approximation still to be found to the conditions under which man has lived for the greater part of his existence.\(^1\) WHO has supported studies of this kind among the Chavante Indians of Brazil, the Babinga pygmies of Central Africa, the Hadza tribe in East Africa, the Tongariki Islanders of the New Hebrides, and the northernmost population in the world — the Thule Eskimos of Greenland. During 1967 the Organization convened a meeting of experts to consider the scientific implications of genetic data collected among such isolated and socially primitive groups and to review, in the light of recent experience, the conduct of such studies.

Population studies directed at specific genetic traits, such as abnormal haemoglobins, require standardized procedures and terminology and access to laboratories in which elaborate identification of genetic variants can be carried out. Accordingly, in recent years the number of WHO international reference centres for this purpose has been increased; they are listed in Annex 12.

A standardized methodology for the study of G6PD\(^2\) and a revised nomenclature for G6PD in man\(^3\) were recommended by a scientific group in 1966. A scientific group on genes, genotypes and allotypes of immunoglobulins (1965) recommended a system of notation for genetic factors of human immunoglobulins.\(^4\) Standardized procedures for chromosome studies in abortion were recommended by a scientific group which met in 1966 to discuss the reasons for the very wide variation in the reported rates of chromosomal anomalies found in cases of spontaneous abortion.\(^5\) It appears that these anomalies may be significant factors in many abortions; they have been demonstrated in 19 per cent. of a total of nearly 800 spontaneous abortions, but in only 2 per cent. of another group of more than 450 induced abortions.

Another field in which a need for uniformity of procedures has been acknowledged is that of studies on twins, which for nearly a century have been one of the geneticist’s means of distinguishing between hereditary and environmental factors. In 1965 a WHO-sponsored meeting of geneticists and epidemiologists discussed the use of twins in epidemiological studies, a method hitherto insufficiently applied for this purpose. The group indicated the areas in which such studies might be valuable — for example, cancer and cardiovascular diseases — and recommended standardized methods of presenting and analysing data.\(^6\)

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provide background information for this meeting, WHO prepared a survey of
twin registers and studies.

Computer methodology permits studies of population genetic structure which
were unthought of only a few years ago. An advanced course on the use of com-
puters in human genetics research was organized by WHO in 1966 in collaboration
with the University of Michigan, USA, and the lectures have been published.¹
WHO has also made time available on its own computer and co-operated with
the University of Aberdeen, Scotland, in a project to map the world distribution
of various genetic markers, to develop the automatic construction of pedigrees
from genetic data, and to elaborate models for the flow of genes in popula-
tions. Assistance has been given to the University of Birmingham, England, in preparing
computer programmes for record linkage, and to the Copenhagen Institute of
Medical Genetics in the preparation for computer processing of the information
contained in the Danish Heredity Register, and in linking it with other social and
medical registers. The importance of record linking was stressed at a seminar on
the use of vital and health statistics for genetic and radiation studies, jointly orga-
nized by the United Nations and WHO in Geneva in 1960.²

An expert committee in 1961³ considered the teaching of genetics in the under-
graduate medical curriculum and in post-graduate training. With a view to
improving teaching in genetics, WHO organized three-month courses for teachers
in medical schools at the University of Copenhagen in 1962, 1964 and 1966; these
have contributed in several countries to the development of new units of human
genetics research and to the integration of this discipline into the medical curriculum.
Other training assisted by WHO has included a laboratory course held in 1960 at
the University of Basel, Switzerland, on methods of human cell culture and cyto-
logy, and a course in Bombay, India, in 1963, on laboratory and field methods in
human population genetics.

Since genetic considerations are fundamental to health and disease, they have
been taken into account in the various aspects of the Organization’s programme — in particular, in its work on mental health, cardiovascular diseases, maternal
and child health, human reproduction and leprosy. During 1967 two scientific
groups convened by WHO considered the genetics of the immune response, and
screening procedures and detection of carriers of inborn errors of metabolism.

The results of a WHO-sponsored study of the frequency of congenital malfor-
mations in different parts of the world were published in a supplement to the Bul-

York.
Forty hospitals in sixteen countries participated in the study, which covered a total of more than 420,000 pregnancies. Significant variations in the incidence of malformations of various types as between the different centres were observed. WHO has also supported research on the association of smallpox and typhoid fever with genetic markers. The pursuit of studies on such conditions as malformations and infectious diseases, in which a strong genetic component interacts with environmental factors, should help to determine their various roles.

Since 1965 WHO has participated in the International Biological Programme, initiated by the International Council of Scientific Unions. The Programme is concerned with "the biological basis of productivity and human welfare", with particular reference to human adaptability to changing conditions.

HUMAN REPRODUCTION

The lines for WHO's programme of activities in the field of human reproduction were laid down by the Eighteenth World Health Assembly in 1965 after its discussion of a report (presented by the Director-General at the request of the Executive Board) on programme activities in the health aspects of world population that might be developed by WHO.

The Assembly took cognizance of the resolution adopted by the Economic and Social Council the previous year on population growth and economic development. During its review of the replies to an inquiry addressed by the Secretary-General to Member States of the United Nations, the Council had noted the concern expressed by many governments of developing countries about the slow rate of economic growth of their countries in relation to the high rate of their population increase, and had suggested that the specialized agencies concerned should take these findings into account in formulating their own programmes. The Health Assembly also noted that the United Nations Population Conference, in April 1965, had attached high priority to the research and other activities in the field of fertility.

In the preamble to its resolution the Assembly set out certain principles having a bearing on WHO's activities in this field. It considered, for example, that it was for national administrations to decide whether and to what extent they should support the provision of information and services to their people on the health aspects of human reproduction; and accepted that it was not the responsibility of

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WHO to endorse or promote any particular population policy. It further noted that scientific knowledge with regard to the biology of human reproduction and the medical aspects of fertility control was insufficient. It approved the report of the Director-General, requesting him to develop further the programmes proposed: (a) in the fields of reference services, studies on medical aspects of sterility and fertility control methods and health aspects of population dynamics, and (b) in the field of advisory services as outlined in Part III, paragraph 3, of his report "on the understanding that such services are related, within the responsibilities of WHO, to technical advice on the health aspects of human reproduction and should not involve operational activities".

As reported to the World Health Assembly, WHO's activities until then had consisted mainly of the convening of scientific groups to clarify certain health aspects of human reproduction (see below) and a limited amount of research.

The Nineteenth World Health Assembly noted that several governments were embarking on nationwide schemes of family planning and that the activities of WHO and its scientific groups had already played their part in collecting and making available information on many aspects of human reproduction. It confirmed that the role of WHO was to give Members technical advice, upon request, in the development of activities in family planning, as part of an organized health service, without impairing its normal preventive and curative functions. In 1967 the Twentieth World Health Assembly requested the Director-General to continue the programme and to assist on request in national research projects on health aspects of human reproduction and in securing the training of university teachers and of professional staff.

The programme of WHO has included a number of meetings of scientific groups, whose findings have influenced its development. Twelve scientific groups met between 1963 and 1967 to review existing knowledge of various aspects of human and comparative reproductive physiology and to indicate areas in which further research was required, and in which WHO might most usefully participate.

The subjects covered by these groups have included the following: biology of human reproduction (1963), physiology of lactation (1963), the effects of labour on the foetus and the newborn (1964), neuroendocrinology and reproduction in the human (1964), mechanism of action of sex hormones and analogous sub-

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1 The paragraph in question stated that "WHO should be prepared to give advice, on request, to the health administrations of its Members and Associate Members on the medical aspects and treatment of sterility and the medical aspects of family planning. It should also be in a position to advise on the place such subjects should have in the health services of the community".


stances (1964), the biochemistry and microbiology of the female and male genital tracts (1965), immunological aspects of human reproduction (1965), chemistry and physiology of the gametes (1965), clinical aspects of oral gestogens (1965), basic and clinical aspects of intra-uterine devices (1966), biology of fertility control by periodic abstinence (1966), and standardization of procedures for chromosome studies in abortion (1966).

Material has been assembled for a bibliography of the world literature of the past twenty-five years on ethnic, geographical and secular variations of certain indices of the human reproductive function. An inventory of research institutions and scientists working in various fields related to human reproduction, providing a survey of current research activities throughout the world, is being compiled in a form analogous to similar tabulations established by WHO in other biomedical sciences (see page 271).

WHO-assisted research projects in reproductive physiology have been concerned with the assessment of mechanisms through which hormonal steroids modify the synthesis and release of pituitary gonadotrophins; the relationship between the chemical structure of certain steroids and their biological effects; the clinical and serological aspects of auto-antibodies to sperm in men; the development of simple methods of detection and prediction of ovulation in women; the analysis of plant materials for their effects on fertility; the duration of lactation amenorrhoea and postpartum infertility in tropical countries; and the introduction of new experimental animals into the laboratory for investigation of reproductive phenomena.

WHO has supported a programme designed to facilitate the collection of human pituitary glands and the extraction, purification and distribution of the hormones obtained from them for biological and medical research.

Studies of an epidemiological nature assisted by WHO included one on population dynamics in Peru, and another on the human reproductive function and fertility in Senegal. These and others being planned, including a study on abortion in São Paulo (Brazil), aim at a better understanding of the determinants and consequences of fertility trends and of their relationships to mortality and to changes produced by population movements.

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Data are being assembled on such subjects as sexual maturation, menstrual phenomena, the menopause, multiple ovulation, non-ovulatory cycles, and the relationship of reproductive health or morbidity to maternal age, parity, spacing of pregnancies, total number of children, miscarriages, paternal age, general health, and infant health.

The Organization has also been called upon to provide information requested by Member States and health workers on a wide range of biological, clinical and public health questions related to human reproduction. Advisory services provided at the request of governments have covered such subjects as family planning and fertility regulation, sterility problems and the development of research in reproductive biomedicine. WHO has also provided a number of research training grants. Training activities are expected to increase following the resolution adopted by the Twentieth World Health Assembly, placing special emphasis on the training of university teachers and professional staff.

**BIOLOGICAL STANDARDIZATION**

The main object of WHO's programme in the field of biological standardization is to ensure an adequate level of efficacy and safety of biological products used in medicine. The work, which has expanded considerably in recent years, comprises a number of new activities as well as the traditional programme, taken over from the League of Nations Health Organisation, of establishing or replacing international standards and international reference preparations used in the laboratory assay of potency of biological substances. By the end of 1967, 150 international standards and reference preparations had been established.\(^1\)

A recent activity has been the establishment and continuous development of a new category of substances, namely international reference reagents — generally antisera of high specificity used for the identification of micro-organisms. Over the last ten years ninety-six such reference reagents have been established.

The programme now also includes the formulation, publication and periodic revision of requirements (specifications) for manufacture and testing which must be fulfilled if biological products used in human and veterinary medicine are to have a minimum level of efficacy and safety. At the close of 1967, seventeen individual sets of requirements had been formulated and published by WHO.

\(^1\) A complete and up-to-date list of the International Standards and International Reference Preparations is annexed to each report of the Expert Committee on Biological Standardization. For the latest list, see the twentieth report, *Wld Hlth Org. techn. Rep. Ser.*, 1968, 384.
Action has also been taken to promote the widest possible use of international biological standards and requirements for biological substances and the application of international recommendations by national control authorities.

In the course of this work, details of which appear in the following pages, contacts have been developed with national control laboratories for the exchange of information on such matters as the use and applications of international standards and requirements, difficulties encountered, and methods of testing and control.

*International Biological Standards and Reference Preparations*

International standards and reference preparations are established by the WHO Expert Committee on Biological Standardization (which meets annually), after international collaborative assays organized by the three WHO International Laboratories for Biological Standards.

The primary purpose of this aspect of the work is to provide a means of ensuring uniformity throughout the world in the designation of potency of many important preparations which are used in the prophylaxis, therapy or diagnosis of human and animal disease and which cannot be characterized adequately by chemical and physical tests. Biological assay methods (tests on animals, animal organs or micro-organisms) are therefore necessary. Because the susceptibility of animals varies the concept of "relative potency" has been introduced in order to achieve uniformity — the effect of a substance being measured in comparison with that of a standard preparation of the same substance.

The international biological standard is a preparation to which an international unit has been assigned after an exhaustive collaborative study undertaken by selected national control laboratories and co-ordinated by one of the three International Laboratories for Biological Standards, which reports to the Expert Committee. When the results are conclusive, the standard is established by the Expert Committee and the international laboratory concerned holds the stock of the preparations and distributes samples as required, free of charge, to national laboratories for biological standards, or to other biological laboratories. The potency of a substance tested can be specified in terms of the standard and conveniently expressed in international units.

Because of the large number of laboratories involved and the hundreds of assays often needed, the procedure for establishing an international standard is slow in most cases.

An international reference preparation, on the other hand, which may be used for a similar purpose, is established either prior to completion of the lengthy study described above or when such a study has shown that the preparation is not entire-
ly suitable to serve as an international standard. Formerly, international units were not assigned to reference preparations. However, with the introduction and widespread use of many new substances the need to express these in units has become evident, since the introduction of an international unit notation obviates the risk of a variety of units being established by individual laboratories and countries. For this reason international units of potency are in certain cases assigned to reference preparations.

Of the three WHO international laboratories the Statens Seruminstitut, in Copenhagen, is the custodian and distributor of the international standards and reference preparations of sera and vaccines used in human medicine, and also of the international reference reagents; and the National Institute for Medical Research, London, acts in a similar capacity for substances such as antibiotics, hormones, vitamins, enzymes and other pharmacologicals. These two laboratories have carried out these functions since the programme was started under the League of Nations. The third WHO International Laboratory for Biological Standards — the Central Veterinary Laboratory, Weybridge, England — was designated in 1962, in consultation with FAO. It is responsible for the custody and distribution of international biological standards and international reference preparations of various kinds, primarily of veterinary importance, and has, in addition, carried out a programme for the establishment of several new standards and reference preparations, and the formulation of minimum requirements for biological substances used mainly in veterinary practice.

Antigens: During the past ten years eleven new international standards or international reference preparations have been established, and four replaced. A further five antigens are under consideration for establishment as new reference preparations or for replacement (Newcastle disease vaccine (live), two cholera vaccines (Ogawa and Inaba), cardiolipin and lecithin).

Although the general policy is to establish a substance as a standard or a reference preparation when it is of acceptable stability during storage under proper conditions, it is sometimes necessary to establish a material before enough knowledge is available as to its long-term stability. This is the problem in the case of rabies vaccine. The inherent instability of this vaccine necessitates continuous examination of its potency at regular intervals for possible deterioration.

Antibodies: Twenty-three new international standards or international reference preparations have been established, and two replaced. A further fifteen are under consideration for possible establishment or replacement, including antitrichinella human serum, anti-toxoplasma serum, anti-anthrax serum, anti-echinococcus human serum, tetanus antitoxin for flocculation test, some snake antivenins (in addition to the already established Naja antivenin), long-acting
thyrroid stimulator, various blood-typing sera, and certain auto-antibody preparations.

Antibiotics: The rapid development in the field of antibiotics, including the discovery and mass production of new therapeutically potent substances, is reflected in the number of established standards or reference preparations. Since 1958 twenty-three new ones have been established, and five replaced. The establishment of further new standards (such as Capreomycin, Rifamycin SV, Lymecycline, Methacycline, Gentamycin and Rolitetracycline) and the replacement of the standards of the two bio-synthetic penicillins most widely used for therapeutic purposes — benzylpenicillin and phenoxymethylpenicillin — are under consideration.

Most of the recently developed semi-synthetic penicillins and cephalosporins of well-known chemical structure, widely used in the therapy of infectious diseases, are prepared in such a high degree of purity that they can be assayed by chemical and physical methods and do not necessitate biological standards. They belong to the class of pure chemical substances and are in the custody of the WHO Centre for Chemical Reference Substances in Stockholm (see page 244).

Hormones, Vitamins, Enzymes: Four new international standards or reference preparations have been established, and seven replaced. A further eleven are under consideration for possible establishment. Many of them are hormones of human origin, such as human growth hormone, human thyrotrophin, human pituitary gonadotrophins, and human insulin. To the classical bio-assays and chemical assays have now been added various immunochemical methods, including the radio-immunochemical method which is proving particularly valuable for the standardization and assay of hormones of human origin.

Other Substances: An international reference preparation has been established for Pyrogen, and the opacity reference preparation has been replaced twice. The establishment of a haemiglobinecyanide reference preparation is also under consideration, with a view to reducing variations in results of haemoglobinometry.

International Reference Reagents

This new category has been introduced to provide biological diagnostic reagents of high specificity for the identification of micro-organisms or their products. Since these reference reagents are not used for the quantitative assay of biological products, an international unit is not assigned to them. Of the ninety-six preparations established since this programme was started in 1958, fifty-four are
various antiviral sera, and there are forty-two established anti-*Leptospira* sera, of which four have been replaced. A further sixteen antisera are under consideration. Lists of the established reference reagents are published with the reports of the Expert Committee on Biological Standardization.¹

**International Requirements for Biological Substances**

The formulation of requirements (i.e. specifications) that can be internationally recommended is a valuable factor in promoting uniformity in the production of vaccines and other biological substances and in ensuring that these products are safe, reliable and potent. Such requirements also facilitate the exchange of these biological preparations between countries.

WHO’s work of formulating requirements for vaccines and other biological substances has been developed considerably since it was started in 1957. The need for such requirements has grown from the expansion of public health programmes relying wholly or partly on the use of substances that have to be assayed biologically. By the end of 1967 seventeen sets of requirements had been formulated and approved by the Expert Committee and published (or were in press) (see list on page 242).

Further sets of requirements are in course of preparation. The procedure followed in formulating requirements has been to prepare an initial draft, which is circulated widely to members of expert advisory panels and other experts (including technical staff of national control laboratories) for comments and suggestions. A revised draft is then prepared for consideration by the Expert Committee on Biological Standardization, which adopts the requirements when they are judged suitable for international use. The accepted requirements are published in the *Technical Report Series*, as integral parts of the reports of the Expert Committee on Biological Standardization, or separately.

The use of accepted requirements for biological substances has proved valuable, not only nationally in public health practice, but also internationally, for example in mass campaigns and eradication programmes against certain communicable diseases. Thus, the criteria applied for vaccines used in the WHO smallpox eradication programme are those of the Requirements for Smallpox Vaccine. International certificates of vaccination and revaccination against smallpox must state that the vaccine used conforms to the Requirements for Smallpox Vaccine recommended by WHO (published in 1959 and revised in 1966).

The establishment of an International Reference Preparation of, and the formulation of Requirements for, Procaine Benzylpenicillin in Oil with Aluminium

INTERNATIONAL REQUIREMENTS FOR BIOLOGICAL SUBSTANCES

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Monostearate (PAM) have been important for the programme against treponemal
diseases, especially yaws, assisted by UNICEF and WHO (see also pages 120 to
126). The insistence on conformity with these requirements has ensured that
only effective PAM preparations were used. Checks on samples of PAM used in
the field have shown that the quality of the preparations was satisfactory. The
second international reference preparation of PAM was established in 1966, with
consequent revision and modifications of the requirements. Studies are continu­
ing in some collaborating laboratories on other long-acting penicillin preparations.

The Development of National Control Laboratories for Biological
Products

The control of biological substances used in prophylactic and therapeutic
medicine has been practised in developed countries for many years. Many of
the developing countries, however, are facing for the first time the necessity of
exercising judgement over products available from any world source, and of
ensuring an acceptable level of quality in products manufactured in their
own territory. In order to help them solve the problem of acquiring the tech­
nical facilities necessary for the national control of biological products, WHO
has provided advice on the establishment and development of national control
laboratories.

The Organization also supplies information to Member States whenever inter­
national standards and reference preparations are established or replaced, and
whenever sets of requirements for biological substances are published for the
first time, or revised.

PHARMACEUTICAL SUBSTANCES

The ever-growing quantity and variety of drugs and the vastly increased
amounts moving in commerce across frontiers are evidence of the need for inter­
national co-operation in controlling their quality. Six meetings of the Expert
Committee on Specifications for Pharmaceutical Preparations,¹ several meetings
of specialists, and a European technical meeting on the quality control of pharma­
ceutical preparations (Warsaw, 1961)² helped to work out principles and details
relating to such control. Relevant publications included the Supplement to the

first edition of the International Pharmacopoeia and Specifications for Reagents mentioned in the International Pharmacopoeia. The continuous development of methods used in pharmaceutical quality control necessitated the preparation of a second edition of the International Pharmacopoeia. It includes monographs giving specifications for the identity and purity of 555 pharmaceutical preparations, as well as sixty-nine appendices describing modern physico-chemical methods used in quality control, among them determination of infra-red absorption spectra, chromatography, non-aqueous titration, and polarography. Of the monographs, 162 are on new products, while 114 monographs that appeared in the first edition have now been omitted.

In the preparation of the second edition, consultations were held with the World Medical Association and the International Pharmaceutical Federation, and members of the WHO Expert Advisory Panel on the International Pharmacopoeia and Pharmaceutical Preparations. The Expert Committee on Specifications for Pharmaceutical Preparations reviewed the methods and specifications proposed and already subjected to tests in various laboratories and in medical and pharmaceutical institutes.

Discussions at the Eighteenth, Nineteenth and Twentieth World Health Assemblies underlined the need for further international action to improve the quality of drugs manufactured for domestic use and for export; and, in accordance with a resolution adopted by the Twentieth World Health Assembly, the Organization has begun preparatory work on the formulation of principles for quality control procedures with a view to their incorporation into good drug manufacturing practice.

The creation of independent control laboratories in Member States where such facilities do not yet exist presents a major problem by reason of the cost involved and the scarcity of expert personnel. Studies have been made of ways and means of establishing — possibly with assistance from the United Nations Development Programme — control laboratories in certain areas to serve several governments collectively.

Some of the new analytical methods used in pharmaceutical quality control require the use of chemical reference substances. In accordance with recommendations made by the Expert Committee on Specifications for Pharmaceutical Preparations, the WHO Centre for Chemical Reference Substances, in Stockholm, has established thirty-nine such substances in connexion with some of the monographs included in the second edition of the International Pharmacopoeia.

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The need for a single non-proprietary name for any given drug throughout the world has been widely recognized. The use of such names avoids the confusion that inevitably arises from the use of multiple designations, and facilitates the labelling of pharmaceutical products, the formulation of regulations governing their production and use, the national and international control of dependence-producing drugs, and the supply of information on adverse reactions to drugs.

More than 2000 international non-proprietary names have now been proposed by the Organization; eighteen lists of such names were printed in the WHO Chronicle and, in addition, two cumulative lists were published (in 1962 and 1967). Over 1700 names have been published as “recommended international non-proprietary names”.

The selection of non-proprietary names has been greatly facilitated by the active co-operation of national nomenclature commissions, which act as intermediaries with the manufacturers.

**DRUG SAFETY**

It is difficult to envisage a truly safe drug, since an increased dosage or prolonged use of even the most innocuous pharmaceutical product may cause an untoward reaction in some individuals. The basic problem is to ensure that the normal use of a given drug is not liable to produce a detrimental biological change, either immediately or long after administration. A striking example of possible dangers has been provided by the damaging effect of thalidomide on embryonic development.

In order that its therapeutic potential might be explored, a substance is customarily subjected to a range of tests in animals or animal preparations. Even a far-reaching experimental study, however, cannot always establish its therapeutic value and all possible side-effects, and the final judgement can be made only after observation in human beings.

In 1962 the Fifteenth World Health Assembly, recognizing the need to establish a system for the evaluation of the safety and efficacy of drugs, requested that a study be made of the feasibility of WHO’s developing a programme with the following main aspects: the formulation of internationally acceptable principles and requirements for drug evaluation; the exchange of information on drug safety and efficacy; and the promotion of rapid transmission of information on serious adverse reactions to drugs. Subsequently a scientific group convened by WHO to consider the question advised that such a programme was feasible.

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1 For procedure for selecting and recommending international non-proprietary names, see The first ten years of the World Health Organization (1958), Geneva, p. 405.
Accordingly, a programme for the promotion of safety of drugs has been developed with the guidance of the Advisory Committee on Medical Research and the collaboration of the International Union of Pharmacology. One feature is a communication service, by which Member States exchange, through the Organization, information on governmental decisions to limit the availability of certain therapeutic substances on account of adverse reactions observed during their clinical use.

Following upon the recommendations of various scientific groups convened by WHO, a pilot research project has been initiated for the purpose of developing a system for international monitoring of adverse reactions to drugs. This project has the benefit of data-processing facilities offered by the Government of the United States of America.

Of particular importance has been the formulation, with a view to international acceptance, of basic principles for the experimental and clinical evaluation of the safety and efficacy of drugs. Thus, in 1966 a scientific group outlined the principles that should govern the first phase of the testing of drugs, in animals. It discussed, inter alia, studies on the metabolism and distribution of drugs in the body, and the importance of integrating them into the relevant clinical studies at the earliest possible stage.¹ The same year another group outlined principles for the testing of drugs for teratogenicity.²

At a symposium on the toxicology of drugs organized by WHO for countries of the European Region in Moscow, in 1964, it was stressed that national authorities responsible for statutory or other forms of drug safety control should be assisted, in the evaluation of data on preliminary toxicity testing and clinical trials, by an independent body of highly qualified experts.

**DRUG DEPENDENCE AND ABUSE**

One aspect of WHO’s activities in this field relates to international arrangements for the control of narcotics. The existing international conventions on the subject are gradually being replaced by the Single Convention on Narcotic Drugs, 1961; WHO participated in the preparation of this treaty instrument and has assumed certain functions and responsibilities under it.

The Organization has continued to perform its statutory functions with regard to dependence-producing drugs in collaboration with the United Nations Commis-

sion on Narcotic Drugs, the Permanent Central Narcotics Board and the Drug Supervisory Body. In the course of seven meetings, the Expert Committee on Dependence-Producing Drugs (formerly known as the Expert Committee on Addiction-Producing Drugs) ¹ has made recommendations for decisions taken by the Organization as to the appropriate status for international control of some sixty substances, or preparations made from them.

The increasing variety of substances producing dependence and leading to abuse called for a review of the traditional terminology, and the proposal made in 1963 by the expert committee — that the general term "dependence" be used, qualified by the type of drug involved — has been widely accepted. The committee described the following specific types of drug dependence: morphine, barbiturate, cocaine, amphetamine, and cannabis. ² Subsequently descriptions were formulated of two further types — namely, drug dependence of khat and hallucinogen (LSD) types.³

A scientific group reviewed and evaluated the methods available for detecting in advance, by pharmacological experiment or clinical observation, the dependence-producing properties of various types of drugs.⁴

In addition to carrying out its functions in connexion with the international control of dependence-producing drugs, the WHO expert committee has reviewed the specifically medical aspects of drug dependence prevention, treatment and rehabilitation. The problem is not solely a matter of national or international control of dependence-producing drugs; there is need for study of the reasons why people have recourse to drugs. The psychological and social factors involved lend ever-increasing importance to the combination of treatment with education — of the community as well as of the individual. In this connexion, WHO produced a film in 1967 on the dangers of opium and heroin.

At a meeting in 1966, the Expert Committee on Mental Health advocated a combined approach to drug dependence and alcoholism, in view of the many similarities in causation and treatment of these conditions (see also page 218).⁵

The high rate of consumption of drugs — whether antibiotics or tranquillizers — has been causing concern in many countries. It may result in adverse reactions to some drugs, or some form of dependency on others. It involves a threat to health and a waste of resources, and information is required on the size and nature of the problem. To provide a basis for considering whether the particularly high

consumption of drugs in certain countries in the European Region corresponds to real needs or represents an appreciable over-consumption, WHO has made a study in six countries in the Region, taking into account such factors as over-prescription, self-medication and health insurance schemes.

FOOD ADDITIVES

The chemical industry has greatly increased the number of substances — formerly mainly of vegetable origin — that are added to foods and drinks as preservatives or to enhance colour or taste. The widespread utilization of pesticides in agriculture and the use of antibiotics and other biological substances in animal husbandry have created another group of additives — those which are unintentional, but remain in foods prepared for human consumption.

These intentional and unintentional food additives may create risks to health, and many countries have introduced legislation for their control. For some substances the evidence has been clear, and governments have forbidden their use. Some have proved innocuous, and are among those permitted. Others, especially the new ones, require systematic study to ensure that they have no adverse effect on health. Finding out whether a substance may be carcinogenic, for instance, is not as simple as establishing in animals its degree of crude toxicity.

A scientific basis for legislation is necessary. WHO, often in co-operation with FAO and other agencies, has attempted to help by co-ordinating experience and knowledge available, assisting in the development of criteria and methods for international use — thus facilitating the comparison of studies — and indicating topics in which further research is required. WHO’s activities in the field of food additives have therefore mainly taken the form of international meetings and assistance to research.

WHO and FAO have jointly convened several meetings of expert committees with a view to evaluating the toxicity of food additives and pesticide residues, as recommended by the first 1 and second 2 joint FAO/WHO conferences on food additives and by a joint meeting of the FAO Panel of Experts on the Use of Pesticides in Agriculture and the WHO Expert Committee on Pesticide Residues, held in 1961.3

The Joint FAO/WHO Expert Committee on Food Additives has established the main criteria for toxicological evaluation of food additives 4 and the basis for

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testing for carcinogenicity.\(^1\) It has evaluated toxicological data and drawn up specifications for a number of antimicrobials and antioxidants, emulsifiers and stabilizers, food colours, acids and bases, flour-treatment agents, flavours, non-nutritive sweeteners and other food additives.\(^2\)

Recommendations regarding future research on food additives were made by a scientific group convened by WHO in 1960 to consider methods of evaluating carcinogenicity, and by a group of consultants at a meeting in 1963. Another scientific group, which met in 1966, reviewed toxicological testing methods and the interpretation of experimental results, and made recommendations concerning the choice of appropriate test animals, guidelines for observations in man, the duration of toxicity studies, and the margin of safety to be applied in estimating acceptable daily intakes.\(^3\)

The public health aspects of the increasing use of antibiotics in animal foodstuffs, and for plant disease control and food preservation, were considered by a WHO expert committee in 1962.\(^4\) In 1961 FAO, IAEA and WHO sponsored an intergovernmental meeting on the wholesomeness of irradiated food, and in 1964 a joint FAO/IAEA/WHO expert committee discussed the technical basis for legislation on the subject.\(^5\) WHO has now begun to collect data relevant to the evaluation of the wholesomeness of irradiated food and to the necessary technical controls.

Joint meetings of the FAO Committee on Pesticides in Agriculture (or the FAO Working Party on Pesticide Residues) and the WHO Expert Committee on Pesticide Residues were held in 1963, 1965 and 1966.\(^6\) Acceptable daily intakes were estimated for about half of the fifty pesticides and fumigants considered, and recommendations were made on the additional toxicological investigations necessary for a safety evaluation of the remainder.

WHO has recently begun to sponsor research aiming to ascertain which pesticides can suitably be used in place of those that have been found to produce an unusually high toxicity when ingested by persons suffering from malnutrition.

As part of the Organization’s service for the collection of data on current research in medical and related sciences, and to assist in the co-ordination of research on food additives, the Organization has compiled information on the investigators working in this field and on the research projects on which they are engaged. This information is kept up to date and is available on request.

Work on the *Codex Alimentarius* is described on page 226.

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In a comprehensive review of the Organization's work in assisting governments in the environmental health field, submitted to the Twelfth World Health Assembly in 1959, it was pointed out that, despite some substantial achievements, progress was too slow to make a significant impact on the vast problem of environmental health. More than half the world's population was still without elementary sanitation; hundreds of millions of people were without safe water; and in too many countries as many as one quarter of the hospital beds were occupied by patients suffering from water- and filth-borne diseases. The Health Assembly endorsed the principles and proposals set forth in general terms in the report, laying stress on the development of community water supplies not only for their own value but as a spearhead for other activities.

During the last decade, though community water supply has been given special emphasis, the other environmental deficiencies that endanger health have also received attention: air and water pollution control, sewage and solid wastes disposal, health aspects of housing and physical planning, and radiation health protection. The determination of the research required, the stimulation and support of such research, the collection and dissemination of results, are fundamentals—along with training—of environmental health activities.

Factors that underlie the world's water supply problem and also accentuate other environmental health problems are the phenomenal increases in population growth, in urbanization and industrialization, as a result of which many more people are living in congested conditions and are exposed to increasing pollutants in the air and in water, food and soil. At the same time developing industrial technology means more atmospheric pollution and liquid and solid wastes which, in the absence of proper management and control, endanger public health.

The establishment of environmental health units in ministries of health and enrolment of qualified sanitary or public health engineers and other specialists are prerequisites for an environmental health programme. Progress in these directions has been slow but encouraging. Many of the countries of Central and

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South America have such units with sanitary engineers. Several countries in Africa and Asia now have at least the nucleus of an environmental health structure. WHO is assisting Member States to establish such structures and to develop programmes and plans by granting fellowships and by supporting training institutions as well as by providing advice.

WHO has also participated in work on extreme climates. For instance, it contributed to UNESCO's programme on arid zone research in 1960 and to a symposium on environmental physiology and psychology in arid conditions organized by UNESCO at Lucknow, India, in 1962. In the same year a conference on medicine and public health in the Arctic and Antarctic was convened by WHO. It was attended by eleven Member States and representatives of the World Meteorological Organization and the Scientific Committee on Antarctic Research of the International Council of Scientific Unions. Selected papers presented at the conference have been published in the Public Health Papers series.¹

The Organization is developing its environmental health programme in co-operation with the United Nations (including the United Nations Development Programme), UNICEF, IAEA, the specialized agencies concerned, the International Bank for Reconstruction and Development and the Inter-American Development Bank.

GENERAL SANITATION SERVICES,
EDUCATION OF ENVIRONMENTAL HEALTH PERSONNEL,
HOUSING AND URBAN DEVELOPMENT

WHO has continued to provide assistance to countries in the promotion of environmental health services. Apart from its activities under the community water supply programme (see page 255), WHO is now assisting seventy-two Member States in establishing or developing environmental health services at central, provincial or municipal levels, or in training personnel for such services. In addition, ninety sanitary engineers and fifty sanitarians are attached to forty-four WHO-assisted projects for the control of communicable diseases or the promotion of maternal and child health. In Africa where, before 1957, there were few activities in environmental sanitation, sixteen projects were operational in 1967.

Some WHO activities are for the benefit of specific groups. A study undertaken in collaboration with ILO and the Inter-Governmental Maritime Consultative Organization (IMCO) resulted in the publication in 1967 of a Guide to Ship

Sanitation. The preparation a few years before of a similar Guide to Hygiene and Sanitation in Aviation is dealt with in Chapter 4 (see page 100). At the request of the United Nations Conference on International Travel and Tourism (held in Rome in 1963) a study was undertaken on the sanitation of tourist establishments.

Education of Environmental Health Personnel

Since the development of sanitation services is hampered in many countries by the lack of qualified personnel, an important part of WHO's activity has been directed to the promotion of education and training of personnel at all levels.

Various forms of assistance have been provided for the creation of new courses in sanitary engineering and environmental sanitation, for example in Iran (at Teheran), India (at Madras), Lebanon (at Beirut), and in Italy, at the University of Naples, where an academic course in sanitary engineering for civil engineers is now given in French, chiefly for engineers working in developing countries. A similar course in English has been organized at Delft in collaboration with the Netherlands Universities' Foundation for International Co-operation, UNESCO and the Organization for Economic Co-operation and Development. Japan, the Philippines and Thailand are among the countries in which graduate and undergraduate courses in sanitary engineering have been established, and in the European Region a number of courses on specific engineering subjects have been organized.

Further impetus was given to the establishment of new sanitary engineering educational schemes in Brazil and Venezuela with financial assistance from the Special Fund component of the United Nations Development Programme. In Latin America, education, training and research in sanitary engineering have since 1962 been planned as a single regional programme, in which various academic programmes, courses and seminars have been carried out in sequence, although held in different countries. Altogether thirty-four universities in twenty-one countries of Latin America have agreed on such a programme.

Steps have also been taken with a view to setting up in 1968 in a French-speaking country on the African continent an environmental health centre, to provide training, research facilities and services. Moreover, the Organization has awarded fellowships to the staff of training and research institutions in various countries, since one of the greatest obstacles to the development of education programmes in public health engineering is the dearth of qualified teachers.

A WHO inter-regional symposium on engineering education and training programmes for environmental health, in 1965, drew attention to the need for

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engineers and planners to receive teaching in environmental health during their university education, in order to make them aware of the health and sanitation implications of their future work.

In 1967 an expert committee emphasized the other aspect of the question, namely that of training "environmental health engineers" and other specialists called upon to deal with the widening range of environmental hazards, utilizing the newer methods and technologies that are now being introduced into university education.\(^1\)

Both the inter-regional symposium and the expert committee referred to the important role of sanitation personnel other than public health engineers in controlling environmental risks to health. WHO has sponsored the establishment of advanced courses for public health inspectors in India, Kenya, the Philippines and Syria. The training of other sanitation personnel, such as engineering subordinates, health (sanitation) assistants, sanitarians, sanitary aides, and waterworks operators, has gone forward with assistance from WHO in countries in all regions. In the African Region, for example, fourteen projects for training assistant health inspectors in sanitation were in operation by 1967. In addition, field training has been provided in connexion with WHO-assisted projects for community water supplies, sewage and waste disposal.

**Housing and Urban Development**

Since 1956 WHO's work in housing and urban development has been closely linked to that of the United Nations, the specialized agencies and the Organization of American States on programmes of concerted international action in housing, building and regional planning.

The nature and scope of the public health factors involved in these programmes have been discussed by three expert committees convened by WHO: the first, in 1961, dealt with the public health aspects of housing; the second, in 1964, with the environmental health aspects of metropolitan planning and development; and the third, in 1966, with the appraisal of the hygienic quality of housing and its environment. Preparations for this last committee were made in close co-operation with the United Nations Statistical Office, the United Nations Centre for Housing, Building and Planning, and the Economic Commission for Europe.

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The reports of these committees bring out the importance of environmental factors— inadequate water and sewerage systems, pollution, unhygienic dwellings, etc.— in the current deterioration of housing conditions and show how that deterioration can be avoided by proper attention to environmental aspects at the planning stage. This can be achieved by the close association of health authorities with public works agencies and others concerned with housing programmes.

A similar point is made in *Housing Programmes: the Role of Public Health Agencies*¹ which also discusses the establishment and maintenance of housing standards.


In co-operation with the United Nations Centre for Housing, Building and Planning (New York) WHO participates in country projects financed from the Special Fund component of the United Nations Development Programme in various parts of the world. These have included housing, city and regional planning schemes in Lagos in 1962, in Entebbe-Kampala in 1964, in Caracas in 1965, in Taipei and Kabul in 1966. Similar projects are in the planning stage in East Pakistan and Singapore.

As part of its own programme, WHO assisted in surveys of the public health aspects of housing in Ethiopia, Iran, Iraq, Sudan, the United Arab Republic and the countries of the Caribbean and Central American area in 1962 and 1963; advised on sanitation and public health for the general reconstruction plan for Skopje, in Yugoslavia, which was devastated by earthquake in 1963; and has provided advice on rural planning to Venezuela since 1965. Assistance in sanitary engineering and training was provided to housing and planning agencies in Iraq in 1965 and 1966 and in Libya in 1967, and to the Inter-American Centre of Housing and Planning in Colombia since 1966. The Organization participated in a course on housing, given in 1966, at the Latin American Institute for Economic and Social Planning in Santiago, Chile.

"The challenge to public health of urbanization" was the subject of the technical discussions at the Twentieth World Health Assembly in 1967 (see also page 42).

COMMUNITY WATER SUPPLY

Because safe and adequate supplies of water for the inhabitants of communities constitute an important measure for the protection and improvement of health and are indispensable to economic and social development, the Twelfth World Health Assembly in 1959 sanctioned a programme for the improvement of community water supplies. At the same time, it requested the Director-General to establish a Special Account for Community Water Supply.

Previously WHO’s assistance in the field of water supplies had been aimed at rural communities; from 1959 onwards the programme was expanded to include large urban communities; this entailed assistance on all aspects of water supplies -- engineering, financial, economic and managerial.

To ascertain the nature and extent of the needs of urban areas, a study was made in 1962 of the situation in seventy-five developing countries with a total urban population of 320 million. It showed that only about 33 per cent. of the urban population and certainly less than 10 per cent. of the total population were supplied with piped water in their homes or premises, and that even these supplies were in many cases deficient in quality, quantity or continuity. An additional 25 per cent. of the urban population obtained water from public outlets often several hundred metres from their homes, while over 40 per cent. of the urban population had no access to any safe and reliable source of water.

The seventy-five developing countries concerned have an annual population growth considerably greater than the world average, and an urban growth-rate about one and a half times higher than that of their rural communities. Hence in the very areas where the situation is at present most serious the problem is becoming rapidly worse.

Taking these factors into consideration, the community water supply programme was designed to help developing countries in assessing their needs, in formulating policies and programmes for meeting those needs, and in creating national and regional organizations for planning, financing, constructing, managing and operating community water supplies.

Since its inception in 1959, this programme has grown rapidly and in 1967 it included WHO-assisted projects in eighty-three countries, involving the services of 121 full-time WHO engineers. Of these projects three-quarters are financed from regular WHO funds and the remaining quarter from the United Nations Development Programme and the WHO Special Account for Community Water Supply.

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Shortage of skilled manpower is a major obstacle in most of the countries concerned. WHO has assisted in training a variety of professional and sub-professional personnel through fellowships, the organization of seminars and training courses, the provision of instructors for on-site training, and by other means. All the Organization's field activities include training of counterpart staff and instruction classes for all grades of personnel. Consulting engineering firms which are sub-contractors to WHO take members of government staffs into their headquarters offices for training in waterworks planning and design.

These instruction programmes are usually aimed at "training the trainers", and local instructors are taught various techniques which will enable them to pass on the knowledge they acquire, in their own language, to local staff. Teaching is supported by manuals and course notes, as well as by WHO publications. Monographs such as *Water Supply for Rural Areas and Small Communities*¹ and *Operation and Control of Water Treatment Processes*² have proved valuable for training and serve as reference books for national staffs.

*International Standards for Drinking-Water*,³ first published in 1958, was revised and re-issued in 1963, incorporating the findings of an expert committee. Many governments have officially adopted these standards, while others have used them as a basis for national standards. A similar publication, *European Standards for Drinking-Water*,⁴ was the outcome of WHO-assisted studies in Europe.

Most developing countries lack funds for the construction of waterworks facilities. WHO, although not itself a financing agency, assists Member governments in a number of ways in this respect. Pre-investment surveys financed by the Special Fund component of the United Nations Development Programme have been undertaken, with WHO assisting both in the preparation of the government's request and as executing agency for the project. Such surveys have been completed or are in progress in Ghana (for Accra-Tema), India (Calcutta), Senegal (Dakar), Turkey (Istanbul), Uganda (Kampala), and also in Ceylon, Malta and Morocco. In other cases, government studies and surveys assisted by WHO have led to projects being financed by the International Bank for Reconstruction and Development or under bilateral assistance programmes, as in Burundi (Bujumbura), Dahomey (Cotonou and Porto Novo), Togo (Lomé), Liberia (Monrovia), Turkey (Adana and Mersin) and the Republic of Korea (Seoul). In all such sur-

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veys, the aim is a viable water undertaking, staffed by trained personnel, adequately managed, with a financial structure which will ensure its operation as a self-supporting investment capable of amortizing its original cost. The establishment of a national water corporation in Ghana, and a similar authority for Calcutta, are examples of institutions of this kind set up with guidance from WHO.

Since the consumers normally bear the whole, or at least a substantial part, of the cost of the treatment, storage and supply of water they use, WHO has assisted in setting up rate structures and internal financial arrangements which will enable the authorities concerned to obtain revenue on an equitable basis.

The progress achieved through comprehensive technical, managerial and financial assistance can be seen in the countries of Latin America that subscribed in 1961 to a specific health programme. It aimed to provide water supplies to a minimum of 70 per cent. of the urban and 50 per cent. of the rural populations by the end of the decade in 1971. Programmes were prepared for each of the nineteen countries involved and, in 1965, fourteen of these countries were ahead of schedule in respect of their urban water supplies, though progress in respect of the rural populations was less satisfactory. In these countries more than US $1100 million of national and international funds were invested between 1961 and 1967, for the benefit of about fifty-three million people (see also page 11). The stimulating effect of national targets, support from international capital development agencies, the creation of revolving funds and other financial devices, have all helped in accelerating progress. The assistance of the Organization has been a factor in achieving this result.

For rural communities, international assistance has also been available in the form of equipment and supplies by UNICEF. These are now being provided in some sixty countries, with WHO assisting in the preparation of the project and in the installation of the water supply system. In Pakistan, for example, UNICEF made available materials for rural water supplies to the value of over $1 million.

Research into all aspects of community water supply is also being promoted as part of the assistance to developing countries. Here the general objectives are the reduction of construction and operation costs through increased use of local materials and skills, the simplification of designs and processes, field trials of methods which have been evolved under laboratory conditions, and the interchange of ideas which have proved successful in practice.

Among national research institutions which, with WHO assistance, are studying water supply problems peculiar to their countries, are the Central Public Health Engineering Research Institute at Nagpur (India) and the Centre for Sanitary Engineering Research at the University of Alexandria, United Arab Republic.
ENVIRONMENTAL POLLUTION

In some countries huge capital investments are made annually to control pollution. WHO's programme aims at assisting countries by determining those levels of pollution which are compatible with health and by advising on measures to prevent the growth of pollution into a major hazard in the course of economic and social development.

Air Pollution

Following the meeting in 1957 of the first expert committee to discuss air pollution\(^1\) WHO has been mainly concerned with the measurement of air pollution and with its effects on health.

Since one of the difficulties in assessing pollution levels is the lack of standardized sampling and analytical procedures, the work on measurements was directed to the elaboration of methods that can produce accurate and comparable data and be internationally acceptable. Studies on this subject, which was discussed by an expert committee in 1963\(^2\) and a scientific group in 1965, have led to the preparation of a guide to the selection of measuring methods.

The influence of air pollution on health was discussed at a number of meetings convened by WHO, mainly in the European Region where the problem is most acute. At a European symposium held in Copenhagen in 1960, it was agreed that convincing evidence of the effects of specific air pollutants could best be obtained from internationally co-ordinated epidemiological investigations carried out under varying climatic and environmental conditions.\(^3\) During the last decade a remarkable increase in research in this field has taken place, including large-scale epidemiological studies, studies on the action of pollutants upon the central and autonomic nervous systems and research into biochemical and immunological responses to stimuli.

At a symposium on the health effects of air pollution, held in Prague in 1967, progress was reviewed and an attempt made at evaluation of methods used to measure air pollution. New approaches to the determination of the short- and long-term effects of air pollution on health, and standards, criteria and guides were also discussed.

A European seminar for sanitary engineers, held in Brussels in 1962, provided a forum for the exchange of information on technical and administrative measures

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for the prevention and control of air pollution. The following year an inter­
regional symposium discussed fundamental principles on which "air quality
criteria and guides" should be based and their relative importance as a basis for
formulating national legislation and local regulations and standards.

WHO publications on air pollution and its control have included a survey of
existing legislation,\(^1\) a monograph presenting up-to-date knowledge on various
aspects of the subject,\(^2\) and papers on air pollution control, published in the
Bulletin\(^3\).

The Organization has assisted a number of countries, including China (Tai­
wan), Cyprus, India, Iran, Israel, Japan, Kuwait, Lebanon and Turkey, in matters
of air pollution by providing fellowships for study abroad and advisory services,
including help in identifying the causes of specific cases of pollution.

In Latin America there now exists a network of air sampling stations linking
the following cities: Buenos Aires, Rio de Janeiro and São Paulo, Bogotá, San­
tiago de Chile, Kingston, Mexico City, Lima, Montevideo, and Caracas. For the
first time it will be possible to compare results using the same standards for the
sampling and analysis of air in all cases. Successful control programmes have
also been established in Santiago, Lima and parts of São Paulo’s industrial com­
plex.

\textit{Water Pollution}

The first WHO expert committee to discuss water pollution control, in 1965,\(^4\)
estimated that the few countries where effective pollution control existed would
have to double their water treatment facilities in the next twenty years. It advo­
cated the use of statistical analysis to compare the cost of pollution prevention
and abatement with the resulting economic benefits. It also recommended research
on certain pollutants and control methods.

A second expert committee on the same subject, in 1967, concentrated mainly
on pollution in arid and semi-arid regions and in those developing countries where
wide seasonal variations in precipitation create special pollution problems. It
paid special attention to problems of water re-use and to the effects on water qua­
ty of agricultural practices and industrial development.

In the European Region, which has some of the most densely populated and
highly industrialized areas of the world, water pollution problems are particu­

\(^1\) Int. Dig. Hlth Leg., 1963, 14, 187-229.
\(^2\) Barker, K. et al. (1961) Air pollution, Geneva (World Health Organization: Monograph Series
No. 46).
larly acute and their solution often requires international collaboration. Surveys have been undertaken and meetings organized with a view to promoting greater national and international action. Several years' co-operation on this subject between the United Nations Economic Commission for Europe, FAO, IAEA, and WHO culminated in a conference in Geneva in 1961 to identify the most important water pollution problems in Europe and consider the technical, legal, financial and economic aspects of water pollution prevention. A selection of the papers presented at the conference was later published by WHO on behalf of the agencies concerned.\(^1\) WHO took part in a travelling seminar on the Rhine to study at first hand pollution problems on a river flowing through several countries. A WHO conference organized in 1966 in Budapest discussed the regional planning of water pollution control and the creation of authorities to administer control programmes for a whole region or river basin.

A comparative study of legislation governing water pollution control in thirteen countries was published in the *International Digest of Health Legislation*.\(^2\)

WHO has provided assistance to a number of countries on water pollution problems. For example the Organization is assisting Israel in pollution prevention; Iraq, Pakistan, Sudan and Syria in pollution surveys; and India, in the organization of water pollution control and its prevention. Thailand has received technical advice on the organization of water pollution control and prevention, and China (Taiwan) on the legal, administrative and technical aspects of control.

In Latin America assistance has been given to Argentina, Brazil, Costa Rica, Jamaica, Peru, Uruguay, Venezuela and several territories in the Caribbean area regarding the pollution of individual stretches of water and ocean beaches. In Brazil, WHO has co-operated with the municipal authorities of the state of São Paulo in planning and executing air and water pollution control programmes and in exploiting water resources to the full.

As executing agency for projects financed from the Special Fund component of the United Nations Development Programme, WHO has assisted India in developing the Central Public Health Engineering Research Institute at Nagpur as the country's major research centre for environmental sanitation problems, with particular reference to water pollution control; and Poland in research into methods for combating the pollution of the Oder and Vistula rivers in a highly industrialized area.

This direct assistance to countries is supplemented by fellowships and courses in various institutions supported by WHO or set up with its help (at the Univer-


\(^{2}\) *Int. Dig. Hlth Leg.*, 1966, 17, 627-834.
University of Naples, the Technological University of Delft, the Central Public Health Engineering Research Institute at Nagpur, the Guanabara State Institute of Sanitary Engineering at Rio de Janeiro, various institutes in Venezuela, the Polytechnic at Teheran, etc.).

A study of methods for surveying water pollution and the re-use of water in developing countries is also receiving WHO assistance. Similarly the study on coastal pollution continues; the first phase, completed in 1967, included a comprehensive review of the pathogenic and other organisms discharged with sewage into coastal waters, their survival and health significance.

In addition, and in order to fill gaps in existing knowledge, WHO has given assistance to research on specific subjects, for example the long-term effects on health of pesticides used in agriculture; methods for the identification and measurement of non-ionic detergents in water; methods for the identification and measurement of other synthetic organic compounds in water; drinking-water standards in relation to new pollutants.

At the request of the United Nations Economic and Social Council, WHO prepared a report on research into environmental pollution and measures for its control in collaboration with the United Nations, ECE, ILO, FAO, UNESCO, WMO, IMCO and IAEA.

WASTES DISPOSAL

Many communities do not yet have engineered systems of waste-water collection or treatment facilities of any kind. The need becomes particularly acute when piped water becomes available. WHO assistance for national water supply programmes has therefore often included help in the planning, financing and administration of sewerage and waste disposal. Large capital investments are required, administrative and organizational structures must be created and, above all, adequately qualified personnel must be trained to cope with the local problems of waste water and solid refuse.

A major part of the Organization's work in developing countries consists of advisory services, sometimes over a period of years, to national, regional or local authorities on various aspects of wastes management. Much of it takes the form of surveys and the preparation of requests to the United Nations Development Programme for the financing, from the Special Fund component, of the necessary pre-investment and engineering feasibility studies. Studies carried out by consulting engineering firms serve as a basis for securing from international sources the loans essential for the implementation of the long-term plans.
WHO is executing agency for a number of Special Fund projects in which the engineering feasibility reports cover sewerage and sewage disposal facilities as well as water supply. Examples of such projects are found at Accra-Tema, Calcutta, Istanbul and Kampala, in Malta and in the south-west coastal area of Ceylon. The Malta project envisages a form of sewage treatment yielding an effluent for irrigation purposes and sludge in the form of a compost which can be used as soil conditioner and fertilizer for horticulture.

The first large-scale Special Fund project devoted exclusively to wastes disposal is at Manila, where a master plan for a sewerage system is being prepared. A similar project being planned for Ibadan (Nigeria) includes engineering studies for sewerage, surface water drainage and solid wastes collection and disposal, as well as subsequent assistance in the managerial and operational aspects.

The Organization has provided assistance on wastes disposal to many other countries, including Argentina, Barbados, Brazil, Burundi, Chad, China (Taiwan), Colombia, Cyprus, Dahomey, Ethiopia, Guam, Iran, Jamaica, Jordan, Lebanon, Malta, Panama, Peru, Syria, Thailand, Trinidad and Tobago, and Venezuela. In some cases the assistance was concerned with the collection and disposal of refuse and industrial solid wastes. For example, advice was provided to Dahomey on refuse collection and processing in Cotonou and Porto Novo, and to Venezuela on the planning and construction of incinerators; and along the border between the United States of America and Mexico a survey was conducted in cities where different methods of solid-wastes disposal have been demonstrated.

With increasing urbanization and industrial development the disposal of the growing quantity of refuse and solid wastes of all kinds is becoming a complex and expensive process which in some industrial countries can account for 20 per cent. of the municipal budget. It was one of the problems considered in 1964 by an expert committee convened to discuss the health implications of environmental change. It was also the subject of the technical discussions at the meeting of the Directing Council of PAHO/WHO Regional Committee in 1960.

In the European Region, WHO sponsored seminars for sanitary engineers to discuss the disposal of waste into the sea and coastal waters (at Nice, France, in 1958), and the design, operation and economics of sewage treatment plants for small towns and the problems of collection, treatment and disposal of refuse (at Naples in 1965).

A WHO scientific group on the treatment and disposal of wastes met in 1966 to review present knowledge and problems. It made recommendations regarding research on simplified waste collection, treatment and disposal designed

to make the best use of local resources in manpower and materials; the management and disposal of waste-water solids and their integration with community and industrial solid wastes; recovery and recycling of liquid and solid wastes; methods and processes of on-site waste management, and other topics related to basic design criteria, technology, administration and management of wastes disposal systems.

Research is now being conducted into so-called "tertiary" methods of treatment — new and improved processes, such as activated carbon filters, distillation and electrodialysis — to remove a higher percentage of the pollutants and to allow greater re-use of waste water for agriculture, industry, recreation, and even municipal water supply in areas of water shortage. Although the greatest concern in the developed countries is with the potential health effects of new chemical pollutants, in the developing countries the problem is still essentially one of microbiological pollution of the soil and of water-sources through insanitary sewage disposal.

In 1967 a review was made of the latest technical information available on the adequate storage, collection, disposal and utilization of urban solid wastes, including new methodology for proper management and control. On the basis of information collected during 1964 and 1965 a guide was prepared on the construction and operation of waste stabilization ponds, which are being used increasingly either as a complete treatment process for raw sewage and industrial wastes, or as a further purification process for the effluent of conventional treatment plants.

A study was started in 1967 of simplified, low-cost designs for water-borne sewage disposal systems suitable for small communities and housing developments in developing countries. The construction of excreta disposal systems in rural areas is dealt with in a monograph ¹ published by WHO and addressed to public health administrators and engineers engaged in health work.

RADIATION HEALTH

The development of nuclear energy and the application of radiation and radioactive materials in many fields have considerably increased the possibility of exposure to ionizing radiations. Protection against such radiation is now a recognized public health problem calling for government action. A WHO expert

committee on radiation concluded in 1962 that it was the responsibility of the health agency "to provide a single focal point for evaluation of the total health impact of all sources of radiation and to ensure that adequate measures for health protection are taken".¹

Radiation protection has therefore been one of the main concerns of WHO in this field. The Organization's activity has also been directed to the measurement of radiation units, the use of radiation in medical research and therapy, the environmental health aspects of radiation, and studies on the biological effects — both somatic and genetic — of radiation. The work has involved close contact with other international organizations concerned with the increasing use of radiation, radioactive material and nuclear energy, particularly the International Atomic Energy Agency and the two non-governmental organizations dealing respectively with the scientific study of radiation protection and the establishment of appropriate units of radiation and their measurement (the International Commission on Radiological Protection and the International Commission on Radiation Units and Measurements).

In this new field a large element of WHO's work consists of sponsoring meetings of experts, of publications, and of assistance in training and research.

**Radiation Measurements and Standards**

With the increase in the quantity and variety of the radionuclides being released into the environment, reliable and practical assay techniques are required for the assessment of the resulting health hazards. The methods available in 1958 for measuring the radionuclides in the human body and the environment, with special reference to food, were reviewed by a joint WHO/FAO expert committee on methods of radiochemical analysis, which selected those thought to be most practical for laboratories new to radiochemical work.² These methods have since been improved and new ones developed, and in 1966 WHO published, jointly with IAEA and FAO, a new compendium, *Methods of Radiochemical Analysis*.³ This is the outcome of a scientific meeting convened by the three agencies in 1964 to revise and expand the earlier recommendations.

An example of WHO's contribution to the establishment of standards in this field is the inclusion in *International Standards for Drinking-Water* ⁴ (see also page 256) of a section on the measurement of radioactive pollution of water supplies. In 1967 WHO produced recommendations for routine surveillance for radio-

nuclides in air and water. The detailed procedures for monitoring air and water are designed for implementation by public health administrations.

A study on ionizing radiation and health,\(^1\) which was prepared in 1960 at the request of the Executive Board for discussion by the Thirteenth World Health Assembly, deals chiefly with the interpretation of physical exposure levels, and the present radiation pattern as described in physical terms.

Since 1962, and in co-operation with the United States Public Health Service, the Organization has been assisting countries in South America to monitor their environment for radioactive material. This programme is being extended to other areas. Also, an international network for environmental radiological monitoring is being established to provide systematic data on levels of radioactivity to which populations are exposed.

**Biological Effects of Radiation**

The populations of areas where the natural background radiation is abnormally high appear to offer a valuable source of information on the biological effects of radiation. Studies of these populations have been advocated by a number of expert groups convened by WHO, including an expert committee in 1958.\(^2\) The latter discussed the effects of radiation on human heredity and outlined a protocol for investigation, with particular reference to the situation in Kerala state, India, where the levels of natural radiation are many times higher than average. Measurements have since been carried out in several areas with high natural radiation—in Ceylon, India and the United Arab Republic—and the possibility of the necessary multidisciplinary studies has been explored. In Brazil, some of the results of investigations being undertaken with technical advice from the Organization have been discussed by the United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR).

In order to increase knowledge about the effects of radiation, WHO has been sponsoring research in several countries on the incidence of leukaemia in women who had been subjected to deep X-ray treatment.

WHO has collaborated with IAEA and UNESCO on aspects of basic biology and the effects of radiation, for example in a symposium on the cellular basis and etiology of late somatic effects of ionizing radiation, held in 1962 in London. WHO also participated in the second and third international conferences on the peaceful uses of atomic energy, convened by the United Nations in Geneva in 1958 and 1964.

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Medical and other Uses of Radiation

The medical applications of radiation and radioisotopes and the dosimetry of different techniques applied in medicine have been discussed at several meetings convened by IAEA and WHO. For instance, joint study groups discussed, in 1959, the use of radioisotope teletherapy units and in 1964 the planning of radiotherapy facilities.

In the Americas methods based on radioanalysis were used to elucidate the mechanism of chronic manganese poisoning in miners.

Joint work by FAO, IAEA and WHO on the wholesomeness of irradiated food is mentioned on page 249.

Radiation Health Protection

A major part of WHO’s activity was naturally concerned with the medical uses of radiation and was aimed at securing the maximum benefit from medical radiology while reducing as far as possible the hazards of exposure. This was discussed by the Expert Committee on Radiation in 1964 and was the subject of a number of seminars, including one in Athens in 1963 for directors of health laboratories and members of health services from the European and Eastern Mediterranean Regions, and one in Lund (Sweden) in 1965 for physicians, physicists, radiologists and public health administrators from Europe. Practical demonstrations on ways of reducing the radiation dose received by patients and medical personnel were given in seminars by travelling teams of experts in radiological health which visited, in 1962, centres in Iran, Lebanon, Pakistan and the United Arab Republic, and in 1964 centres in Burma, Ceylon, India, Singapore and Thailand.

Collaboration between WHO and industry with a view to producing better X-ray units in order to minimize the radiation dose received has been continuing for several years. On advice from WHO several manufacturers produced prototypes of general purpose diagnostic units designed to meet the radiological needs of the smaller hospitals and clinics receiving assistance from UNICEF and WHO and the standards recommended by WHO with regard to protection against radiation hazards. After the prototypes had undergone several inspections by WHO at the factories, four models (one each from four manufacturers) were approved for use in programmes assisted by UNICEF and WHO (see also page 312).

Public health responsibilities for radiation protection were reviewed by the WHO Expert Committee on Radiation which met in 1962. It discussed the admi-
nistrative structure of radiation protection services and advocated the introduction of flexible legislation to facilitate their operation. A survey of existing legislation regarding protection against ionizing radiation was published in 1964.¹ The organization of radiation protection services was considered also at an inter-regional conference, held in Düsseldorf, Federal Republic of Germany, in 1962 and at a seminar held in Singapore in 1965 for participants from the Eastern Mediterranean and Western Pacific Regions.

In 1959 an expert committee considered medical supervision in radiation work and basic health questions associated with occupational exposure to ionizing radiation.² The main emphasis was on training. A world survey of the available postgraduate training facilities in the medical uses of radiation was completed in 1966.

In addition, WHO has co-operated in the provision of training and has assisted individual countries in the development of radiation protection services. Examples are an international course on radiological health inspections organized in 1966 in Rockville, Md. (USA), and assistance given to Thailand for the establishment of a division of radiation protection in the Ministry of Health.

Guidance on action to be taken in the event of radiation accidents was given at two international seminars sponsored jointly by FAO, IAEA and WHO: the first held in Scheveningen, Netherlands, in 1961, on agricultural and public health aspects of radioactive contamination in normal and emergency situations; and the second held in Geneva in 1963, on the protection of the public in the event of radiation accidents. The proceedings of the second seminar were later published by WHO.³

In addition to the joint activities already mentioned, there has been continuing collaboration with IAEA on such matters as a study on methods of surveillance of environmental radiation exposure, on the management of radioactive waste produced by the users of radioisotopes, and on regulations for the transport of radioactive materials. With FAO work has continued on all matters relating to the radioactive pollution of agricultural products and to the remedial measures required.

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¹ Int. Dig. Hlth Leg., 1964, 15, 209-376.
Co-ordination of Medical Research
Programme Co-ordination and Evaluation
Co-operation with other Organizations

Co-ordination within WHO and with other organizations with which WHO co-operates is a main element in the activities described in this chapter.

For instance, where a piece of research is carried out simultaneously in various laboratories throughout the world, co-ordination implies an attempt to ensure comparability of results, to establish an order of priorities, and to encourage reciprocally beneficial activities; when many are engaged in education and training, each in his own limited area of concern, their pooled experience may be of value to all; or again the organization of a meeting on a particular topic, in a particular year, may call for a choice as to whether it should be regional or inter-regional.

Programme co-ordination of one type or another, and planning itself, are more effective when based on a review and assessment of past activities.

Activities in health often have considerable impact in such diverse fields as economic development or general education, which are the responsibility of other international agencies. The activities of the latter, in such matters as industrialization or agricultural development, have their effect on human health. Co-ordinated action, or even concerted action in a number of projects and programmes, has thus necessarily taken place, to common advantage.

CO-ORDINATION OF MEDICAL RESEARCH

During the first ten years of its existence, WHO conducted some research as an integral part of its programme activities, but there was no special effort to promote and co-ordinate medical research on a large scale. Many research activities were simply one aspect, or by-product as it were, of projects of assistance to governments.

The Eleventh World Health Assembly, held in Minneapolis in 1958, called for "a special study of the role of WHO in research and of ways in which the Organis-
MEDICAL RESEARCH PROGRAMME: REFERENCE CENTRES

WHO's programme of co-ordination of medical research owes much to an extensive network of reference centres. The centres, both international and regional, are responsible for the standardization of techniques, reagents, etc., and are focal points for consultations between research workers throughout the world.
In its work on cardiovascular diseases, WHO has sponsored a large-scale study on the possible bearing of environmental factors on coronary heart disease, with a view to improving diagnosis during life. Autopsy specimens (aortas and coronary arteries) from different communities are examined and pathological changes are graded at periodic meetings by collaborating pathologists from various countries.
A notable event in WHO's cancer programme was the issue in 1966 of *Histological Typing of Lung Tumours*, the result of six years' work on the part of the WHO International Reference Centre for the Histological Classification of Lung Tumours in Oslo, assisted by pathology departments in fifteen countries. The volume, in which the colour microphotographs and accompanying colour transparencies are identified by nomenclature in English, French, Russian and Spanish, is the first in a series of histological classification of tumours to be issued by WHO with the help of the network of reference centres.
RESEARCH ON LEPTOSPIROSIS

Work at the WHO/FAO Leptospirosis Reference Laboratory at the London School of Hygiene and Tropical Medicine, one of the eight reference centres co-operating in research on this disease. Studies co-ordinated so far have mainly dealt with the problem of diagnosis and typing of leptospirosis — a disease transmitted from animals to man.

BIOLOGICAL STANDARDIZATION

The establishment and promotion of international standards for biological, pharmaceutical and other products is one of the constitutional functions of WHO. Biological assay methods are used to measure the potency of some substances, and the international standards and reference preparations necessary for this purpose are established by the WHO Expert Committee on Biological Standardization after international collaborative assays organized by the WHO International Laboratories for Biological Standards. Some of the international standard preparations are shown here.
zation might assist more adequately in stimulating and co-ordinating research and developing research personnel”. During the ensuing months two meetings of internationally recognized leaders in medical research were held, and after consideration of the Director-General’s report the Twelfth World Health Assembly decided to start an intensified WHO programme of medical research. This new programme got under way as from 1960. A report, published in 1964, on the early development of the Organization’s intensified medical research programme, includes a short review of trends in research in various subjects.

Organization and Objectives

In 1959 the Twelfth World Health Assembly decided to establish an Advisory Committee on Medical Research. Its nineteen members meet once a year, review the WHO research programme and advise the Director-General on research policy, priorities, and the need for additional research in certain fields. Past and present members are shown in Annex 5.

The choice of research activities to be promoted and assisted by WHO is guided by the discussions of the Advisory Committee, the reports of scientific groups and problems in the field requiring new knowledge for their solution.

The objectives of the programme are fourfold: support of national research, provision of services for research, training of research workers and improvement of communication among scientists.

Support of National Research

This is reflected in two types of activities, namely “collaborative research” and “grants to individual investigators”.

Collaborative research, by far the largest single item in the WHO research programme, is based on the premise that some problems are better resolved by the co-ordinated efforts of workers in various countries, sometimes representing several disciplines. These research projects are WHO-initiated, but contracted out to established institutions. Since 1960 some special research activities have been partly supported by grants from the Government of the United States of America. They have included research on certain aspects of schistosomiasis; virus diseases; vector control; prevalence and types of anaemia; hypovitaminosis A, xerophthalmia and keratomalacia; human gamma-G immunoglobulins for intravenous injection; human reproduction; and also an international pilot study of schizophrenia.

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Unlike the previous category of activities the grants to individual investigators are not WHO-initiated projects. Although WHO is not a financing institution, small complementary grants are awarded to promote the research of individual scientists working on subjects of interest to WHO.

The subjects of collaborative research projects undertaken in the period 1958-1967 are shown in Annex 10.

*Provision of Services for Research*

WHO facilitates the research efforts of the scientific community through indirect assistance such as the services of reference centres and the recommendations of scientific groups.

A reference centre is a national institution selected by WHO to perform certain work of international utility, ranging from standardization of techniques or reagents, the maintenance of reference strains of micro-organisms, and the provision of special strains of laboratory animals, to the standardization of nomenclature. The WHO network of reference centres includes international and regional centres; these, in their turn, are connected with a large number of national or collaborating centres. The institutions that have served during the decade as international and regional reference centres are listed in Annex 12. They make available to WHO and the international research community their highly developed competence in specific subjects.

Apart from the expert committees which advise on various fields of health, scientific groups have been convened to review aspects more specifically related to research, identify gaps in knowledge and help in selecting subjects most suitable for international collaborative investigation. Although the scientific groups are convened primarily to advise the Director-General on the development of the research programme, reports on subjects considered to be of wider concern are published in the *Technical Report Series*. Annex 7 lists the scientific groups and also the expert committees convened during the decade.

*Training of Research Workers and Exchange of Information*

To increase the research potential of countries, a number of research training grants have been awarded. A few of these have been supported by the Government of Czechoslovakia, the Government of Israel, and the Swedish National Association against Heart and Chest Diseases. Also, scientists engaged in research are enabled to visit their colleagues working on similar projects in other countries to discuss common problems and exchange ideas, for periods of up to three months. (See also page 89 and Annex 11.)
Since 1965 information on research institutions, scientists and research projects in certain fields has been collected systematically by WHO. Some of this information has been coded and classified and stored by the WHO computer; it is selectively retrieved and made available to scientists and research institutions upon request. The first list, on cancer research, was distributed in 1966. Similar lists are being established for research on cardiovascular diseases, dental health, human reproduction and veterinary public health.

Communication among scientists has been further promoted by the many meetings organized by WHO (see Annexes 7 and 15), by the fellowships awarded (see Annex 9) and through its technical publications (see Chapter 10 and Annex 13). Papers based on WHO-sponsored research appear frequently in other scientific journals also, but it has not been possible to refer to more than a very few of these in the compass of this volume.

Some of the salient features of the WHO research programme are outlined below; further details of these and other research activities are given under the various subject titles elsewhere in this book.

Fields of Research

Communicable Diseases

The larger part of WHO’s research effort has been directed towards the solution of problems related to communicable diseases. The spectrum of diseases covered ranges from virus infections through bacterial and parasitic infections to the zoonoses. There are, however, wide variations of emphasis. Furthermore, the emphasis has shifted from one sector to another in accordance with circumstances. Thus in the field of bacterial diseases, emphasis in the early years was placed on tuberculosis, venereal disease, yaws and enteric infections. However, the spread of cholera El Tor from its endemic focus in the Celebes to countries in South-East Asia and the Western Pacific Region, reaching the Middle East in 1965, called for an intensified effort for the elucidation of the epidemiological, immunological and therapeutic aspects of this disease. Similarly in the field of parasitic diseases, schistosomiasis was a major concern of WHO for several years, while trypanosomiasis—both African and American—has now also become a focus of interest. In the field of vector control, the main effort remains directed towards the study of insecticides and insecticide resistance, although much attention is beginning to be paid to the biological aspects of vector control.

WHO’s approach to communicable diseases is, initially, epidemiological in the widest sense of the term. Field surveys and ecological studies of all kinds are

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combined with fundamental research on the genetic, immunological and bionomic aspects of the causative agents, of the vector and of the host. Thus, the malaria research programme has involved the Organization in such studies as the relation of human haemoglobin variants, sickle-cell haemoglobin and glucose-6-phosphate dehydrogenase (G6PD) deficiency to the prognosis of malaria; in attempts to grow the exo-erythrocytic forms of plasmodia \textit{in vitro}; in the development of a fluorescent protein tracing method for the measurement of circulating antibody; and in studies on the genetic factors involved in insecticide resistance in various species of \textit{Anopheles}.

A second aspect of communicable diseases studied by WHO is that of chemotherapy and chemoprophylaxis. In tuberculosis, for example, these studies led to a number of operational research projects aimed at better public health strategies in tuberculosis control. In African trypanosomiasis, the search is being pursued for a less toxic drug than those at present in use. In malaria, a large number of drugs are being tested for their prophylactic and therapeutic properties.

The introduction of griseofulvin has called for an intensive study of the susceptibility of dermatophytes to new antibiotics. WHO is giving support to a number of field trials as well as \textit{in vitro} studies related to the chemotherapy of mycotic infections.

Recent advances in the understanding of immunological mechanisms have led the Organization to promote research on the immunology of communicable diseases. New diagnostic methods have been developed through WHO-supported research. The development of more effective vaccines has been encouraged. A world serum reference bank has been established at New Haven (USA) and two regional banks at Johannesburg and Prague, so that epidemiological studies based on modern immunology can be developed.

In addition to such means as reference centres, collaborative research and grants, an additional mechanism became necessary to facilitate study under field conditions in areas with a shortage of qualified personnel. WHO has established field units and teams such as the filariasis research unit at Rangoon, the \textit{Anopheles} control research unit at Lagos, the \textit{Aedes} research unit in Bangkok, and the inter-regional treponematoses epidemiological team. These units not only provide qualified personnel for research on the spot, but also contribute to developing a nucleus of co-operating local scientists.

\textit{Non-communicable Diseases}

Among the non-communicable diseases, priority has been given to cancer and to cardiovascular and nutritional diseases. Work on the first two diseases is concentrated mainly on the epidemiological and histopathological aspects, start-
ing with standardization of definitions and nomenclature to permit international and sequential comparisons.

Certain tumour types have been intensively studied; a classification of lung tumours has been published and classifications of breast tumours and of neoplastic disorders of the haematopoietic system are in preparation. Field epidemiological teams are studying the prevalence and distribution of oropharyngeal tumours and of Burkitt's tumour. In cardiovascular research, attempts have been made to clarify the epidemiological and histopathological aspects of atherosclerosis, arterial hypertension, ischaemic heart disease, the cardiomyopathies and chronic cor pulmonale.

In the field of nutrition, extensive studies of nutritional anaemias and protein-calorie malnutrition have been undertaken. The role of the various deficiencies, such as iron, folate, vitamin B₁₂, etc., is now better understood. The problem of protein malnutrition is, however, much more complex. WHO works closely with the Institute of Nutrition of Central America and Panama (INCAP), as well as with FAO and other organizations, in an attempt to develop protein-rich foods that are readily available and acceptable to the population of developing countries (see pages 222-223).

The Organization has also developed in recent years a research programme in the field of mental health; it includes studies on the epidemiology of mental disorders and the determination of diagnostic criteria.

Public Health Practice

Under this heading, WHO research programmes include studies in the field of public health practice, organization of medical care, maternal and child health, and nursing. The approach is mainly operational. Thus, the Organization supports studies on the assessment of community health, the utilization of health services and the deployment of health personnel.

Biomedical Sciences

The standardization of biological substances is one of the traditional functions of WHO and has always involved a certain amount of research. Evaluation and monitoring constitute a new approach by WHO to the problem of drug safety and the role of WHO in this field is still evolving.

Immunology, human genetics, and human reproduction, although fairly new fields for WHO, are on the way to becoming major areas of research. The approach to the study of human reproduction has followed essentially two main lines: (a) the basic physiological and endocrinological aspects of reproduction,

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and (b) the problem of population dynamics, especially the demographic aspects and questions of fertility control.

**The Research Programme of the Pan American Health Organization**

The countries of the Americas, which contribute to the Pan American Health Organization independently of their contributions as Member States of WHO, operate a supplementary research programme through PAHO. Parts of this programme receive additional finance in the shape of grants made by foundations, governmental authorities and others. It is oriented towards the solution of specific problems of the Region and is co-ordinated with the WHO research programme. Within the guidelines and the recommendations of the PAHO Advisory Committee on Medical Research, it emphasizes research projects involving multinational participation.

PAHO has promoted studies on nutrition, communicable diseases, zoonoses, environmental health, and such broad fields as scientific communication and national research policies. Specific subjects of research receiving assistance were endemic goitre, nutritional anaemias, epidemic typhus, plague, malaria, schistosomiasis, arboviruses, Chagas' disease, dental health, radiation hazards, human adaptability, population dynamics, and migration of scientific personnel.

PAHO also sponsors organized discussions on special topics recommended by the Advisory Committee. Five areas of inquiry have thus far been reviewed: tuberculosis research, population and health problems of "shanty" towns, factors in deprivation likely to influence mental development and intellectual functions, life at high altitudes, and immunological aspects of parasitic infections.

**Recent Developments in the WHO Research Programme**

Recent years have seen two important developments in the medical research programme.

The first was the establishment of the International Agency for Research on Cancer, with headquarters at Lyons (France). Details will be found on pages 211 and 313.

The second development was the establishment within WHO of a Division of Research in Epidemiology and Communications Science, following a resolution of the Nineteenth World Health Assembly. In 1967, preparatory work was begun which should strengthen the Organization's research programme through increased contributions from the mathematical sciences and computer technology, behavioural and communications sciences, methodology of operational investigations and general ecology.
The method of preparation of the programme of the Organization, as outlined in the history of the Organization's first ten years,1 has not undergone major change. It provides for guidance as to areas of emphasis, while limited funds compel choices. Primary review of needs and requests is done within the countries themselves; co-ordination of the requests of countries is undertaken at the regional level; overall co-ordination is then assured centrally, before the World Health Assembly reviews the proposed programme.

One element which has been strengthened is that of co-ordination at national level. In many countries national co-ordinating and planning committees have come into existence, and WHO is appointing country representatives whose main function is to help these national co-ordination efforts in the health field.

A major development has been in the systematic evaluation or review of projects and programmes. From the beginning, attention had been paid to evaluation, and in 1954 and 1955 the Executive Board made an organizational study on "Programme analysis and evaluation" 2 at the request of the World Health Assembly. It is since 1955, however, that experience in evaluation (other than for fellowships, which were assessed since the earliest days) started to be consolidated centrally and the process systematized.

There is still much to be learned on the methodology of evaluation, and the fourth general programme of work, covering the period 1967-1971,3 states:

"The introduction of evaluation criteria into the plans of programmes will facilitate both the assessment of their evolution and their retrospective analysis. A continuing review of projects and the experience gained in the field, including follow-up studies of past assistance, should provide the basis on which programme formulation and project planning can be better developed. Efforts will also be made to advance the understanding of the interplay of health factors and economic development in countries."

Reporting, first established on a systematic basis in 1950, has provided the foundation for project evaluation. Prepared according to specific instructions and designed to facilitate assessment, field reports are normally drafted by the national and WHO officers collaborating on the project. These reports are sent to the national health authority, to the Resident Representatives of the United Nations Development Programme, as well as to the responsible regional office,

3 Off. Rec. Wld Hlth Org., 143, 64.
and to WHO headquarters. At local level they have permitted a continuing assessment of field activity in the light of each project's objectives. Regionally, they have made possible a continuous technical and operational supervision and review of ongoing and terminated projects. In their totality at headquarters, they have enabled the Organization to keep its programme policies under constant scrutiny.

In certain fields, such as malaria, tuberculosis, leprosy, or venereal diseases, this continuous evaluation has been supplemented by an assessment on the spot, carried out by teams of independent experts recruited for the purpose.

The Organization has kept its extensive fellowships programme under constant review (see page 87). Every fellow is required to complete a report at the termination of his or her studies, and a comprehensive questionnaire about three years after returning home. The comments thus received have helped to improve policies and procedures concerning fellowships and to determine the usefulness and long-term impact of the training given. Similar procedures have been used to evaluate the results of other educational activities, such as seminars, in the light of comments by participants and staff.

The evaluation by individual governments of their own health programmes has been much facilitated by the Organization's assistance to many of them in the development of their epidemiological and statistical services and national health plans. More direct assistance has also been provided to several governments, at their request, for an overall evaluation of their national health situation and services.

With the installation of the electronic computer at headquarters the accumulated experience from the field, as recorded in hundreds of project reports reaching headquarters from all regions, can now be analysed, abstracted and stored for retrieval whenever required for purposes of assessment and programme formulation.

The retrospective evaluation of programmes, as distinct from projects, has also been undertaken. WHO programmes are based on three sources of guidance: policy directives and resolutions of the World Health Assembly and Executive Board, technical recommendations of expert committees and similar groups, and the needs of Member States as recorded by the Organization. A review of these sources of guidance makes it possible to ascertain the extent to which the execution of a programme reflects policy directives, technical recommendations and the health needs of Member States. To start with, the experience gained in the programmes on maternal and child health and on education and training has been systematically reviewed. Another type of programme evaluation is known as operations research. In this, a set of projects is first examined, each project being broken down into its component elements. From these analyses it is then possible to construct a composite, theoretical project profile containing all the
different elements of the entire set. Finally, each project is compared with this theoretical profile to determine its degree of conformity or variance and the reasons accounting for the findings. This type of evaluation has been applied to various programmes, notably in the fields of communicable diseases and health protection and promotion.

It is obvious that what has been done is only a beginning. The methodology is still crude. It can be applied to some activities and not to others. In many ways it is not an evaluation in the strict sense, but an attempt at a critical review of completed activities in order to avoid past errors and to improve the content of the programme and current methods of work. Progress in evaluation may be affected by current exploratory studies, including the identification of criteria on which evaluation may be based, the development of easier computerized systems of information retrieval from reports, the clarification of the role of evaluation in the planning of health programmes and the establishment of methods for utilizing econometric and sociometric data in evaluating the impact of health programmes.

CO-OPERATION WITH OTHER ORGANIZATIONS

This book contains many references to activities undertaken in co-operation with the United Nations, the specialized agencies and a variety of non-governmental organizations. The basis for such co-operation and the arrangements made to ensure co-ordination were outlined in The First Ten Years of WHO and have not changed; and the whole field of co-ordination was reviewed by the WHO Executive Board in an organizational study presented to the Assembly in 1962.¹

Co-operation with the United Nations and other organizations is frequently a necessity, either because the action contemplated goes beyond the areas in which WHO is competent and calls for combined efforts, or because the necessary resources can only accrue to WHO through some other financing body.

It is also a legal obligation under Article 69 of the WHO Constitution and Article 58 of the United Nations Charter. Articles 62 and 63 of the Charter, also, give the Economic and Social Council, one of the three main organs of the United Nations, certain powers of co-ordination and guidance in the non-political field vis-à-vis the specialized agencies. Accordingly, as recorded in the history of the first ten years of the Organization, WHO has a formal relationship agreement

with the United Nations, and similar agreements with those specialized agencies with which it most frequently undertakes joint action, namely ILO, FAO, and UNESCO. Early in this decade an agreement was also concluded with IAEA.

In accordance with Article 64 of the Charter, WHO, like the other specialized agencies, reports annually to the Economic and Social Council, to which its representatives supply orally any additional information on its work which the Council may require. The Council may also call for special reports on particular topics, as in 1962, when it requested a study on research into pollution of every kind and its control (see page 261). Again, a specialized agency may of its own initiative seize the Council of any problems falling within its own sphere of competence, which it considers of critical importance; WHO thus called the Council's attention, in 1966, to the spread of certain communicable diseases and other deficiencies in health work.

Lastly, the continuing need to increase efficiency and ensure concerted action by members of the United Nations system has led to considerable development of the work of the Administrative Committee on Co-ordination (ACC); this was created in the early days of the United Nations by its Secretary-General and is composed, under his chairmanship, of the Directors-General or Executive Heads of all specialized agencies and of certain other related organizations.

ACC now has a network of subordinate bodies promoting inter-agency cooperation and co-ordination in specific fields of general concern, such as science and technology, education and training, outer space, water resources, marine sciences, rural and community development, housing and urbanization, industrialization, population questions, youth and statistics. A parallel network ensures co-ordination and uniformity of procedures in the administrative, budgetary and personnel fields (see page 312).

In some cases the pursuit of co-ordination has entailed assignment of WHO staff to other agencies or undertakings governed by them, for instance UNICEF, IAEA and UNRWA, all of which are mentioned in other chapters of this book. WHO has also provided health administrators for the staff of the United Nations regional development institutes in Santiago, Dakar and Bangkok, and sanitary engineers have been stationed at the headquarters of ECA and ECLA to co-operate with these Commissions.

The United Nations Development Decade (1960-1970) proclaimed by the General Assembly in 1961 has helped to draw attention to the vast needs in all economic and social fields, including health, and has in some cases already shown results. Achievements, however, have mostly lagged behind expectations. Speaking before the Twentieth World Health Assembly, the Director-General reported: "The main obstacle to reaching the objectives of the Development Decade, U Thant said during the 1966 summer session of the Economic and Social Council,
was the inadequacy of the support given to the developing nations for the greater utilization of their socio-economic potential."

Many references to concerted action will have been found in earlier chapters in this volume. Attention may again be drawn to two operations of an emergency character, assistance to Palestine refugees (see page 281) and to the Democratic Republic of the Congo (see page 44).

**United Nations Development Programme (UNDP): Special Fund and Technical Assistance Components**

The creation of the Special Fund in 1958 reflected the desire of the General Assembly to enlarge the scope of assistance through pre-investment projects which could lead to an early result, with the widest possible impact on the economic, social and technical progress of a developing country and capable, on completion, of attracting capital investment.

The Expanded Programme of Technical Assistance, created in 1949, well before the Special Fund, developed noticeably during the decade. Its objectives did not undergo any appreciable change and it served effectively in assisting governments to meet specific needs. It is worth mentioning that the WHO share of Technical Assistance funds will have decreased from 17.6 per cent. in 1958 to a probable 14.6 per cent. in 1968, owing to increased emphasis on industrialization and the participation of new agencies in the programme.

The Expanded Programme of Technical Assistance and the Special Fund were merged into the new United Nations Development Programme by the General Assembly in 1965, but it was stipulated that the characteristics and operations of the two components should remain separate. The Governing Council, which had provided policy guidance for the Special Fund, was accorded overall authority over both components of the programme. An Inter-Agency Consultative Board was set up, consisting of the Executive Heads of all participating and executing agencies.

So far WHO has been designated executing agency for about 2.2 per cent. only of the Special Fund programme, mainly for work in environmental health (see Chapter 8). Coupled with the marked downward trend already noted in WHO's share in the Technical Assistance component, this situation led the Twentieth World Health Assembly to adopt resolution WHA20.53, drawing attention to the importance of national health planning as part of overall economic and social development, and to the need to ensure that health authorities were properly represented in national planning bodies.

In June 1967, at the fourth session of the Governing Council of the United Nations Development Programme, the Administrator called for increased attention to health projects in the Special Fund component.
WHO's participation, however, extends to UNDP projects executed by other agencies in such fields as land reclamation, irrigation, river-basin development, water resources, housing and urban renewal, food production, animal health and occupational health institutes. WHO comments on these projects and provides consultants to identify public health implications.

In 1966 the Governing Council of the United Nations Development Programme decided to amalgamate into a single revolving fund the Technical Assistance funds used to finance contingency requests, Special Fund preliminary operations and Special Fund preparatory assistance missions. From these funds WHO has received resources to finance its action in such urgent cases as the Chilean earthquake in 1960 and the cholera outbreak in 1965-1966. In addition it participated in the Special Fund preliminary operations in Ceylon to survey the south-west coastal area for water-supply and sewerage projects. It took part in a number of other UNDP missions to assist governments in preparing or reformulating proposals for assistance from the Special Fund component.

New fields for assistance from the Special Fund component which are under discussion include medical education, pharmaceutical quality control of drugs, and health institutes.

After the Technical Assistance Committee and Economic and Social Council had reviewed the role of the Resident Representatives of the United Nations Technical Assistance Board in 1961, the ACC formulated the principles governing their functions. Over the years these principles constituted a working basis for collaboration, but they were revised in 1967 to take account of the rapidly expanding responsibilities of Resident Representatives. WHO continues to collaborate with Resident Representatives in joint programming activities of the two components of the UNDP.

**United Nations Children's Fund (UNICEF)**

In accordance with the co-operative principles established in 1950, the UNICEF/WHO Joint Committee on Health Policy has continued to give guidance respecting UNICEF-assisted health projects for which WHO retains technical responsibility. These projects now absorb some two-thirds of UNICEF's operational budget (in 1966, for example, 117 health projects accounted for some US $19 million of expenditure). They are divided between maternal and child welfare (about 60 per cent. of the total) and disease control — malaria in the first place, then tuberculosis, yaws, trachoma and leprosy. Poliomyelitis, measles and smallpox also receive attention. Among other topics recently discussed by the Joint Committee figure the need to strengthen health components in nutrition programmes, a review of the fluoridation of water in connexion with dental health, and the health aspects of family planning.
**United Nations Relief and Works Agency for Palestine Refugees in the Near East (UNRWA)**

WHO continues to be responsible for the planning, implementation and supervision of UNRWA’s health programme through the assignment of certain senior staff members, including the Director of Health, a physician/epidemiologist and a public health nurse.

**International Labour Organisation (ILO)**

The most important area of cooperation between WHO and ILO is occupational health, including the health of seafarers. WHO also advises ILO on other matters such as the organization of medical care within social security systems, and working conditions for women and adolescents. Further references to work with ILO will be found in other chapters of this book, particularly on pages 50 to 52.

With the United Nations, FAO and UNESCO, WHO has continued to participate in ILO’s Andean Region Development Programme, a collective project, pursued over many years, designed to promote the economic, social and health development of an unfavoured population group in the Andean highlands.

**Food and Agriculture Organization (FAO)**

Co-operation with FAO centres largely on nutrition and the zoonoses (see pages 149 and 221). Joint expert committees have continued to examine these subjects and their recommendations provide the basis for a number of joint FAO/WHO activities such as nutritional surveys, training courses, seminars and co-ordinated research programmes. The WHO Protein Advisory Group became a FAO/UNICEF/WHO group in 1961. These organizations also contributed to a report on increasing the production and use of edible protein which was presented to the Economic and Social Council in July 1967.

Other FAO/WHO expert groups have reported on calcium and vitamin requirements, and on methods of planning and evaluation in applied nutrition programmes. More than sixty projects in applied nutrition were started during the last ten years, some of them involving co-operation not only with FAO but with UNICEF and UNESCO. WHO, FAO and UNICEF have together established several nutrition training centres for workers in developing countries.

Another area of joint concern relates to the health implications of agricultural development. With FAO and the United Nations, WHO has studied the health aspects of land and water surveys, irrigation schemes and projects involving land reclamation.
On the initiative of several European countries, a joint FAO/WHO Codex Alimentarius Commission is drafting standards for various foodstuffs. Joint FAO/WHO expert committees and other meetings have drawn up specifications for the identity and purity of a number of food additives (see page 248).

**United Nations / FAO World Food Programme**

The World Food Programme, launched jointly by the United Nations and FAO in 1962, is aimed at making available to developing nations commodities contributed by participating governments on a voluntary basis. From 1963 until August 1967, more than US $250 million worth of food, services and cash, including some $45 million for emergency feeding operations made necessary by natural catastrophes, were contributed.

Since 1963 a liaison arrangement with WHO has facilitated the scrutiny of the health implications of the projects under consideration. WHO has reviewed its own programmes and identified those which could benefit from food aid. Several such schemes are under study with interested governments, but only a few have yet reached the implementation stage (see, for example, page 160).

**United Nations Educational, Scientific and Cultural Organization (UNESCO)**

UNESCO's programmes are of interest to WHO in a variety of spheres, including education at all levels, in and out of school, technological training and certain fields of pure research, such as cell biology and brain research.

Within the experimental literacy programme being sponsored by UNESCO in five developing countries with UNDP aid, WHO's interest is again to contribute subjects such as health in the home, family nutrition, accidents and injuries at work, to the reading materials which are being produced in large quantities for new literates.

The introduction of an adequate element of health education in school curricula, in teacher-training courses, in "fundamental education" (now known as rural and community development) centres, and in literacy campaigns, has entailed increasing UNESCO and WHO co-operation, ranging from joint publication activities (see page 56) to the seconding of health personnel to training centres set up by UNESCO in Mexico and the United Arab Republic.

**International Civil Aviation Organization (ICAO)**

Application of the International Sanitary Regulations remains the principal area of collaboration between WHO and ICAO. ICAO takes part in the work of
the WHO Committee on International Quarantine, and the two organizations maintain close contact on such matters as airport sanitation and aircraft disinsection.

*World Meteorological Organization (WMO)*

WMO and WHO have co-operated mainly in work relating to environmental pollution.

*International Atomic Energy Agency (IAEA)*

IAEA signed a relationship agreement with WHO in 1959. Liaison officers were later exchanged in accordance with a resolution of the Economic and Social Council calling for co-operation on the peaceful uses of atomic energy. References to joint activities will be found in the section on radiation health (page 263).

*Inter-Governmental Maritime Consultative Organization (IMCO)*

Contact is maintained with IMCO regarding the international code of signals for medical treatment at sea, enforcement of the International Sanitary Regulations, and pollution of the seas.

*International Telecommunication Union (ITU)*

Co-operation with ITU concerns notifications under the International Sanitary Regulations and the broadcasting of epidemiological radio bulletins. ITU also participates in work relating to the health of seafarers.

*Universal Postal Union (UPU)*

The Organization co-operates with UPU in regard to transport of dangerous goods, including therapeutic substances, insecticides, etc., and the shipment of perishable biological and pathological substances.

*Other Intergovernmental Organizations*

WHO is in contact with such intergovernmental organizations as the Council of Europe, the Organization of American States, the League of Arab States, the Organization of African Unity, the Organization for Economic Co-operation and Development, the Inter-American Development Bank, the Inter-American Committee of the Alliance for Progress, and the Colombo Plan Bureau.
Non-Governmental Organizations

At the end of 1967 seventy-one non-governmental organizations were in official relations with WHO, an increase of twenty-eight over the past ten years. A full list is contained in Annex 14. Non-governmental organizations admitted to relationship fall into two main categories: those engaged in some particular branch of medical science or research, and those representing a more general interest, such as the World Federation of United Nations Associations (WFUNA), the League of Red Cross Societies, or the Council for International Organizations of Medical Sciences (CIOMS).

References will be found in other chapters to many WHO activities which have the support of the competent non-governmental organizations. The World Health Assembly has recognized the value of this support and called for its continuance and further expansion.
This chapter summarizes two types of activity designed to convey information, the first to health authorities and to the medical and other health professions, the second to the general public.

The first type includes the selection, editing and translation of a wide range of technical material for publication; the selective acquisition, indexing and cataloguing of serial and non-serial publications in all fields of interest to WHO; and the provision on request of information both on the published literature and on the documents of WHO and other agencies. Reference to individual publications has already been made, as appropriate, in the various chapters of this volume. A general summary is presented here and details of some publications may be found in Annex 13.

The second type of activity, public information, is concerned with the use made not only of the printed word, but also of the other media, mainly radio, television and films, in order to bring health work to the attention of the general public.

PUBLICATIONS AND LIBRARY SERVICES

In 1958, WHO published a special volume on The First Ten Years of the World Health Organization,1 which constitutes an official history of the Organization’s first decade, preceded by a review of the circumstances that led to its establishment, from 1851, the year in which the first of the series of International Sanitary Conferences was held. At the same time it published a bibliography of Publications of the World Health Organization, 1947-1957, and it was decided that further bibliographies of WHO publications should be issued every five years.

In the following year a new series—Public Health Papers—was inaugurated. It had been evident for some time that the pattern of WHO publications was

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incomplete in that it lacked a vehicle for material of broad public health interest, and the new series was intended to fill this gap. A total of thirty-two titles (listed in Annex 13) has been published in this series.

In the same year appeared the First Report on the World Health Situation. Such reports are published every four years after submission in provisional form to the World Health Assembly; three of them have now appeared.¹

In that year also the Executive Board started an organizational study of WHO publications, based on a detailed report ² in which the development of the publishing programme was summarized, and the characteristics, purpose and distribution of each type of publication were described. In a synoptic table the publications were functionally classified as periodicals; monographs and brochures; specifications and standards; directories; bibliographies; manuals; advisory reports; special publications; and official publications.

Reporting to the Thirteenth World Health Assembly (1960), the Chairman of the Executive Board indicated that the “Board had specially appreciated the Technical Report Series and the Bulletin, the Monograph Series and the International Digest of Health Legislation”.

In addition to reports of expert committees, reports of scientific groups considered to be of sufficient general interest to warrant publication have recently been issued in the Technical Report Series, which by the end of 1967 comprised 380 titles.

The Monograph Series, the Organization’s main vehicle for books on public health subjects of international significance, consists generally of systematic and full presentations of specific subjects. Up to the end of 1967 a total of fifty-five monographs had been published (see Annex 13).

The scope of the Bulletin of the World Health Organization—the chief scientific organ of WHO—has been enlarged to include papers on such subjects as cancer, cardiovascular diseases and medical genetics, which were not represented in earlier years. The format and cover were redesigned in 1959, starting with volume 21; since then the Bulletin has appeared with a larger page area and in smaller print in double columns. Because of the increased flow of contributions there has been no reduction in the size of issues, over 15 000 pages of the larger Bulletin having been published in the second (as in the first) ten years. It has now reached its thirty-seventh volume. Since 1964, a complete translation in Russian has been published.

Of the International Digest of Health Legislation, eighteen volumes have now been published, containing nearly 8000 legislative texts. An index is published

¹ Off. Rec. Wld Hlth Org., 94; 122; 155.
annually for each volume, but access to this legislative material is further facilitated by the publication of cumulative five-year indexes, of which the third covers the volumes published in 1960-1964.

A new feature of the *Digest* since the first number of volume 15 (1964) is an introduction, which points out and describes the major innovations in the legislation appearing in the current number. This introduction is then used as the basis for a regular section in the *WHO Chronicle*, entitled "Recent changes in health legislation".

The documentation provided by the *Digest*, together with other bibliographical sources such as public health codes and specialized works on health legislation, has made it possible to reply to more than 600 requests for information during the past ten years. These requests related to a wide range of health legislation problems, including different aspects of pharmaceutical legislation, legislation relating to the medical and paramedical professions, sanitation, and foodstuffs.

Since 1958, comparative surveys of legislation on the following subjects have been published in the *Digest* and subsequently issued as offprints: notification of communicable diseases; communicable diseases in schools; classification of pharmaceutical preparations; endemic goitre; pharmaceutical advertising; treatment of drug addicts; distribution of and trade in pharmaceutical preparations; air pollution; the control of tuberculosis; protection against ionizing radiations; auxiliary personnel in nursing; control of water pollution.

The Executive Board discussed at its twenty-fifth session (1960) the question of increasing the number of *WHO* publications issued in Russian, the only publication issued then in that language being the *WHO Chronicle*. On the recommendation of the Board, the Thirteenth World Health Assembly decided that the number of publications issued in Russian should be progressively increased during the years 1961-1963. To put this decision into effect involved many problems, not the least of which was the relative lack of local facilities for printing in Russian. The solution adopted was a contractual arrangement whereby the USSR Ministry of Health, Moscow, undertook the entire work of translating and printing the Russian editions of *WHO* publications, and an agreement to this effect was signed in 1960. This arrangement has worked very well.

During this period most *WHO* publications have accordingly been issued in four languages: English, French, Russian and Spanish, and their distribution has continued to develop. A regular three-yearly postal check is made of certain categories of recipients of free documents and publications to keep the mailing lists of some 37 000 addresses up to date.

The value, at list price, of sales of *WHO* publications was US $120 000 in 1958, and had risen to US $360 000 in 1967. The latter figure does not take account of the net sales of publications in the Russian language, which amounted in 1967 to US $26 000.
At the thirty-ninth session of the Executive Board and the Twentieth World Health Assembly (in 1967) the question of introducing Russian and Spanish as working languages of these organs was discussed. The Health Assembly considered a three-phase plan for these languages to become working languages, in addition to English and French. It decided that the first phase of this plan should be initiated in 1968 and reviewed by the Twenty-second World Health Assembly.

Apart from the question of languages of publication, the Organization has received requests from several international and national non-governmental organizations for advice or assistance in the standardization of medical terminology in various fields. A survey was made of recent or current medical terminological activities, both within and outside WHO, with a view to determining whether this was a field in which the Organization might usefully play a co-ordinating role. The subject is very complex and no final conclusions have yet been reached.

A distinct, but related, problem is that of arriving at an internationally acceptable standard list of medical terms for the purpose of indexing, storing, and retrieving medical information, especially in relation to computerized retrieval systems. The Organization accepted the offer of the National Library of Medicine, Bethesda (USA) to supply magnetic tapes of its Medical Literature Analysis and Retrieval System (MEDLARS) for use with the WHO computer. In this connexion the possibility of developing, in consultation with interested international and national groups, an international list of indexing terms (descriptors) is under study.

*The WHO Library*

The Organization’s capacity to deal quickly with requests for information will be greatly enhanced by the use of a computerized system, but a considerable improvement has also resulted from the move to the new WHO building, of which a prominent feature is the WHO library.

The planning of the new library started in 1961, and before plans were established visits of inspection were made to modern university and special libraries in several countries. At the end of 1967 the collection in the new WHO library comprised over 80,000 volumes, 20,000 reports and 2,800 current medical and scientific periodicals, all easily available for rapid consultation by readers.

In 1960 WHO initiated a scheme for the international exchange of duplicate literature in medicine and allied sciences, in which today seventy-nine libraries in thirty-nine Member States are participating. Since its inception, 118 lists of duplicate medical literature available for donation have been distributed. Although the total number of pieces dispatched by the other libraries as a result of the scheme is not known, WHO alone has sent 66,876 items to fifty-three libraries.
With the new facilities it is possible to receive WHO fellows in medical librarianship, and in 1966 a six-week course for twelve medical librarians from the Eastern Mediterranean Region was held in the WHO library. This course was the third of its kind, the previous two having been held in Beirut in 1964 and 1965 in co-operation with the American University of Beirut, the specialized instruction in medical librarianship being provided by WHO lecturers.

Publications of the Pan American Sanitary Bureau

From the funds derived from the Pan American Health Organization, the Pan American Sanitary Bureau/WHO Regional Office for the Americas finances a publications programme, which has grown rapidly in volume and scope in the past ten years. It is designed to complement, without duplicating, the publications of WHO distributed in the Americas. The programme comprises the Special Publications series (Scientific Publications, Official Documents, and Miscellaneous Publications) and the periodical publications: the monthly Boletín, and a new quarterly journal on medical education, Educación médica y salud.

In the Scientific Publications series the Bureau has made available to health services throughout the Americas an increasingly broad selection of technical literature. The programme has practically tripled in volume in the past decade. While twenty-six publications were issued in 1958, the figure rose to sixty-one in 1966.

Apart from the Official Documents, material is selected for publication primarily to fill Latin America's needs in technical handbooks and guides and to disseminate information on the results of field projects, seminars, and other technical meetings of the Organization. The emphasis has been on literature that will stimulate the practical application of new methods in public health.

In addition to original material in both Spanish and English, a number of texts are selected each year for translation into Spanish or Portuguese in order to respond to specific needs in Latin America.

The monthly journal, Boletín de la Oficina Sanitaria Panamericana completed its forty-sixth year of publication in 1967. It has continued to serve the purpose for which it was created by the Sixth International Sanitary Convention (Montevideo, 1920), namely the notification of current technical literature on all

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1 The Scientific Publications series of the Pan American Health Organization includes such titles as Live poliovirus vaccines (Nos 44 and 50, 1959 and 1960); Plague in the Americas (No. 115, 1965); Science policy in Latin America (No. 119, 1966); Environmental determinants of community well-being (No. 123, 1965); Man and his environment: biomedical knowledge and social action (No. 131, 1966); Deprivation in psychobiological development (No. 134, 1966); Life at high altitudes (No. 140, 1966); Migration of health personnel, scientists, and engineers from Latin America (No. 142, 1966); First international conference on vaccines against viral and rickettsial diseases of man (No. 147, 1967); Immunologic aspects of parasitic infections (No. 150, 1967); and The unreasonable man (No. 152, 1967).
international aspects of health in the Americas. With the steady growth in the number of readers, the press-run increased from about 8400 copies in 1958 to 11,200 in 1967.

The Boletín, while primarily a Spanish-language journal, has included an increasing amount of material in English, Portuguese, and French. The selection of contents has focused more and more on the needs of the public health administrator and the health worker in the field. Increasing emphasis has also been given to studies relating directly to operating projects and to the work of the Organization. Special arrangements are maintained for publishing articles selected from the Bulletin of WHO simultaneously in Spanish in the PASB Boletín.

The new quarterly journal on medical education, Educación médica y salud, was launched in 1966 as a joint project of PASB and the Pan American Federation of Associations of Medical Schools.

In the past ten years the volume of publications distributed by the Regional Office, including WHO publications, has increased from approximately 180,000 copies in 1958 to 300,000 in 1966.

The principal functions of the library of the Pan American Sanitary Bureau are to collect and co-ordinate materials in the health-related sciences and to correlate these with the needs of the Organization and of the staff. The library meets requests from governments, received directly or through the zone offices, and from individual physicians and researchers.

Although the collection is not numerically large, it has frequently been reviewed so as to reflect the aims of the Organization. Material no longer needed or not germane is offered to medical libraries in all parts of the Americas through the United States Book Exchange, the Medical Library Association Exchange, and the National Library of Medicine.

In 1965 the library was transferred from its former cramped quarters to its modern and functional premises in the new office building.

PUBLIC INFORMATION

With the aim of informing the public about health problems generally and about the Organization's activities, WHO provides press, photo and radio services, publishes a magazine, and makes films. In addition, the trend has been to encourage and assist independent writers, reporters and film makers to produce their own material on the work and achievements of the Organization. The reasons for such an approach include smaller cost to WHO and improved distribution facilities through ordinary commercial channels. The problem of non-commercial distribution of information material remains acute, as for all members of
the United Nations system, but some progress has been made as a result of discus-
sions by the Consultative Committee on Public Information (an inter-agency
body).

WHO has been able to develop close association with a number of reporters,
feature writers, and television and radio contacts who are kept informed of the
work of WHO, and who turn to the Organization for dependable information on
health questions.

The task of informing the public about the work of WHO has been made
easier by the growing popular interest in economic, social and, above all, scientific
affairs, including health. The mass media in general are also contributing to this
educational process. Information emanating from WHO is accordingly in greater
demand and finds a more receptive audience. The Organization is solicited more
and more for information not only about its own activities but about health
questions in general. As compared with the situation ten years ago the initiative
has now passed to the individual journalist, editor, or radio or television producer.
The number of private persons and groups that address themselves to the Organi-
zation for information has also increased. Nevertheless the stimulation of inter-
rest among those who command a mass audience will no doubt remain the prin-
cipal task. United Nations Information Centres throughout the world have been
of great help and United Nations radio, film and television services have provided
valuable technical facilities.

Press

In addition to briefings for individual journalists, three categories of material
are provided to meet the demand not only for news of topical interest but also
for background information. Press releases cover current meetings, staff appoint-
ments, technical reports and other publications, statistics and notable events in
the day-to-day work of the Organization; background articles treat specific health
problems in greater detail than a press release; and a monthly digest of news
(Around the World with WHO) summarizes developments of current interest.

The regular mailing lists for this material include the corps of foreign corre-
respondents in Geneva and the local press. The increasing number of permanent
news correspondents in Geneva—five in 1948, 120 in 1958 and over 200 at the end
of 1967—reflects the importance of this city as an international source of news
and secures WHO a worldwide audience. The Organization has participated in a
number of meetings (such as editors’ round tables) organized by the United
Nations from time to time to reinforce contacts with the press.

A review of press cuttings received from all parts of the world indicates that
the World Health Assembly, its decisions and personalities continue to attract
widespread notice. Other topics related to WHO's programme that have received attention in the press include cancer, cardiovascular diseases, smallpox eradication, cholera, influenza, the growing accident rate, family planning, medical research and the shortage of medical and nursing personnel.

World Health

In 1958 World Health changed its character and format from an eight-page newspaper with pictures to an illustrated magazine of up to forty pages or more per issue. The contents were diversified: WHO and WHO projects continue to be regularly featured, but articles and photographs on health work not directly sponsored by WHO are now included. Much space has been given, over the years, to the activities of related organizations, including those of the Red Cross, UNESCO, the Freedom from Hunger Campaign, the work of the United Nations High Commissioner for Refugees, UNICEF, and the Intergovernmental Committee for European Migration.

The magazine commissions articles by independent writers and attempts to present technical matters in pictorial form, to appeal to health workers and laymen alike, and to describe health problems in a regional or worldwide setting. Supplements giving general information about WHO are added from time to time.

The topicality of the magazine suffers, however, from the long preparation needed for several language editions. A Russian version was added to the English, French, Spanish and Portuguese editions in 1960. It is translated and printed in Moscow in 10,000 copies. In 1967, a German edition was started by the German Green Cross. Taking into account all language editions, World Health appears in about 120,000 copies in ten issues a year.

Sales have made slow progress and now stand at 5000 subscribers. The free distribution list includes health departments, health workers, secondary schools, United Nations associations, journalists, newspapers and periodicals. Some of the non-governmental organizations in official relations with WHO (such as the International Union against Cancer, the International Society of Cardiology and the International Union against Tuberculosis) have greatly helped to make the magazine known, and pictures and articles appearing in its pages are republished by many other periodicals.

Books

Though their value for public information purposes is recognized, few books for the general reader can be produced by WHO because of cost and distribution difficulties. Efforts have been made instead to interest established writers in studying the work of the Organization at first hand.
Thus for WHO's tenth anniversary *Voyage chez les vivants*, by Pierre Gascar, appeared in France and the USSR; *Doctors to the World*, by Murray Morgan, was published first in the United States, then in England, and was later translated into Italian; and Fraser Brockington's general survey, *World Health*, was published in England. As the malaria eradication campaign progressed, *Fever Peaks*, by Wayne Mineau, was published in England. For the twentieth anniversary Joseph Kessel, Boris Izakov and Lucjan Wolanowski have visited a number of countries to gather material for books on health work in which WHO is participating.

**World Health Day**

The celebration of World Health Day on 7 April, the anniversary of the coming into force of the Constitution of WHO in 1948, has continued to provide an occasion for focusing public attention on important health problems. Primary responsibility for World Health Day activities rests with the governments and in many countries the event is widely celebrated. The practice, established during the first ten years, of building up a campaign around a theme, has been continued since. Preparations include the production of articles in a number of languages, which are distributed to governments, the press, non-governmental organizations, etc.; an issue of *World Health* is devoted to the theme; recordings are made in a number of languages and broadcast in all WHO regions; help is given to government and private television networks to produce appropriate programmes; photographic material is sent, on request, to all parts of the world; if finances permit, a short film is produced.

The themes of World Health Day in the past ten years have been: Ten years of health progress (1958); Mental illness and mental health in the world of today (1959); Malaria eradication—a world challenge (1960); Accidents and their prevention (1961); Preserve sight, prevent blindness (1962); Hunger: disease of millions (1963); No truce for tuberculosis (1964); Smallpox, constant alert (1965); Man and his cities (1966); Partners in health (1967).

**Photographs and Exhibits**

The WHO photo library is probably the world’s most extensive collection of pictures on the health situation. It includes over 15,000 registered negatives, of which a catalogue was brought out, presenting individual photographs and photo stories from 110 countries. Thus the photo library can produce and edit photographic documents to illustrate health activities and achievements in almost any area of the world.
In addition an average of twelve photo stories have been produced each year, many of them the work of photographers of international repute. Nearly all WHO photo stories first appear in *World Health*, and are then available for general reproduction. A growing number of publishers and photo agencies all over the world have shown interest and now receive these photographs regularly. In 1967, nearly 4000 requests for pictures were received, mainly from the press but also from book publishers. The photographic laboratory installed in the new headquarters building produces about 40,000 prints a year.

As regards exhibitions, WHO follows the policy developed by the inter-agency Consultative Committee on Public Information which limits participation in international exhibitions to those of a universal character whose policy is in line with that of the United Nations, and which do not involve expense, such as space rental, for the agencies.

Primarily for financial reasons, WHO does not take part in national exhibitions, but material is prepared for them on request, when the theme is related to the Organization’s work.

*Films and Television*

Ten films have been produced in the past ten years, some as joint productions with government film offices, and others in co-operation with the United Nations and specialized agencies, thus reducing the cost to WHO, which has also continued to sponsor film-production by private companies, either by giving help with scripts or by sharing expenses. WHO films have been widely used on television and television networks have received help in producing their own programmes on the work of WHO: many networks, especially in Europe, have sent teams abroad to collect film material for use in programmes on a wide variety of health subjects.

Experience with animated cartoons has been favourable. A short colour cartoon is often more successful than an ambitious feature film and presents no major language problem. "To your Health", a cartoon film on alcohol and alcoholism made in 1956, is still in wide use; 160 copies were sold in 1966 alone.

Distribution involves difficulties: WHO films are offered to the developing countries as far as possible without charge or at small cost. It has not yet been possible to organize a film loan service.

Recent WHO films include two on communicable eye diseases—"Open your Eyes", a dramatization of the trachoma control campaign in Morocco, and "Visit in the Desert", on trachoma in Sudan—and one, "Speciosa", on the training and work of nurses in Burundi. Other films concern schistosomiasis and leprosy. Four animated cartoons have as their themes tuberculosis, smallpox, drug dependence and urbanization.
Radio

Radio continues to reach increasing numbers of listeners, through its extension in developing countries and the rapid spread of cheap receiving sets.

The number both of sound recordings made and of copies dispatched has grown steadily: recordings rose from thirty-eight in 1959 to 217 (distributed in 504 copies) in 1967. Copy tapes are made and distributed solely at the request of broadcasters and there are indications that about 90 per cent. of all copies dispatched are used.

In Geneva WHO has continued to use the recording facilities of the United Nations in the Palais des Nations and has received valuable assistance from United Nations radio officers and technicians. English and French are the languages most frequently used, but recordings have also been made in many other languages.

Malaria Eradication Postage Stamps

A philatelic project, organized in 1962, transmitted an appeal for support for malaria eradication to all parts of the world through millions of postage stamps and cancellations with the message "The world united against malaria". Stamps were issued by ninety-eight postal authorities, sixteen postal administrations provided special cancellations, and many countries made donations to WHO in stamps, philatelic material and money. Pamphlets and booklets were issued by postal administrations, commercial and voluntary groups. Radio stations all over the world carried programmes on malaria eradication. Exhibitions were organized by WHO and philatelic associations.

Visitors

While WHO had its offices in the Palais des Nations a few visitors each year came for briefing, members of the secretariat occasionally addressed groups and film shows were arranged. In 1963, when records were first kept, there were 220 visitors. After the move to the WHO building in May 1966, 2000 visitors that year and over 2250 in 1967 were shown round the building and heard talks on the Organization's work.
CHART 3. STRUCTURE OF THE WORLD HEALTH ORGANIZATION AT 31 DECEMBER 1967

For the organizational structure at headquarters at 31 December 1967, see Chart 4.

Headquarters units provide technical advice and guidance in their respective fields of responsibility to regional and other offices.
CHAPTER 11

Constitutional, Administrative and Financial Developments

In administrative matters the first ten years of the Organization may be regarded as the formative stage. Because international administration was still a relatively new concept, work had to be carried on by trial and error, with much improvisation because of the necessity of dealing with new problems promptly. In the period which followed, systematic efforts were pursued to create an efficient and economic administrative machinery based on modern managerial concepts and tools, and suited to support the increasing programme activities of the Organization.

There were numerous elements involved in this process. The administration, its functioning and practices, as they emerge at the end of the second decade, are the results of a complex process which required constant awareness of the factors of growth, of financial problems, the development of human resources and the impact of evolving administrative science and technology on the established organizational structure and procedures.

Critical examination of the administrative performance has become a standard feature in the Organization’s life. Numerous management surveys have covered headquarters and regional activities and many WHO representatives’ offices. But it is not through these surveys only that the Organization’s efficiency is being tested. Continuous scrutiny of the work is carried out at all levels of the secretariat to find shortcomings and introduce improvements (see also pages 275 to 277).

Constitutional, administrative and financial developments proceeded under the guidance and direction of the World Health Assembly and the Executive Board, which yearly review the financial position of the Organization and its administrative and managerial evolution.

The Executive Board, in addition to its regular consideration of the programmes of WHO, its financial policy and internal organization, continued to undertake organizational studies at the request of the Health Assembly in a search for the most efficient and effective operational and administrative functioning of the Organization. The subjects of studies by the Board during the last decade were: Publications (the second study on this subject, 1959-1960); Co-ordination with
the United Nations and the specialized agencies (1961-1962); Measures for providing effective assistance in medical education and training to meet the priority needs of the newly independent and emerging countries (1962-1963); Methods of planning and execution of projects (1962-1965); Co-ordination at the national level in relation to the technical field programme of the Organization (1964-1967).

Throughout the decade the financial situation of the Organization remained sound. This soundness was achieved and maintained owing to the deliberate policy and co-operation of Members in meeting their financial obligations. The annual collection of contributions to the total assessment of active Members has most often been approximately 96 per cent. The unpaid portions are collected subsequently (see Table 2, page 308). The yearly obligations against the effective working budget varied between 97.06 per cent. and 98.59 per cent.

Membership

On 31 December 1967 the membership comprised 126 Members and three Associate Members, compared with eighty-five Members and three Associate Members in 1957. The new Members came primarily from the African continent and more particularly from that part of Africa served by WHO's Regional Office in Brazzaville; the number of Member States in this region grew from three in 1957 to twenty-nine in 1967.

Of the present Members, Byelorussian SSR and Ukrainian SSR continue to be inactive; they do not participate in the work of the Organization nor do they pay their assessed contributions.

During the decade thirty-nine Members acceded to the Convention on the Privileges and Immunities of the Specialized Agencies together with its Annex VII, which relates specifically to WHO, thus bringing the total to sixty-two. The Convention defines the legal capacity and the privileges and immunities the Organization should enjoy in the territory of each Member in order to fulfil its objectives and to exercise its functions with the necessary degree of independence and freedom of action, thus enabling it to operate without interference or outside pressure.

Amendments to the Constitution

In October 1960, amendments to the Constitution increasing the number of Members entitled to designate a person to serve on the Executive Board from eighteen to twenty-four entered into force. From the Fourteenth World Health Assembly (1961) onwards, the Board has accordingly consisted of twenty-four persons designated by as many Members.
In view of the recent increase in the membership of the Organization, a further amendment to the Constitution designed to bring the number of persons serving on the Board to thirty was adopted by the Twentieth World Health Assembly, in 1967.

In 1965, the World Health Assembly adopted amendments to Article 7 of the Constitution, providing for the suspension or exclusion from the Organization of a Member ignoring the humanitarian principles and the objectives laid down in the Constitution by deliberately practising a policy of racial discrimination.

Neither of these two amendments has yet been accepted by two-thirds of the Members of the Organization, which is the constitutional requirement for them to enter into force.

**International Regulations**

No international conventions or regulations were adopted by the World Health Assembly during the second ten years, other than regulations modifying or supplementing the Nomenclature Regulations and the International Sanitary Regulations. Where it has been necessary to elaborate and promulgate international norms or standards, the tendency has been to rely on the procedure provided under Article 23 of the Constitution relating to recommendations. This procedure appears to be adequate where questions of reciprocity are not predominant, and it has the advantage of flexibility, since a recommendation may be modified or adopted without any formalities having to be observed. (See also pages 76 and 98.)

**Structure of the Organization**

The structure of the Organization as a whole and the details of the headquarters secretariat in December 1967 are shown in the charts on pages 296 and 300. For purposes of comparison the headquarters structure at the end of 1957 is also shown (in Chart 5, page 301). As will be seen, there are now five Assistant Directors-General as compared with three at the end of 1957. The number of divisions has increased from 11 to 15 and the number of units from 40 to 76. New units and divisions are established as required to allow the Organization to cope with new fields of activity or with increasing work resulting from a greater emphasis on specific aspects of ongoing activities.

In the allocation of units to divisions and in the assignment of divisions to Assistant Directors-General full flexibility is maintained. A redistribution of functions is undertaken whenever it is considered necessary in order to avoid duplication and to streamline internal procedures.
* This division, which was not subdivided into sections, dealt with municipal and regional sanitation, rural and community sanitation, housing and town planning, vector control and insecticides, milk and food sanitation, environmental aspects of occupational health, and transport sanitation.

** As from 1 January 1958.
Regionalization remained one of the distinctive features of the Organization. The role of the regional offices was reinforced by the appointment of WHO representatives with established offices in a number of countries. The specific functions of the WHO representative include assistance to the governments in reviewing health needs and resources, and in planning, co-ordinating, implementing and evaluating their national health programmes and policies. He is also required to co-operate with the Resident Representatives of the United Nations Development Programme and the representatives of other agencies and sources of assistance regarding the health aspects of assistance programmes. He represents, and sometimes acts on behalf of, the regional director at the country level; gives a certain amount of common servicing and liaison facilities to project staff; and keeps the regional director informed of all relevant actions and developments.

A WHO representative may be assigned to two or more adjoining countries. At the end of 1967 forty-eight WHO representatives’ offices serving 109 countries and territories had been established.

Staff

Staff development required the tapping of new recruitment sources, the streamlining of existing recruitment procedures and the balancing of geographical distribution. Changes in the recruitment policy and procedures introduced in 1963 resulted in speeding up appointments of staff, particularly in field projects. Difficulties are, however, still encountered in finding suitable candidates for certain disciplines.

The increasing number of new Members, as well as the return to the Organization of the majority of inactive Members, could have created an unbalanced geographical distribution of staff had a special effort not been made to prevent it. On 30 November 1967, the number of Members which had one or more nationals employed by the Organization was ninety-five, compared with fifty-three at the end of 1957. Thus, nationals of 75 per cent. of Members were serving in the secretariat in 1967 as compared with 62 per cent. in 1957.

Details of the number and distribution of staff in 1957 and 1967 are given in Annex 16.

The concept of staff training has come to be accepted as a regular feature of the Organization’s activities, having as objectives to enable staff members to achieve their full potential in the service of the Organization, to prepare them for international health work generally and to develop the special skills necessary to carry out the programme of the Organization (see Chapter 3, page 91). The briefing of staff was expanded and improved, including the introduction of a sys-

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1 See Map 1, facing p. 1.
Language courses, especially for clerical and secretarial staff, are a continuous feature.

Office Accommodation

Progress was made in providing adequate and permanent office accommodation at headquarters and at several of the regional offices, and in extending and adapting existing office buildings in other regions.

Headquarters. In 1966, for the first time in many years, the whole headquarters staff was brought together in one location, affording improved working facilities, and giving added vigour to the team spirit of the staff.

The development of plans for the construction of a permanent headquarters building in Geneva had been authorized by the Twelfth World Health Assembly in May 1959. An international competition was held in which fifteen well known architects from thirteen countries participated. The winning design was that of the late Jean Tschumi of Switzerland. The foundation stone was laid in May 1962 by the President of the Fifteenth World Health Assembly, the late Dr S. V. Kurasov, Minister of Health of the USSR, on a site made available by the Republic and Canton of Geneva. A major portion of the costs of construction was met by loans from the Swiss Confederation and the Republic and Canton of Geneva, the remaining costs being met from the regular budget of the Organization. Numerous gifts from Members were received in cash or in kind. The construction of the building was completed in the spring of 1966 and the inauguration ceremony took place on 7 May of that year, during the Nineteenth World Health Assembly.

The building is a pre-stressed concrete structure, encased in aluminium and glass façades, constructed on a modular basis with movable partitions, thus providing maximum flexibility. It provides some 550 offices, four medium-sized conference rooms, work areas, and a conference hall for the meetings of the Executive Board. The construction of an adjacent temporary building providing eighty-three offices was authorized by the Twentieth World Health Assembly in May 1967 and was completed by the end of the year.

Regional Office for Africa. The complex at the Cité de Djoué outside Brazzaville, which had been provided by the French Government as offices and living quarters since 1956, was ceded to the Organization in April 1962, including the land, all buildings and twenty-five houses for the staff.

An extension of the existing office building and the construction of a conference hall, financed from the budget of the Organization and by contributions from a number of Members of the African Region, were completed in September.
1967. Houses were also constructed, providing forty-eight apartments of various sizes to accommodate the increased staff.

Regional Office for the Americas. In 1965 the Pan American Sanitary Bureau/WHO Regional Office for the Americas completed the construction of a new office building in Washington. The site was provided by the Government of the United States of America. The construction was very largely financed by a loan from the Kellogg Foundation to the Pan American Sanitary Bureau, with repayments provided for in the regular budget of the Pan American Health Organization, credited to a special fund to be used for increased programme assistance to Members of the Region.

Regional Office for South-East Asia. The Government of India undertook to construct a new office building in New Delhi to replace the provisional accommodation which the Organization had occupied. The new six-storey building, with a separate conference hall, was completed and occupied in 1962. In 1967 the Government of India offered to sell the building to the Organization and the Twentieth World Health Assembly, in May 1967, authorized the Director-General to accept the offer.

Regional Office for Europe. When the Regional Office moved to Copenhagen in June 1957 it occupied buildings specially constructed or bought by the Danish Government for that purpose. As from January 1962, the Government placed an adjacent house at the disposal of the Regional Office. To meet the long-term needs, the Government has acquired additional land and intends to construct a new building to be completed and occupied by 1970. In the meantime, the Government has had a temporary building constructed in the grounds of the Regional Office to meet the most pressing needs. All the buildings provided by the Government are at the disposal of the Organization rent-free.

Regional Office for the Eastern Mediterranean. The Regional Office has been housed since 1949 in a building previously occupied by the Egyptian Sanitary, Maritime and Quarantine Board in Alexandria and placed at the disposal of the Organization by the Government of the United Arab Republic at a nominal rent of 10 piastres per annum. The lease was renewed in 1958 for a period of twenty years. To accommodate the increasing staff of the Regional Office WHO has constructed an additional floor and made certain other structural alterations.

Regional Office for the Western Pacific. On land made available in Manila by the Government of the Philippines, the Organization constructed a three-storey office building with adjoining conference facilities which was occupied in 1959. The building was financed largely by contributions from the host Government and other Members of the Region, with about 28 per cent. paid from the budget of the Organization.
Electronic Computer Services and Data-Processing

Towards the end of 1963 an assessment of the potential use of modern computer facilities by the Organization was undertaken. This was followed in 1964 by a detailed feasibility study, the results of which indicated the benefits and great potentialities for the use of a computer in WHO. A delivery contract was signed in December 1964 and the computer was installed in June 1966. It was expanded to include more powerful equipment by the end of 1967. The technological conception of the computer allows further expansion to handle either higher volume or completely new applications.

The use so far made of the computer for biomedical research information services, for the processing and analytical studies of health statistics, and in other technical fields, has been mentioned in preceding chapters. Starting from June 1966, electronic data-processing was applied in the Organization's administrative services for payroll, pension fund, personnel records, budget, etc.

The computer is essential to the development of research which the Organization is undertaking in epidemiology and communications science. Plans for electronic data-processing in these fields are being developed.

There is ample evidence that the computer will make possible new approaches to many technical and managerial problems. Advanced equipment of this type makes it possible both to break new ground in data-processing, and to carry out activities which were hitherto excluded on grounds of cost.

Preparation and Form of Presentation of the Annual Programme and Budget Estimates

Under the Constitution, the Director-General is responsible for the preparation of the annual programme and budget estimates of the Organization. The budget cycle extends over a three-year period.

In the first year the Director-General, taking account of the general programme of work covering a specific period, approved by the Health Assembly, gives policy guidance and instructions on budget preparation to senior headquarters staff and to Regional Directors and indicates tentative allocations of funds to each region. These instructions include directives on programme trends and refer to decisions of the Executive Board and the World Health Assembly. Plans for projects of assistance are then developed in consultation with the requesting governments and in collaboration, to the extent possible, with interested agencies providing assistance under bilateral or multilateral arrangements. Following a review and consolidation by the Regional Director, each proposed regional programme is examined by the appropriate Regional Committee and subsequently transmitted to the Director-General with the comments and recommendations of these commit-
tees. All programme and budget proposals are then reviewed by the Director-General and consolidated into the annual programme and budget estimates of the Organization.

In the second year the proposed programme and budget estimates are examined by the Executive Board and its Standing Committee on Administration and Finance, submitted to the World Health Assembly, together with a report by the Board containing its comments and recommendations, and approved by the Assembly.

In the third year the programme as approved, but adjusted to take account of any subsequent changes in governments’ priorities, is implemented by the Organization and the governments.

In order to present in one volume an integrated international health programme, the Director-General’s proposed programme and budget estimates continue to include information on all activities financed from funds administered directly or indirectly by the Organization. In addition to the regular budget estimates, financed by assessments on Members of WHO, the volume shows the estimated costs of health programmes requested, or expected to be requested, by governments, under the Technical Assistance and Special Fund components of the United Nations Development Programme; of activities expected to be assisted jointly with UNICEF; and of activities to be financed by the Pan American Health Organization. The volume also includes, in separate annexes, cost estimates and relevant information on activities proposed under the various special accounts in the Voluntary Fund for Health Promotion; activities of the International Agency for Research on Cancer; and projects requested by governments, but which the Director-General could not include within the budget level proposed.

The form of presentation of the programme and budget has been under constant review. The annual programme and budget is now presented functionally,

**TABLE 1. REGULAR BUDGETS, 1958-1967**

<table>
<thead>
<tr>
<th>Year</th>
<th>Total budget US $</th>
<th>Undistributed reserve US $</th>
<th>Effective working budget US $</th>
<th>Actual obligations US $</th>
</tr>
</thead>
<tbody>
<tr>
<td>1958</td>
<td>14 769 160</td>
<td>12 030</td>
<td>13 566 130</td>
<td>13 236 820</td>
</tr>
<tr>
<td>1959</td>
<td>16 028 026</td>
<td>1 078 060</td>
<td>14 949 966</td>
<td>14 654 981</td>
</tr>
<tr>
<td>1960</td>
<td>18 113 760</td>
<td>1 195 060</td>
<td>16 918 700</td>
<td>16 623 517</td>
</tr>
<tr>
<td>1961</td>
<td>21 114 348</td>
<td>1 333 900</td>
<td>19 780 448</td>
<td>19 201 885</td>
</tr>
<tr>
<td>1962</td>
<td>26 545 940</td>
<td>1 683 140</td>
<td>24 863 800</td>
<td>24 164 650</td>
</tr>
<tr>
<td>1963</td>
<td>32 543 670</td>
<td>2 149 570</td>
<td>30 394 100</td>
<td>29 785 550</td>
</tr>
<tr>
<td>1964</td>
<td>36 763 820</td>
<td>2 223 130</td>
<td>34 542 690</td>
<td>33 869 165</td>
</tr>
<tr>
<td>1965</td>
<td>42 026 370</td>
<td>2 521 370</td>
<td>39 507 000</td>
<td>38 346 067</td>
</tr>
<tr>
<td>1966</td>
<td>47 097 390</td>
<td>2 615 590</td>
<td>44 481 800</td>
<td>43 439 677</td>
</tr>
<tr>
<td>1967</td>
<td>55 523 640</td>
<td>3 448 040</td>
<td>52 075 600</td>
<td>51 339 664</td>
</tr>
</tbody>
</table>
i.e. by subject, both in summary and in detail; by project, country and region; and is also summarized by major programme groups. In addition, it provides detailed and summarized information by purpose of expenditure. Table 1 shows the regular budgets for the ten years 1958-1967.

The Undistributed Reserve, which is part of the total budget appropriation, represents at present the assessments on two Members that are not actively participating in the work of the Organization, on China — for which special assessment arrangements have been approved by the Health Assembly — and on another Member which has not been paying its contributions since 1966. No obligations may be incurred against this part of the budget, as no income is expected to be derived from it. The Undistributed Reserve is therefore deducted from the total budget to arrive at the amount of the effective working budget, which is the amount within which the planned annual programme is implemented.

**Procedure for Considering the Annual Programme and Budget Estimates**

During the first years of the second decade the procedures for considering the annual programme and budget estimates remained essentially the same as they had been towards the end of the first decade. These procedures require the Executive Board and its Standing Committee on Administration and Finance to examine the Director-General's proposed annual programme and budget estimates in detail and to report thereon to the World Health Assembly.

The criteria governing the Executive Board's review of the annual programme and budget estimates were established by the Second and Fifth World Health Assemblies (1949 and 1952) and are still in force.

The Assembly's procedures for examining the annual programme and budget estimates were modified by the Fifteenth World Health Assembly. The Committee on Programme and Budget of the Health Assembly, before examining the main features of the proposed programme and recommending the budgetary ceiling, has to consider also whether the annual programme follows the general programme of work covering a specific period; the Committee on Administration, Finance and Legal Matters has also to consider the text of the draft appropriation resolution and recommend the amounts to be appropriated for activities other than the operating programme.

The Twentieth World Health Assembly decided to include in the terms of reference of the Committee on Programme and Budget the task of recommending the general order of magnitude for the budget for the second ensuing year, for the orientation of the Director-General in the preparation of his proposed programme and budget estimates for that year. It was clearly recognized that such recom-
mendations could be binding neither on the Director-General in the light of his constitutional responsibility, nor on future sessions of the World Health Assembly.

Assessed Contributions

The Organization’s primary source of income consists of the contributions received from Members in accordance with a scale of assessment determined annually by the World Health Assembly. Table 2 shows the growth of the resources available to WHO from the assessed contributions of active Members for the years 1958 to 1967. It also shows for each year the amount collected, absolutely and as a percentage of the total, and the amount of contributions outstanding at the end of the year.

<table>
<thead>
<tr>
<th>Year</th>
<th>Assessments US $</th>
<th>Collections</th>
<th>Outstanding at end of year US $</th>
<th>Outstanding at 31 December 1967 US $</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Amount US $</td>
<td>Percentage</td>
<td></td>
</tr>
<tr>
<td>1958</td>
<td>13 415 440</td>
<td>12 910 942</td>
<td>96.24</td>
<td>504 498</td>
</tr>
<tr>
<td>1959</td>
<td>13 943 710</td>
<td>13 326 521</td>
<td>95.59</td>
<td>615 489</td>
</tr>
<tr>
<td>1960</td>
<td>15 746 420</td>
<td>15 129 902</td>
<td>96.08</td>
<td>616 518</td>
</tr>
<tr>
<td>1961</td>
<td>17 713 430</td>
<td>16 632 041</td>
<td>93.90</td>
<td>1 061 389</td>
</tr>
<tr>
<td>1962</td>
<td>22 927 570</td>
<td>21 217 841</td>
<td>94.18</td>
<td>1 310 129</td>
</tr>
<tr>
<td>1963</td>
<td>28 985 140</td>
<td>25 310 040</td>
<td>87.32</td>
<td>3 675 100</td>
</tr>
<tr>
<td>1964</td>
<td>32 399 200</td>
<td>31 311 746</td>
<td>96.64</td>
<td>1 067 454</td>
</tr>
<tr>
<td>1965</td>
<td>36 882 880</td>
<td>35 310 592</td>
<td>95.74</td>
<td>1 572 288</td>
</tr>
<tr>
<td>1966</td>
<td>40 938 820</td>
<td>39 294 155</td>
<td>95.98</td>
<td>1 645 665</td>
</tr>
<tr>
<td>1967</td>
<td>49 878 590</td>
<td>47 767 365</td>
<td>95.77</td>
<td>2 111 225</td>
</tr>
</tbody>
</table>

Working Capital Fund

The main purpose of the Working Capital Fund is to finance the annual appropriations of the Organization pending receipt of contributions from Members. It may also be used by the Director-General to meet unforeseen and extraordinary expenses up to US $250 000, or up to $1 million with the concurrence of the Executive Board; and to provide emergency supplies to Members on a reimbursable basis, subject to a limit of $25 000 for any one Member and a total of $100 000 at any one time.

The Eighteenth World Health Assembly in 1965 changed the composition of the Working Capital Fund and the way in which it is financed in order to enable it to be increased from sources other than Members’ advances. The Fund has two parts, Part I consisting of advances by Members and Part II of amounts transferred from casual income in order to supplement the amount provided in Part I, so that the total amount of the Fund will be equal to, but not exceed, 20 per cent. of the effective working budget for each financial year. This ratio had not been reached by the end of the second decade.
Pan American Health Organization (PAHO) Regular Budget and other Funds

International health activities in the western hemisphere are financed not only from the WHO regular budget and other funds administered by WHO, but also from the regular budget and other special funds of PAHO. The Pan American Sanitary Bureau (PASB) serves as the Regional Office of the World Health Organization for the Western Hemisphere and administers the regular budget and other funds of PAHO. The PAHO regular budget funds derive from assessments on Member governments and participating governments of PAHO.

Voluntary Contributions

Voluntary Fund for Health Promotion

As early as 1949 the World Health Assembly and the Executive Board recognized that, even to begin meeting the vast health needs of the world, considerable supplementary resources over and above the WHO regular budget would be required. In 1960 the Thirteenth World Health Assembly decided to establish a Voluntary Fund for Health Promotion to receive contributions from public and private sources, in any usable currency or in kind, to be used for such purposes as are necessary for the implementation of the programmes approved by the World Health Assembly to be financed from the Fund. At the same time the Assembly decided that the operations planned to be financed from this Fund should be presented separately both in the Director-General's annual proposed programme and budget estimates and in the Financial Report.

The Voluntary Fund for Health Promotion includes as sub-accounts all special accounts which were already in existence. By subsequent resolutions of the World Health Assembly and the Executive Board other sub-accounts were established, so that the Voluntary Fund for Health Promotion, at the end of 1967, consisted of the following sub-accounts:

- General Account for Undesignated Contributions,
- Special Account for Smallpox Eradication,
- Special Account for Medical Research,
- Special Account for Community Water Supply,
- Malaria Eradication Special Account,
- Special Account for Assistance to the Democratic Republic of the Congo,
- Special Account for Accelerated Assistance to Newly Independent and Emerging States,
- Special Account for the Leprosy Programme,
- Special Account for the Yaws Programme,
Special Account for the Cholera Programme,
Special Account for Miscellaneous Designated Contributions.

As at 31 December 1967 contributions had been pledged, mostly by governments, to the Voluntary Fund for Health Promotion to the value of US $32,928,119, of which US $30,876,461 had been received.

Studies were undertaken on the possibilities of obtaining more substantial contributions from private sources such as industry, commercial and financial circles, benevolent organizations and the general public. These studies showed that world health foundations established in individual countries as independent benevolent organizations could be appropriate instruments for raising private contributions for international health work. The Executive Board and the World Health Assembly manifested their interest in the plan and requested the Director-General to take such action as would encourage the establishment of such foundations.

So far, world health foundations have been set up in Canada, Ceylon, Switzerland, the United Kingdom of Great Britain and Northern Ireland, and the United States of America. In several other countries action has been initiated. The concept of world health foundations has been gaining support and it is expected that the movement will be further strengthened by the creation of the Federation of World Health Foundations (in January 1967).

United Nations Development Programme (UNDP)

As a participating and executing agency of the United Nations Development Programme, which is financed by voluntary contributions, the Organization obtains additional funds for health activities which form part of the total WHO programme. The United Nations Development Programme has a Technical Assistance component (previously known as the "Expanded Programme of Technical Assistance") and a Special Fund component. WHO has obligated or committed the following amounts under each of these components:

<table>
<thead>
<tr>
<th>Year</th>
<th>Technical Assistance Obligations</th>
<th>Special Fund Commitments</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>US $</td>
<td>US $</td>
</tr>
<tr>
<td>1958</td>
<td>5,326,970</td>
<td>—</td>
</tr>
<tr>
<td>1959</td>
<td>4,880,785</td>
<td>—</td>
</tr>
<tr>
<td>1960</td>
<td>4,819,213</td>
<td>—</td>
</tr>
<tr>
<td>1961</td>
<td>5,596,331</td>
<td>65,569</td>
</tr>
<tr>
<td>1962</td>
<td>7,334,842</td>
<td>432,223</td>
</tr>
<tr>
<td>1963</td>
<td>7,062,948</td>
<td>701,434</td>
</tr>
<tr>
<td>1964</td>
<td>8,430,281</td>
<td>422,474</td>
</tr>
<tr>
<td>1965</td>
<td>6,817,651</td>
<td>1,173,830</td>
</tr>
<tr>
<td>1966</td>
<td>9,071,814</td>
<td>2,076,083</td>
</tr>
<tr>
<td>1967</td>
<td>6,977,770</td>
<td>3,874,123</td>
</tr>
</tbody>
</table>
United Nations Children’s Fund (UNICEF)

In accordance with the principles governing co-operation between the World Health Organization and the United Nations Children’s Fund, WHO studies and approves plans of operation for health programmes which conform with the policies laid down by the UNICEF/WHO Joint Committee on Health Policy and for which countries may request supplies and equipment from UNICEF. A considerable amount of the annual resources of UNICEF obtained through voluntary contributions has been devoted to jointly assisted health projects. The amounts spent annually by UNICEF on health activities during these last ten years have varied, but have been of the order of US $15 million to $20 million.

Revolving Sales Fund

The original Publications Revolving Fund was credited with the receipts from sales of WHO publications and was used to finance the cost of printing additional copies of publications for sale.

The Executive Board in 1959 decided to extend the use of the Fund to include such items as films, filmstrips and any other items which the Organization produced for sale, renaming it the Revolving Sales Fund. At the end of each financial year any credit balance in the Fund which exceeds US $40,000 is transferred to miscellaneous income, which is used at the discretion of the Health Assembly.

Revolving Fund for Teaching and Laboratory Equipment for Medical Education and Training

Many Members have reported on the difficulties they have in purchasing teaching and laboratory equipment needed for medical education and training purposes, because of the delay encountered in obtaining the convertible currencies required.

In order to assist governments in this respect, the Nineteenth World Health Assembly, in 1966, established a Revolving Fund for Teaching and Laboratory Equipment for Medical Education and Training. Through this fund it became possible for Members to deposit with the Organization, in advance, the estimated costs of the needed equipment in their own national currencies, the Organization then making the purchases on their behalf.

Since the Organization has been able to use the currencies in its various programmes, the procedure has worked well and has been of considerable assistance to the Members concerned.

The Fund was originally established in the amount of US $100,000 and will increase yearly by the same amount, in the annual budgets, until it reaches
$500 000 in 1971, when the position will be reviewed by the Executive Board and the World Health Assembly.

**Income and Obligations : All Sources of Funds**

A detailed table showing income and obligations over the second ten years from all sources of funds is given in Annex 17.

**Supply Services**

Apart from the procurement of non-expendable administrative equipment, furniture and consumable administrative items, the Organization purchases technical supplies for the programme. It also makes available its supply services to Members, to the United Nations and the specialized agencies, and to non-governmental organizations in official relations with it.

The Organization normally provides a project only with such necessary supplies and equipment as are not locally available or are not contributed from other international or bilateral sources. Over the period 1958-1967 such purchases almost tripled, reaching 28 000 items in 1967. They include X-ray equipment, manufactured with WHO guidance and meeting the recommended standards for protection against radiation hazards, which was purchased on behalf of UNICEF for projects jointly assisted by UNICEF and WHO.

During the past ten years over forty Members have used WHO supply services for purchases totalling over US $2.5 million. For all purchases on behalf of Members, except in cases of emergency, prior payment of the total estimated cost is required. A service charge of 3 per cent. is payable unless the purchases are made in furtherance of an activity planned or carried out with the assistance of WHO. In addition, by 31 December 1967, applications totalling $300 000 had been approved for purchases out of the Revolving Fund for Teaching and Laboratory Equipment for Medical Education and Training.

The provisions governing the purchase of supplies and equipment for Members in emergency situations were modified after 1958 when the World Health Assembly authorized the Director-General to utilize the Working Capital Fund for this purpose (see page 308). No service charge is made on such purchases. Emergency purchases have been made on several occasions and consisted mainly of vaccines and medicaments. In meeting emergencies close co-operation has been maintained with the League of Red Cross Societies, while WHO supply services have been made available to the League.

**Co-ordination in Administrative Matters with the United Nations and the Specialized Agencies**

Co-ordination in administrative, budgetary and financial matters within the United Nations system is ancillary to the co-ordination of policies and programmes
already described in Chapter 9. As new responsibilities fell to the United Nations and specialized agencies in the economic and social fields, and as assistance activities expanded, the task of co-ordination in administrative matters increased also. It was accompanied by a strong tendency towards greater uniformity of procedures in the preparation and execution of programmes.

The Administrative Committee on Co-ordination has continued to be the central inter-secretariat body for administrative co-ordination, through the Consultative Committee on Administrative Questions and through special and ad hoc bodies. In a number of areas co-operation has been carried out through direct, daily secretariat contacts. For instance, in Geneva a single staff medical service is administered by WHO on behalf of the organizations in Geneva; the purchasing of paper and office supplies for the organizations located in Geneva is also carried out jointly; conference facilities and committee rooms are reciprocally shared.

Co-ordination on administrative matters has been facilitated by the strengthening of the International Civil Service Advisory Board to enable it to serve as an independent inter-organizational body and make technical judgements, free of external pressures, when problems arise in the administration of the common system of employment conditions for staff.

In 1966 the United Nations General Assembly established an ad hoc Committee of Experts to Examine the Finances of the United Nations and the Specialized Agencies. Following its recommendations, inter-agency studies and consultations on budget presentation and financial practices and procedures were undertaken with the object of achieving a greater measure of comparability and uniformity in these matters among the international organizations.

The growing importance of co-ordination within the United Nations system naturally increases the workload of the Organization and accentuates the need for safeguarding the Organization's own constitutional and technical responsibilities. As mentioned earlier, the Executive Board undertook an organizational study on co-ordination with the United Nations and the specialized agencies which was submitted to the World Health Assembly in 1962. The subject is again being studied by the Executive Board.

The International Agency for Research on Cancer

The Eighteenth World Health Assembly decided on 20 May 1965 to establish the International Agency for Research on Cancer in accordance with the provisions of a statute sponsored by five founding States. The Agency is financed by equal annual contributions from each participating State, of which there are now nine: Australia, the Federal Republic of Germany, France, Israel, Italy, the Netherlands,
the Union of Soviet Socialist Republics, the United Kingdom of Great Britain and Northern Ireland, and the United States of America.

The Agency is controlled by a Governing Council composed of one representative of each participating State and the Director-General of the World Health Organization.

There is a Scientific Council, composed of twelve scientists selected on the basis of their technical competence in cancer research and allied fields, and appointed on a rotating basis by the Governing Council. The Scientific Council recommends programmes and special projects to the Governing Council and reports on the scientific and technical aspects of the Agency's programme and budget; it also evaluates the activities and special projects sponsored by the Agency. Subject to the general authority of the Director-General of WHO the secretariat is headed by a Director selected by the Governing Council.

The Agency is at present housed in a building in Lyons, France, placed at its disposal free of charge by the city of Lyons. The French authorities have offered to construct a new building in Lyons at their expense as permanent accommodation for the Agency.
Annex 1

MEMBERS AND ASSOCIATE MEMBERS
OF THE WORLD HEALTH ORGANIZATION

At 31 December 1967

At 31 December 1967 the World Health Organization had 126 Member States and three Associate Members, as compared with eighty-five Member States and three Associate Members at 31 December 1957. The list below gives the date on which each became a party to the Constitution or the date of admission to associate membership.

<table>
<thead>
<tr>
<th>Member States</th>
<th>Date</th>
<th>Member States</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Afghanistan</td>
<td>19 April 1948</td>
<td>Denmark</td>
<td>19 April 1948</td>
</tr>
<tr>
<td>Albania</td>
<td>26 May 1947</td>
<td>Dominican Republic</td>
<td>21 June 1948</td>
</tr>
<tr>
<td>Algeria</td>
<td>8 November 1962</td>
<td>Ecuador</td>
<td>1 March 1949</td>
</tr>
<tr>
<td>Argentina</td>
<td>22 October 1948</td>
<td>El Salvador</td>
<td>22 June 1948</td>
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<tr>
<td>Australia</td>
<td>2 February 1948</td>
<td>Ethiopia</td>
<td>11 April 1947</td>
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<td>Austria</td>
<td>30 June 1947</td>
<td>Federal Republic of Germany</td>
<td>29 May 1951</td>
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<td>Barbados</td>
<td>25 April 1967</td>
<td>Finland</td>
<td>7 October 1947</td>
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<tr>
<td>Belgium</td>
<td>25 June 1948</td>
<td>France</td>
<td>16 June 1948</td>
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<td>Bolivia</td>
<td>23 December 1949</td>
<td>Gabon</td>
<td>21 November 1960</td>
</tr>
<tr>
<td>Brazil</td>
<td>2 June 1948</td>
<td>Ghana</td>
<td>8 April 1957</td>
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<td>Bulgaria</td>
<td>9 June 1948</td>
<td>Greece</td>
<td>12 March 1948</td>
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<td>Burundi</td>
<td>22 October 1962</td>
<td>Guatemala</td>
<td>26 August 1949</td>
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<td>Byelorussian SSR</td>
<td>7 April 1948</td>
<td>Guinea</td>
<td>19 May 1959</td>
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<td>Cambodia</td>
<td>17 May 1950</td>
<td>Guyana</td>
<td>27 September 1966</td>
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<td>Cameroon</td>
<td>6 May 1960</td>
<td>Haiti</td>
<td>12 August 1947</td>
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<td>Canada</td>
<td>29 August 1946</td>
<td>Honduras</td>
<td>8 April 1949</td>
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<td>Central African Republic</td>
<td>20 September 1960</td>
<td>Hungary</td>
<td>17 June 1948</td>
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<td>Ceylon</td>
<td>7 July 1948</td>
<td>Iceland</td>
<td>17 June 1948</td>
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<td>Chad</td>
<td>1 January 1961</td>
<td>India</td>
<td>12 January 1948</td>
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<td>Chile</td>
<td>15 October 1948</td>
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<td>China</td>
<td>22 July 1946</td>
<td>Iran</td>
<td>23 November 1946</td>
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<td>Colombia</td>
<td>14 May 1959</td>
<td>Iraq</td>
<td>23 September 1947</td>
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<td>Congo (Brazzaville)</td>
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<td>20 October 1947</td>
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<td>21 June 1949</td>
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<td>Costa Rica</td>
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<td>11 April 1947</td>
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<td>Cuba</td>
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<td>Cyprus</td>
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<td>Dahomey</td>
<td>20 September 1960</td>
<td>Kenya</td>
<td>27 January 1964</td>
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### Member States

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<td>Singapore</td>
<td>25 February 1966</td>
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<td>17 May 1950</td>
<td>Somalia</td>
<td>26 January 1961</td>
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<td>19 January 1949</td>
<td>South Africa</td>
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<td>7 July 1967</td>
<td>Spain</td>
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<td>Libya</td>
<td>14 March 1947</td>
<td>Sudan</td>
<td>14 May 1956</td>
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<td>Luxembourg</td>
<td>16 May 1952</td>
<td>Sweden</td>
<td>28 August 1947</td>
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<td>3 June 1949</td>
<td>Switzerland</td>
<td>26 March 1947</td>
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<td>16 January 1961</td>
<td>Syria</td>
<td>18 December 1946</td>
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<td>Maldives Islands</td>
<td>9 April 1965</td>
<td>Thailand</td>
<td>26 September 1947</td>
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<td>Togo</td>
<td>13 May 1960</td>
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<td>17 October 1960</td>
<td>Trinidad and Tobago</td>
<td>3 January 1963</td>
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<td>Malta</td>
<td>1 February 1965</td>
<td>Tunisia</td>
<td>14 May 1956</td>
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<td>7 March 1961</td>
<td>Turkey</td>
<td>2 January 1948</td>
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<td>Mexico</td>
<td>7 April 1948</td>
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<td>Monaco</td>
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<td>Yemen</td>
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<td>Paraguay</td>
<td>4 January 1949</td>
<td>Yugoslavia</td>
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<td>Peru</td>
<td>11 November 1949</td>
<td>Western Samoa</td>
<td>2 February 1965</td>
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<td>Philippines</td>
<td>9 July 1948</td>
<td>Yemen</td>
<td>16 May 1962</td>
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<td>Poland</td>
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<td>Yugoslavia</td>
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<td>2 February 1965</td>
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<td>Republic of Korea</td>
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<td>Mauritius</td>
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<td>Rwanda</td>
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<td>Qatar</td>
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<td>Saudi Arabia</td>
<td>26 May 1947</td>
<td>Southern Rhodesia</td>
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<td>Senegal</td>
<td>31 October 1960</td>
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<td>Sierra Leone</td>
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</tbody>
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Annex 2

WORLD HEALTH ASSEMBLIES, 1958-1967

PRESIDENTS, VICE-PRESIDENTS AND CHAIRMEN OF MAIN COMMITTEES

Tenth Anniversary Commemorative Session, Minneapolis, USA, 26-28 May 1958

President:
Dr S. AL-WAHBI, Director, Karkh Hospital

Vice-President:
Dr O. VARGAS-MÉNDEZ, Director-General of Health

Eleventh World Health Assembly, Minneapolis, 28 May - 13 June 1958

President:
Dr LEROY E. BURNET, Surgeon General, Public Health Service, Department of Health, Education and Welfare

Vice-Presidents:
Dr J. ANOUTI, Director-General, Ministry of Health
Dr A. SAUTER, Director, Federal Public Health Service
Dr TRAN-VY, Secretary of State for Health

Chairman, Committee on Programme and Budget:
Professor N. N. PESONEN, Director-General, State Medical Board

Chairman, Committee on Administration, Finance and Legal Matters:
Mr S. KHANACHET, Press Attaché, Saudi Arabian Legation, Bonn

Twelfth World Health Assembly, Geneva, 12-29 May 1959

President:
Sir John CHARLES, Chief Medical Officer, Ministry of Health

Vice-Presidents:
Dr D. EL-AZMEH, Minister of Health
Dr V. MARINESCO, Minister of Health and Welfare
Dr Oudom SOUVANNAVONG, Inspector-General of Administrative Affairs, Ministry of Health

Chairman, Committee on Programme and Budget:
Dr H. B. TURBOTT, Deputy Director-General, Department of Health

Chairman, Committee on Administration, Finance and Legal Matters:
Dr O. VARGAS-MÉNDEZ, Director-General of Health
Thirteenth World Health Assembly, Geneva, 3-20 May 1960

President:
Dr H. B. TURBOTT, Director-General of Health, Department of Health New Zealand

Vice-Presidents:
Dr Y. BEN ABBÉS, Minister of Health Morocco
Professor R. BARANSKI, Minister of Health and Welfare Poland
Dr J. M. BAENA, Secretary-General, Ministry of Public Health Colombia

Chairman, Committee on Programme and Budget:
Dr Monawar K. AFRIDI, Vice-Chancellor, University of Peshawar Pakistan

Chairman, Committee on Administration, Finance and Legal Matters:
Dr M. E. BUSTAMANTE, Under-Secretary of Health, Ministry of Health and Welfare Mexico

Fourteenth World Health Assembly, New Delhi, 7-24 February 1961

President:
Dr A. L. MUDALIAR, Vice-Chancellor, University of Madras India

Vice-Presidents:
Dr A. MARTÍNEZ MARCHETTI, Under-Secretary of Social Welfare and Public Health Argentina
Dr J. PLOJHAR, Minister of Health Czechoslovakia
Dr D. SAMONTE, Under-Secretary for Special Health Services Philippines

Chairman, Committee on Programme and Budget:
Dr W. A. KARUNARATNE, Director of Health Services Ceylon

Chairman, Committee on Administration, Finance and Legal Matters:
Dr H. van Zile HYDE, Assistant to the Surgeon General for International Health, Public Health Service, Department of Health, Education and Welfare United States of America

Fifteenth World Health Assembly, Geneva, 8-25 May 1962

President:
Dr S. V. KURASHOV, Minister of Health of the USSR Union of Soviet Socialist Republics

Vice-Presidents:
Dr Monawar K. AFRIDI, Honorary Consultant, Health Division, Ministry of Health, Labour and Social Welfare Pakistan
Dr D. CASTILLO, Assistant to the Director of Public Health, Ministry of Health and Social Welfare Venezuela
Dr P. LAMBIN, Minister of Public Health and Population Upper Volta

Chairman, Committee on Programme and Budget:
Dr W. D. REFSHAUGE, Director-General of Health Australia
Chairman, Committee on Administration, Finance and Legal Matters:
Dr M. López HerrarTe, Minister of Health
Guatemala
and later:
Dr B. D. B. Layton, Principal Medical Officer, International Health Section, Department of National Health and Welfare
Canada

Sixteenth World Health Assembly, Geneva, 7-23 May 1963
President:
Dr M. A. Majekodunmi, Federal Minister of Health
Nigeria
Vice-Presidents:
Professor R. Geric, Deputy Secretary for Public Health and Social Welfare
Yugoslavia
Dr Sushila Nayar, Union Minister of Health
India
Mr Abdul Rahman bin Haji Talib, Minister of Health
Federation of Malaya

Chairman, Committee on Programme and Budget:
Dr V. V. Olguin, Director, International Health and Welfare Relations,
Ministry of Social Welfare and Public Health
Argentina

Chairman, Committee on Administration, Finance and Legal Matters:
Mr I. T. Kittani, Minister Plenipotentiary; Permanent Representative of Iraq to the European Office of the United Nations
Iraq

Seventeenth World Health Assembly, Geneva, 3-20 March 1964
President:
Dr Monawar K. Afridi, Honorary Consultant, Health Division, Ministry of Health, Labour and Social Welfare
Pakistan

Vice-Presidents:
Dr J. Alvarez Amézquita, Secretary of State for Health and Welfare
Mexico
Dr E. B. S. Lumu, Minister of Health
Uganda
Dr Hurustiati Subandrio, Deputy Minister of Health
Indonesia

Chairman, Committee on Programme and Budget:
Dr S. Renjifo, Minister of Public Health
Colombia

Chairman, Committee on Administration, Finance and Legal Matters:
Mr J. H. Zeuthen, Permanent Under-Secretary of State, Ministry of the Interior
Denmark

Eighteenth World Health Assembly, Geneva, 4-21 May 1965
President:
Dr V. V. Olguin, Director, International Health and Welfare Relations,
Ministry of Social Welfare and Public Health
Argentina
Vice-Presidents:
Dr S. Al-Sammarrai, Minister of Health, Iraq
Dr A. Engel, Director-General of the National Board of Health, Sweden
Mr O. Owusu-Afriyie, Minister of Health, Ghana

Chairman, Committee on Programme and Budget:
Dr A. L. Mudaliar, Vice-Chancellor, University of Madras, India

Chairman, Committee on Administration, Finance and Legal Matters:
Professor R. Vannugli, Chief, International Organizations Division, Ministry of Health, Italy

Nineteenth World Health Assembly, Geneva, 3-20 May 1966

President:
Dr A. Sauter, Director, Federal Public Health Service, Switzerland

Vice-Presidents:
Dr K. B. N'Dia, Minister of Public Health and Population, Ivory Coast
Dr A. Roldos Garcia, Minister of Welfare, Labour and Health, Ecuador
Dr Sushila Nayar, Union Minister of Health and Family Planning, India

Chairman, Committee on Programme and Budget:
Dr A. Nabulsi, Under-Secretary of State, Ministry of Health, Jordan

Chairman, Committee on Administration, Finance and Legal Matters:
Sir William Refshauge, Director-General of Health, Australia

Twentieth World Health Assembly, Geneva, 8-26 May 1967

President:
Dr V. T. Herat Gunaratne, Director of Health Services, Ceylon

Vice-Presidents:
Dr T. Soda, Director, Institute of Public Health, Ministry of Health and Welfare, Japan
Dr J.-C. Happi, Commissioner-General for Public Health and Population, Cameroon
Dr E. A. D. Holmberg, Secretary of State for Public Health, Argentina
Dr Z. Szabó, Minister of Health, Hungary
Dr M. Shahgholi, Minister of Health, Iran

Chairman, Committee on Programme and Budget:
Dr A. H. Thomas, Deputy Chief Medical Officer, Department of Health, Sierra Leone

Chairman, Committee on Administration, Finance and Legal Matters:
Dr A. R. Al-Adwani, Head, Internal Diseases Unit, Sabah Hospital, Kuwait
Annex 3

EXECUTIVE BOARD, 1958-1967

1. CHAIRMEN AND VICE-CHAIRMEN OF THE EXECUTIVE BOARD
AND CHAIRMEN OF ITS STANDING COMMITTEES

<table>
<thead>
<tr>
<th>Session</th>
<th>Designating State</th>
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<tbody>
<tr>
<td>Twenty-first (14-28 January 1958)</td>
<td>United Kingdom of Great Britain and Northern Ireland</td>
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<tr>
<td>Chairman of the Executive Board:</td>
<td>Sir John Charles</td>
</tr>
<tr>
<td>Vice-Chairmen of the Board:</td>
<td>Dr Dia E. El-Chatti, Dr P. E. Moore</td>
</tr>
<tr>
<td>Chairmen of Standing Committees</td>
<td></td>
</tr>
<tr>
<td>Administration and Finance:</td>
<td>Professor G. A. Canaperia, Dr C. Díaz-Coller</td>
</tr>
<tr>
<td>Non-governmental Organizations:</td>
<td></td>
</tr>
<tr>
<td>Twenty-second (16-17 June 1958)</td>
<td>Syria</td>
</tr>
<tr>
<td>Twenty-third (20 Jan. - 3 Feb. 1959)</td>
<td>Canada</td>
</tr>
<tr>
<td>Chairman of the Executive Board:</td>
<td>Dr P. E. Moore</td>
</tr>
<tr>
<td>Vice-Chairmen of the Board:</td>
<td>Dr C. Díaz-Coller, Dr A. Habernoll</td>
</tr>
<tr>
<td>Chairmen of Standing Committees</td>
<td></td>
</tr>
<tr>
<td>Administration and Finance:</td>
<td>Dr H. van Zile Hyde</td>
</tr>
<tr>
<td>Non-governmental Organizations:</td>
<td>Professor E. Aujaleu</td>
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<tr>
<td>Twenty-fourth (1-2 June 1959)</td>
<td>France</td>
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<tr>
<td>Twenty-fifth (19 Jan. - 1 Feb. 1960)</td>
<td>Iran, Brazil</td>
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<tr>
<td>Chairman of the Executive Board:</td>
<td>Professor E. Aujaleu</td>
</tr>
<tr>
<td>Vice-Chairmen of the Board:</td>
<td>Professor M. N. Etemadian, Dr H. M. Penido</td>
</tr>
</tbody>
</table>

1 All sessions were held in Geneva except the twenty-second, which was held in Minneapolis (USA), and the twenty-seventh, which was held in New Delhi.
Chairmen of Standing Committees
Administration and Finance:
Dr A. J. Metcalfe

Non-governmental Organizations:
Professor M. N. Etemadian

Designating State
Australia
Iran


Chairman of the Executive Board:
Dr H. M. Penido

Vice-Chairmen of the Board:
Dr A. O. Abu Shamma
Dr V. N. Butrov

Chairmen of Standing Committees
Administration and Finance:
Mr T. J. Brady

Non-governmental Organizations:
Dr A. Lynch

Headquarters Accommodation:
Professor E. Aujaleu

Brazil
Sudan
Union of Soviet Socialist Republics
Ireland
Peru
France

Twenty-seventh (30 Jan. - 1 Feb. 1961)

Chairman of the Executive Board:
Dr A. O. Abu Shamma

Vice-Chairmen of the Board:
Dr A. Martinez Marchetti
Dr K. Suvarnakich
Dr D. Castillo

Chairmen of Standing Committees
Administration and Finance:
Dr H. van Zile Hyde

Non-governmental Organizations:
Dr L. Molitor

Headquarters Accommodation:
Professor E. Aujaleu

Sudan
Argentina
Thailand
Venezuela
United States of America
Luxembourg
France

Thirtieth (29-30 May 1962)

Chairman of the Executive Board:
Dr Monawar K. Afridi

Vice-Chairmen of the Board:
Dr R. Vannugli
Dr J. Adjei Schandorf

Chairmen of Standing Committees
Administration and Finance:
Dr A. Nabulsi

Pakistan
Italy
Ghana
Jordan

1 Elected at the twenty-ninth session, in place of Dr A. Martinez Marchetti.
### Meeting Sessions

<table>
<thead>
<tr>
<th>Session</th>
<th>Non-governmental Organizations</th>
<th>Headquarters Accommodation</th>
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<td>Thirty-second (27-28 May 1963)</td>
<td>Dr S. Sigurdsson</td>
<td>Professor E. Aujaleu</td>
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<tr>
<td>Thirty-third (14-24 January 1964)</td>
<td>Professor M. Kacprzak</td>
<td>Dr A. C. Andriamasy</td>
</tr>
<tr>
<td>Thirty-fourth (26-29 May 1964)</td>
<td>Dr H. B. Turbott</td>
<td>Professor E. Aujaleu</td>
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<tr>
<td>Thirty-fifth (19-28 January 1965)</td>
<td>Dr H. B. Turbott</td>
<td>Professor E. Aujaleu</td>
</tr>
<tr>
<td>Thirty-sixth (24-25 May 1965)</td>
<td>Dr K. Evang</td>
<td>Professor E. Aujaleu</td>
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<tr>
<td>Thirty-seventh (18-28 January 1966)</td>
<td>Dr T. Alan</td>
<td>Professor E. Aujaleu</td>
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</table>

¹ Elected at the thirty-third session, in place of Professor M. Kacprzak.
Thirty-eighth (23-24 May 1966)

Chairman of the Executive Board: Dr J. Watt
Vice-Chairmen of the Board: Dr J.-C. Hippi
Chairmen of Standing Committees
Administration and Finance: Dr K. N. Rao
Non-governmental Organizations: Professor P. Macúch
Headquarters Accommodation: Professor E. Aujaleu

Thirty-ninth (17-27 January 1967)

Chairman of the Executive Board: Dr J. Watt
Vice-Chairmen of the Board: Dr J.-C. Hippi
Professor R. Gerić
Chairmen of Standing Committees
Administration and Finance: Dr K. N. Rao
Non-governmental Organizations: Professor P. Macúch
Headquarters Accommodation: Professor E. Aujaleu

Fortieth (29-30 May 1967)

Chairman of the Executive Board: Dr K. N. Rao
Vice-Chairmen of the Board: Professor P. Macúch
Dr P. D. Martínez
Designating State
United States of America
Cameroon
Yugoslavia
India
Czechoslovakia
France
India
Czechoslovakia
Mexico
### 2. Member States Designating a Person to Serve on the Executive Board

**1958-1967**

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**Composition 1958-59**

**Composition 1959-60**

**Composition 1960-61**

**Composition 1961-62**

**Composition 1962-63**

**Composition 1963-64**

**Composition 1964-65**

**Composition 1965-66**

**Composition 1966-67**

**Composition 1967-68**

¹ Syria having become the Syrian Province of the United Arab Republic, Tunisia was elected in June 1958 to replace it for the last year of its term.

² Egypt having become the Egyptian Province of the United Arab Republic, the latter was accorded in June 1958 the assumption of Egypt's remaining term of two years.

³ First election after entry-into-force of amendments to Articles 24 and 25 of the Constitution increasing membership of Board from eighteen to twenty-four.

⁴ Elected for one year only (1961-1962); see footnote 3 above.

⁵ Elected for two years only (1961-1963); see footnote 3 above.
REGIONAL COMMITTEES, 1958-1967
CHAIRMEN AND VICE-CHAIRMEN

REGIONAL COMMITTEE FOR AFRICA

Eighth session, Monrovia, 22-27 September 1958
Chairman: Dr J. B. Tnus, Assistant Director-General of the National Public Health Service, Liberia
Vice-Chairman: Dr L.-P. AUJOUlat, Ministry of Public Health and Population, France

Ninth session, Nairobi, 21-26 September 1959
Chairman: Dr A. J. WALKER, Chief Medical Officer and Permanent Secretary for Health, Kenya, United Kingdom of Great Britain and Northern Ireland
Vice-Chairman: Dr C. M. NORMAN-WILLIAMS, Chief Medical Adviser to the Federal Government, Nigeria

Tenth session, Accra, 8-13 August 1960
Chairman: Dr P. M. J. PHILLIPS, Acting Deputy Chief Medical Officer, Ministry of Health, Ghana
Vice-Chairman: Dr G. KPOSTRA, Minister of Public Health, Togo

Eleventh session, Brazzaville, 25 September - 4 October 1961
Chairman: Dr R. MAHOUATA, Minister of Public Health, Congo (Brazzaville)
Vice-Chairman: Dr S. DOLO, Minister of Public Health, Mali

Twelfth session, Geneva, 24 September - 2 October 1962
Chairman: Dr Bogar A. BÀ, Minister of Public Health, Labour, and Social Affairs, Mauritania
Vice-Chairmen: Dr L. DIALLO, Minister of Health, Senegal
Dr H. M. S. BOARDMAN, Chief Medical Officer, Ministry of Health, Sierra Leone
Thirteenth session, Geneva, 23-27 September 1963

Chairman: Dr I. S. KADAMA, Permanent Secretary/Chief Medical Officer, Ministry of Health
Vice-Chairmen: Dr D. E. BOYE-JOHNSON, Deputy Chief Medical Officer, Ministry of Health
Dr S. P. TCHOUNGUI, Federal Minister of Public Health and Population

Uganda
Sierra Leone
Cameroon

Fourteenth session, Geneva, 14-21 September 1964

Chairman: Mr D. COLY, Minister of Health and Social Affairs
Vice-Chairmen: Dr P. LAMBIN, Minister of Public Health and Population
Dr J. C. LIKIMANI, Director of Medical Services

Senegal
Upper Volta
Kenya

Fifteenth session, Lusaka, 6-16 September 1965

Chairman: Mr P. W. MATOKA, Minister of Health
Vice-Chairmen: Mr M. A. HEL BONGO, Minister of Public Health and Social Affairs
Dr A. H. THOMAS, Acting Deputy Chief Medical Officer, Ministry of Health

Zambia
Chad
Sierra Leone

Sixteenth session, Kinshasa, 12-22 September 1966

Chairman: Dr M. TSHISHIMBI, Minister of Health
Vice-Chairmen: Mr A. KUEVIDJEN, Minister of Public Health
Mr S. K. NKUTU, Minister of Health

Democratic Republic of the Congo
Togo
Uganda

Seventeenth session, Brazzaville, 25 September - 4 October 1967

Chairman: Mr S. P. P. GOKANA, Minister of Public Health, Population and Social Affairs
Vice-Chairmen: Dr C. V. MTAWALI, Principal Secretary, Ministry of Health
Mr A. D. MAGALÉ, Minister of Public Health and Social Affairs

Congo (Brazzaville)
United Republic of Tanzania
Central African Republic
THE SECOND TEN YEARS

REGIONAL COMMITTEE FOR THE AMERICAS ¹

Tenth session, San Juan, Puerto Rico, 21 September - 3 October 1958
(XV Pan American Sanitary Conference)

Chairman: Dr G. ARBONA, Secretary of Health, Commonwealth of Puerto Rico
Vice-Chairmen: Dr A. JIMÉNEZ ARANGO, Minister of Public Health
              Dr H. V. NOBLÍA, Minister of Welfare and Public Health
              United States of America

Eleventh session, Washington, D.C., 21-30 September 1959
(XI meeting, Directing Council, Pan American Health Organization)

Chairman: Mr H. OLIVERO, Consultant ad honorem, Ministry of Public Health and Welfare
Vice-Chairmen: Dr J. A. JACOME VALDERRAMA, Minister of Public Health
              Dr J. ALVAREZ AMÉZQUITA, Minister of Health and Welfare
              Colombia

Twelfth session, Havana, 14-26 August 1960
(XII meeting, Directing Council, Pan American Health Organization)

Chairman: Dr J. R. MACHADO VENTURA, Minister of Public Health
Vice-Chairmen: Dr H. van Zile HYDE, Special Assistant to the Surgeon General for International Health, Public Health Service, Department of Health, Education and Welfare
              Dr L. LATTUF, Director of Public Health, Ministry of Health and Welfare
              Mexico

Thirteenth session, Washington, D.C., 3-13 October 1961
(XIII meeting, Directing Council, Pan American Health Organization)

Chairman: Dr Luther L. TERRY, Surgeon General, Public Health Service, Department of Health, Education and Welfare
Vice-Chairmen: Dr J. ALVAREZ AMÉZQUITA, Minister of Health and Welfare
              Dr D. CASTILLO RODRIGUEZ, Minister of Public Health
              United States of America

¹ The Directing Council of the Pan American Health Organization and, every fourth year, the Pan American Sanitary Conference serve as the WHO Regional Committee for the Americas.
Fourteenth session, Minneapolis, USA, 21 August - 3 September 1962
(XVI Pan American Sanitary Conference)
Chairman: Dr J. ALVAREZ AMÉZQUITA, Minister of Health and Welfare
Vice-Chairmen: Dr T. PADILLA, Minister of Welfare and Public Health
Dr M. TERÁN-VALLS, Minister of Public Health
Mexico
Argentina
Costa Rica

Fifteenth session, Washington, D.C., 16-25 September 1963
(XIV meeting, Directing Council, Pan American Health Organization)
Chairman: Dr J. ARIAS STELLA, Minister of Public Health and Social Welfare
Vice-Chairmen: Dr S. RENJIFO SALCEDO, Minister of Public Health
Dr A. BONICHE VÁSQUEZ, Minister of Public Health
Peru
Colombia
Nicaragua

Sixteenth session, Mexico City, 31 August - 11 September 1964
(XV meeting, Directing Council, Pan American Health Organization)
Chairman: Dr J. ALVAREZ AMÉZQUITA, Minister of Health and Welfare
Vice-Chairmen: Dr D. GONZÁLEZ TORRES, Minister of Public Health and Social Welfare
Dr B. A. DELGADO BILLINI, Secretary of State for Health and Social Welfare
Mexico
Paraguay
Dominican Republic

Seventeenth session, Washington, D.C., 27 September - 8 October 1965
(XVI meeting, Directing Council, Pan American Health Organization)
Chairman: Dr R. DE BRITTO, Minister of Health
Vice-Chairmen: Dr J. J. Muñoz, Minister of Public Health
Dr J. A. PERAZA, Minister of Public Health and Social Welfare
Brazil
Colombia
Honduras

Eighteenth session, Washington, D.C., 26 September - 7 October 1966
(XVII Pan American Sanitary Conference)
Chairman: Dr A. ORDÓÑEZ PLAJA, Minister of Public Health
Vice-Chairmen: Dr W. H. STEWART, Surgeon General, Public Health Service, Department of Health, Education and Welfare
Dr B. INTERIANO, Minister of Public Health and Welfare
Colombia
United States of America
El Salvador

Nineteenth session, Port-of-Spain, 2-12 October 1967
(XVII meeting, Directing Council, Pan American Health Organization)
Chairman: Dr M. P. AWON, Minister of Health
Vice-Chairmen: Dr P. D. MARTÍNEZ, Under-Secretary for Health
Dr E. POITEVIN, Minister of Public Health and Welfare
Trinidad and Tobago
Mexico
Guatemala
ELEVENTH SESSION, New Delhi, 24-30 September 1958
Chairman: Dr Jaswant Singh, Director-General of Health Services
Vice-Chairman: Dr R. Baidya, Director of Health Services

TWELFTH SESSION, Kandy, Ceylon, 23-29 September 1959
Chairman: Dr W. A. Karunaratne, Director of Health Services
Vice-Chairman: Dr U Maung U, Director of Health Services

THIRTEENTH SESSION, Bandung, 22-29 August 1960
Chairman: Dr S. Anwar, Director of Health Services, East Java
Vice-Chairman: Dr K. Suvarnakich, Director-General, Department of Health

FOURTEENTH SESSION, Ootacamund, India, 19-25 September 1961
Chairman: Dr V. Srinivasan, Director-General of Health Services
Vice-Chairman: Dr A. R. Hakimi, Director-General of Public Health Services

FIFTEENTH SESSION, New Delhi, 18-24 September 1962
Chairman: Maha Thiri Thudame Daw Khin Kyi, Ambassador Extra-ordinary and Plenipotentiary of the Union of Burma to the Government of India
Vice-Chairman: Dr K. Suvarnakich, Director-General, Department of Health

SIXTEENTH SESSION, Bangkok, 10-16 September 1963
Chairman: Dr K. Suvarnakich, Director-General, Department of Health
Vice-Chairman: Dr P. Dolgor, Chief Surgeon, Ministry of Public Health

SEVENTEENTH SESSION, New Delhi, 22-28 September 1964
Chairman: Dr V. T. H. Gunaratne, Director of Health Services
Vice-Chairman: Dr D. Baidya, Director of Health Services

EIGHTEENTH SESSION, Kabul, 30 October - 6 November 1965
Chairman: Dr M. O. Anwary, Minister of Public Health
Vice-Chairman: Dr M. S. Sastrodihardjo, Deputy Executive Director, National Malaria Eradication Service
Nineteenth session, New Delhi, 27 September - 3 October 1966

*Chairman:* Dr M. S. SASTRODHARDJO, Director-General, Eradication of Epidemic and Communicable Diseases, Operational Command

*Vice-Chairman:* Dr U LUN WAI, Divisional Assistant Director of Health, Ministry of Health

Twentieth session, Ulan Bator, 1-8 August 1967

*Chairman:* Dr D. TUMENDELGER, First Deputy Minister of Public Health

*Vice-Chairman:* Dr Y. R. JOSHI, Director of Health Services

REGIONAL COMMITTEE FOR EUROPE

Eighth session, Monaco, 3-6 September 1958

*Chairman:* Dr E. BOERI, General Commissioner for Public Health

*Vice-Chairmen:* Mr W. H. BOUCHER, Assistant Secretary, Ministry of Health

Dr B. DOUBEK, Chief, Secretariat of the Ministry of Health

Ninth session, Bucharest, 8-11 September 1959

*Chairman:* Dr V. MARINESCO, Minister of Health and Social Welfare

*Vice-Chairmen:* Dr J. F. GOOSENS, Secretary-General, Ministry of Public Health and Family Welfare

Dr A. ENGEL, Director-General of Health, Royal Medical Board

Tenth session, Copenhagen, 16-20 August 1960

*Chairman:* Dr J. FRANSEN, Director-General of Health

*Vice-Chairmen:* Dr A. SAUTER, Director, Federal Public Health Service

Dr L. MOLITOR, Director of Public Health
Eleventh session, Luxembourg, 12-15 September 1961

Chairman: Dr L. Molitor, Director of Public Health
Vice-Chairmen: Mr J. le Poole, Director for International Health Affairs, Ministry of Social Affairs and Public Health
Professor F. Widy-Wirski, Deputy Minister of Health and Welfare

Twelfth session, Warsaw, 11-14 September 1962

Chairman: Dr J. Sztachelski, Minister of Health and Welfare
Vice-Chairmen: Dr A. Engel, Director-General, National Board of Health
Dr T. Alan, Director of External Relations, Ministry of Health and Welfare

Thirteenth session, Stockholm, 17-20 September 1963

Chairman: Dr A. Engel, Director-General, National Board of Health
Vice-Chairmen: Dr J. Plojhar, Minister of Health
Dr A. Khatib, Minister of Public Health

Fourteenth session, Prague, 22-26 September 1964

Chairman: Dr J. Plojhar, Minister of Health
Vice-Chairmen: Dr N. H. Fised, Under-Secretary of State, Ministry of Health and Social Welfare
Dr K. Schindl, Director-General of Public Health, Federal Ministry of Social Affairs

Fifteenth session, Istanbul, 7-11 September 1965

Chairman: Dr N. H. Fised, Under-Secretary of State, Ministry of Health and Social Welfare
Vice-Chairmen: Dr Sybilla Radeva, Deputy Minister of Public Health and Welfare
Dr A. Benyakhlef, Secretary-General, Ministry of Public Health

Sixteenth session, Rabat, 6-10 September 1966

Chairman: Dr L. Chraibi, Minister of Public Health
Vice-Chairmen: Dr J. C. Joyce, Chief Medical Officer, Department of Health
Dr J. H. W. Hoogwater, Director-General for International Affairs, Ministry of Social Affairs and Public Health
Seventeenth session, Dublin, 12-16 September 1967

Chairman: Dr J. C. JOYCE, Chief Medical Officer, Department of Health Ireland
Vice-Chairmen: Dr V. H. KALADŽIEV, Vice-Minister of Public Health Bulgaria
and Welfare
Professor R. VANNUGLI, Director, International Organizations Office, Ministry of Health Italy

REGIONAL COMMITTEE FOR THE EASTERN MEDITERRANEAN

Eighth session

SUB-COMMITTEE A, Baghdad, 12-18 October 1958

Chairman: Dr S. AL-WAHBI, Director, Karkh Hospital Iraq
Vice-Chairmen: Dr S. DAJANY, Deputy Director-General of Health Libya
Mr Y. TSEGHE, Adviser to the Ministry of Public Health Ethiopia

SUB-COMMITTEE B, Geneva, 22-25 September 1958

Chairman: Dr M. FARIS, Director-General of Public Health, Department of Public Health Iran
Vice-Chairman: Mr Y. TSEGHE, Adviser to the Ministry of Public Health Ethiopia

Ninth session

SUB-COMMITTEE A, Alexandria, 14-19 September 1959

Chairman: Dr M. O. SHOIB, Director, Division of International Health, Ministry of Public Health United Arab Republic
Vice-Chairmen: Dr M. SHARIF, Director-General of Health Pakistan
Dr H. NASSIF, Director-General, Ministry of Health Saudi Arabia

SUB-COMMITTEE B, Geneva, 28-30 September 1959

Chairman: Dr M. N. ETEMADIAN, Under-Secretary of State, Ministry of Health Iran
Vice-Chairman: Dr P. FAURE, Director of Public Health, French Somaliland France

Tenth session

SUB-COMMITTEE A, Tunis, 15-19 August 1960

Chairman: Dr A. R. FARAH, Chef du Service de la Prévention et de l'Hygiène publique Tunisia
Vice-Chairmen: Dr A. A. ZAKI, Director of Medical Services, Ministry of Health Sudan
Dr A. NABULSI, Director of the Government Laboratory; Director, International Medicine Section, Ministry of Health Jordan
Sub-Committee B, Geneva, 24-26 August 1960

Chairman: Dr S. SYMAN, Director-General, Ministry of Health
Vice-Chairman: Mr H. SEBSEBE, Director-General, Department of Education and Training, Ministry of Health

Eleventh session

Sub-Committee A, Chtaura, Lebanon, 28 August - 1 September 1961

Chairman: Dr J. ANOUTI, Director-General, Ministry of Health
Vice-Chairmen: Dr A. T. DIBA, Under-Secretary of State, Ministry of Health
            Dr J. SHAHEEN, Acting Director-General, Preventive Medicine, Ministry of Health

Sub-Committee B, Geneva, 21-22 August 1961

Chairman: Dr Z. G. PANOS, Chief Medical Officer, Ministry of Health
Vice-Chairman: Mr E. BORROU, Assistant Minister of Health, Ministry of Public Health

Twelfth session

Sub-Committee A, Riyad, 6-10 October 1962

Chairman: Dr A. A. EL MUDARRIS, Under-Secretary of State, Ministry of Public Health
Vice-Chairmen: Dr M. S. HAQUE, Joint Secretary and Director-General of Health, Ministry of Health, Labour and Social Welfare
              Dr G. JALLAD, Director-General of Health, Ministry of Health and Public Assistance

Sub-Committee B, Geneva, 19-21 September 1962

Chairman: Dr A. T. DIBA, Under-Secretary of State, Ministry of Health
Vice-Chairman: Dr P. DILL-RUSSELL, Deputy Chief Medical Officer, Department of Technical Co-operation

Thirteenth session

Sub-Committee A, Alexandria, 20-23 August 1963

Chairman: Dr A. F. EL BAKARI, Assistant Under-Secretary of State, Ministry of Public Health
Vice-Chairmen: Dr J. A. HAMDJI, Director of Endemic Diseases in the Directorate-General of Preventive Medicine, Ministry of Health
              Dr V. VASSILOPOULOS, Director-General, Ministry of Health
ANNEX 4

SUB-COMMITTEE B, Geneva, 28-29 August 1963
Chairman: Mr Y. Tseghe, Vice-Minister of Health, Ministry of Public Health
Vice-Chairman: Dr V. Vassilopoulos, Director-General, Ministry of Health

Fourteenth session

SUB-COMMITTEE A, Kuwait, 3-7 October 1964
Chairman: Dr Y. J. Hijji, Under-Secretary of State, Ministry of Public Health
Vice-Chairmen: Dr J. Anouti, Director-General, Ministry of Health
Dr A. M. Issa, Minister of Health, Labour and Veterinary Services

SUB-COMMITTEE B, Geneva, 22-23 September 1964
Chairman: Dr P. Dill-Russell, Deputy Medical Adviser, Department of Technical Co-operation
Vice-Chairman: Dr H. Morin, Director of Public Health, French Somaliland

Fifteenth session

SUB-COMMITTEE A, Addis Ababa, 20-23 September 1965
Chairman: Mr A. Retta, Minister of Public Health
Vice-Chairmen: Dr A. H. Samii, Under-Secretary of State, Ministry of Public Health
Dr M. A. W. Shoukry, Under-Secretary of State for Health, Ministry of Public Health

SUB-COMMITTEE B, Geneva, 2-3 September 1965
Chairman: Mr M. Agajyelew, Minister Plenipotentiary to the Holy See
Vice-Chairman: Dr H. Morin, Director of Public Health, French Somaliland

Sixteenth session

SUB-COMMITTEE A, Karachi, 19-23 September 1966
Chairman: Dr M. S. Haque, Joint Secretary and Director-General of Health
Vice-Chairmen: Mr H. B. Ismail, Minister of Health and Labour
Dr A. Abdulhadi, Under-Secretary of State, Ministry of Health

Chairman: Mr Y. Tseghe, Vice-Minister of Health, Ministry of Public Health
Vice-Chairman: Dr V. Vassilopoulos, Director-General, Ministry of Health

Fourteenth session

SUB-COMMITTEE A, Kuwait, 3-7 October 1964
Chairman: Dr Y. J. Hijji, Under-Secretary of State, Ministry of Public Health
Vice-Chairmen: Dr J. Anouti, Director-General, Ministry of Health
Dr A. M. Issa, Minister of Health, Labour and Veterinary Services

SUB-COMMITTEE B, Geneva, 22-23 September 1964
Chairman: Dr P. Dill-Russell, Deputy Medical Adviser, Department of Technical Co-operation
Vice-Chairman: Dr H. Morin, Director of Public Health, French Somaliland

Fifteenth session

SUB-COMMITTEE A, Addis Ababa, 20-23 September 1965
Chairman: Mr A. Retta, Minister of Public Health
Vice-Chairmen: Dr A. H. Samii, Under-Secretary of State, Ministry of Public Health
Dr M. A. W. Shoukry, Under-Secretary of State for Health, Ministry of Public Health

SUB-COMMITTEE B, Geneva, 2-3 September 1965
Chairman: Mr M. Agajyelew, Minister Plenipotentiary to the Holy See
Vice-Chairman: Dr H. Morin, Director of Public Health, French Somaliland

Sixteenth session

SUB-COMMITTEE A, Karachi, 19-23 September 1966
Chairman: Dr M. S. Haque, Joint Secretary and Director-General of Health
Vice-Chairmen: Mr H. B. Ismail, Minister of Health and Labour
Dr A. Abdulhadi, Under-Secretary of State, Ministry of Health

Chairman: Mr Y. Tseghe, Vice-Minister of Health, Ministry of Public Health
Vice-Chairman: Dr V. Vassilopoulos, Director-General, Ministry of Health

Fourteenth session

SUB-COMMITTEE A, Kuwait, 3-7 October 1964
Chairman: Dr Y. J. Hijji, Under-Secretary of State, Ministry of Public Health
Vice-Chairmen: Dr J. Anouti, Director-General, Ministry of Health
Dr A. M. Issa, Minister of Health, Labour and Veterinary Services

SUB-COMMITTEE B, Geneva, 22-23 September 1964
Chairman: Dr P. Dill-Russell, Deputy Medical Adviser, Department of Technical Co-operation
Vice-Chairman: Dr H. Morin, Director of Public Health, French Somaliland

Fifteenth session

SUB-COMMITTEE A, Addis Ababa, 20-23 September 1965
Chairman: Mr A. Retta, Minister of Public Health
Vice-Chairmen: Dr A. H. Samii, Under-Secretary of State, Ministry of Public Health
Dr M. A. W. Shoukry, Under-Secretary of State for Health, Ministry of Public Health

SUB-COMMITTEE B, Geneva, 2-3 September 1965
Chairman: Mr M. Agajyelew, Minister Plenipotentiary to the Holy See
Vice-Chairman: Dr H. Morin, Director of Public Health, French Somaliland

Sixteenth session

SUB-COMMITTEE A, Karachi, 19-23 September 1966
Chairman: Dr M. S. Haque, Joint Secretary and Director-General of Health
Vice-Chairmen: Mr H. B. Ismail, Minister of Health and Labour
Dr A. Abdulhadi, Under-Secretary of State, Ministry of Health
SUB-COMMITTEE B, Geneva, 30-31 August 1966

Chairman: Mr M. LENNUYEUX-COMNÈNE, First Secretary, Permanent Mission of France to the United Nations Office and to the Specialized Agencies at Geneva

Vice-Chairman: Dr P. DILL-RUSSELL, Deputy Medical Adviser, Ministry of Overseas Development

France

Seventeenth session

SUB-COMMITTEE A, Teheran, 25-30 September 1967

Chairman: Dr M. SHAHGHOLI, Minister of Health

Vice-Chairmen: Dr N. BERBIR, Minister of Public Health
Mr M. El HEDI KHAFACHA, Minister of Public Health

Iran

SUB-COMMITTEE B, Geneva, 9-10 October 1967

Chairman: Dr P. DILL-RUSSELL, Deputy Medical Adviser, Ministry of Overseas Development

Vice-Chairman: Mr A. ZELLEKE, Counsellor, Deputy Permanent Representative, Permanent Mission of Ethiopia to the United Nations Office at Geneva

United Kingdom of Great Britain and Northern Ireland

REGIONAL COMMITTEE FOR THE WESTERN PACIFIC

Ninth session, Manila, 26 September - 2 October 1958

Chairman: Dr H. E. DOWNES, Assistant Director-General of Health

Vice-Chairman: Dr R. OZAWA, Medical Affairs Bureau, Ministry of Health and Welfare

Australia

Tenth session, Taipei, 16-22 September 1959

Chairman: Dr C. K. CHANG, Director, Department of Health Administration, Ministry of the Interior

Vice-Chairman: Dr E. VALENCIA, Secretary of Health

China

Philippines

Eleventh session, Manila, 12-17 August 1960

Chairman: Dr R. K. C. LEE, Director of Health, Hawaii

Vice-Chairman: Dr TEN YOON FONG, Deputy Director of Medical Services (Medical)

United States of America

Federation of Malaya

Twelfth session, Wellington, 31 August - 5 September 1961

Chairman: Dr H. B. TURBOTT, Director-General of Health

Vice-Chairman: Dr E. VALENCIA, Secretary of Health

New Zealand

Philippines
ANNEX 4

Thirteenth session, Manila, 20-25 September 1962
Chairman: Dr F. Q. DuQUE, Secretary of Health
Philippines
Vice-Chairman: Dr D. J. M. Mackenzie, Director of Medical and Health Services, Hong Kong
United Kingdom of Great Britain and Northern Ireland

Fourteenth session, Port Moresby, Papua, 5-10 September 1963
Chairman: Dr R. F. R. Scragg, Director of Public Health, Territory of Papua and New Guinea
Australia
Vice-Chairman: Dr J. C. Thieme, Director of Health
Western Samoa

Fifteenth session, Manila, 17-22 September 1964
Chairman: Dr L. W. Jayesuria, Deputy Director of Medical and Health Services, Malaya
Malaysia
Vice-Chairman: Dr D. P. Kennedy, Director, Division of Public Health, Department of Health
New Zealand

Sixteenth session, Seoul, 16-21 September 1965
Chairman: Dr Youn Keun Cha, Director, Bureau of Public Health, Ministry of Health and Social Affairs
Republic of Korea
Vice-Chairman: Dr H. E. Downes, Deputy Director-General of Health
Australia

Seventeenth session, Manila, 21-27 September 1966
Chairman: Dr Thor Peng Thong, Director-General of Public Health
Cambodia
Vice-Chairman: Dr S. R. Sayampathan, Senior Health Officer, Ministry of Health
Singapore

Eighteenth session, Taipei, 13-19 September 1967
Chairman: Dr C. K. Chang, Director, Department of Health Administration, Ministry of the Interior
China
Vice-Chairman: Dr R. K. C. Lee, Dean, School of Public Health, University of Hawaii
United States of America
Annex 5

ADVISORY COMMITTEE ON MEDICAL RESEARCH, 1959-1967

The Advisory Committee on Medical Research was established by the Twelfth World Health Assembly in May 1959 (resolution WHA12.17) "in order to provide the Director-General with the necessary scientific advice in relation to the research programme".

During the period 1959-1967, the following sessions were held, all in Geneva:

- First session 7-16 October 1959
- Second session 20-24 June 1960
- Third session 26-30 June 1961
- Fourth session 25-29 June 1962
- Fifth session 24-28 June 1963
- Sixth session 8-12 June 1964
- Seventh session 21-25 June 1965
- Eighth session 20-24 June 1966
- Ninth session 19-23 June 1967

The members of the Committee who attended the sessions were as follows: ¹

**Chairmen**

Dr A. J. WALLGREN, Emeritus Professor of Paediatrics, Karolinska Institute, Stockholm, Sweden

Dr R. COURRIER, Professor at the Collège de France; Member of the Institut de France; Permanent Secretary of the Academy of Sciences; Member of the Academy of Medicine, Paris, France

**Members**

Professor S. ADLER,* Professor of Parasitology, Hebrew University, Hadassah Medical School, Jerusalem, Israel

Professor C. H. BEST, Charles H. Best Institute, University of Toronto, Ont., Canada

Dr O. BIER, Professor of Microbiology, Department of Microbiology and Immunology, School of Medicine, São Paulo, Brazil (*Vice-Chairman, eighth session*)

Professor A. BIERNACKI,* Member of the Polish Academy of Sciences; Director, First Medical Clinic, Medical Academy, Warsaw, Poland

Professor N. N. BLOHIN, President, Academy of Medical Sciences of the USSR; Director, Institute of Experimental and Clinical Oncology, Moscow, Union of Soviet Socialist Republics (*Vice-Chairman, sixth session*)

Professor D. BOVET, Director, Department of Therapeutic Chemistry, Istituto Superiore di Sanità, Rome, Italy (*first term*)

¹ The titles shown are as at date of appointment.

* Deceased during term of office.
ANNEX 5

Sessions attended

Professor D. BOVET, Director, Institute of Pharmacology, University of Sassari, Sardinia, Italy (second term) 9

Sir Austin BRADFORD HILL, Director, Department of Medical Statistics and Epidemiology, London School of Hygiene and Tropical Medicine, London, England 2, 4

Professor L. BUGNARD, Member of the Academy of Medicine; Director, National Institute of Health, Paris, France 1, 2, 3, 4

Sir Macfarlane BURNET, Director, The Walter and Eliza Hall Institute for Medical Research, Melbourne, Australia (Vice-Chairman, fifth session) 2, 3, 4, 5

Professor C. CHAGAS, Director, Institute of Biophysics, University of Brazil, Rio de Janeiro, Brazil 1, 3, 4

Professor J. CHARVAT, Director, Third Department of Medicine, Charles University, Prague, Czechoslovakia (Vice-Chairman, first session) 1, 2, 3

Professor H. CHIARI, Director, Institute of Pathological Anatomy, University of Vienna, Austria 1, 2, 3

Professor I. T. COSTERO, Director, Department of Pathological Anatomy, National Institute of Cardiology, Mexico City, Mexico 8, 9

Dr W. R. S. DOLL, Director, Statistical Research Unit, Medical Research Council, London, England 5, 6, 7, 8

Sir John ECCLES, Director, Institute for Biomedical Research, Chicago, Ill., United States of America 9

Dr J. C. EDOZIEN, Professor of Chemical Pathology, University of Ibadan, Nigeria 8, 9

Professor Zinaida ERMOL'eva, Professor of Medical Microbiology, Central Institute for the Further Training of Physicians, Moscow, Union of Soviet Socialist Republics 1, 2, 3

Dr M. FLORKIN, Professor of Biochemistry, University of Liège, Belgium 8, 9

Dr B. N. HALPERN, Professor at the Collège de France; Member of the Institut de France, Paris, France 6, 7, 8, 9

Professor H. HAMPERL, Director, Institute of Pathology, University of Bonn, Federal Republic of Germany 4, 5, 6, 7

Professor C. HEYMANS, Director, Institute of Pharmacology and Therapeutics, National University, Ghent, Belgium 1, 2, 3, 4

Sir Harold HIMSWORTH, Secretary, Medical Research Council, London, England (Vice-Chairman, third session) 1, 2, 3, 5

Professor B. A. HOUSSAY, Director, Institute of Biology and Experimental Medicine, Buenos Aires, Argentina (Vice-Chairman, seventh session) 4, 5, 6, 7

Professor N. K. JERNE, Director, Paul-Ehrlich Institute, Frankfurt-am-Main, Federal Republic of Germany 6, 7, 8, 9

Professor V. R. KHANOLKAR, Director, Indian Cancer Research Centre, Bombay, India (Vice-Chairman, second session) 2, 3, 4, 5

Professor W. KURYLOWICZ, Director, State Institute of Hygiene, Warsaw, Poland 9
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Professor A. Lacassagne, Member of the Institut de France; Emeritus Professor, Collège de France; Director of Research Laboratory, University of Paris, France

Sir Aubrey Lewis, Professor of Psychiatry, University of London, England

Dr Robert F. Loeb, Emeritus Bard Professor of Medicine, Columbia University, New York, United States of America (Vice-Chairman, fourth session)

Dr W. Löffler, Emeritus Professor of Medicine, University of Zurich, Switzerland

Sir Samuel Manuwa, Federal Public Service Commission, Lagos, Nigeria

Professor S. R. Mardashev, Vice-President, Academy of Medical Sciences of the USSR; Chair of Biochemistry, First Medical Institute, Moscov, Union of Soviet Socialist Republics (Vice-Chairman, ninth session)

Dr W. McDermott, Livingstone Farrand Professor of Public Health and Preventive Medicine, Cornell University Medical College, New York, United States of America

Professor Ch. M. H. Moffidi, Dean, School of Public Health; Director, Institute of Public Health Research, Teheran, Iran

Dr C. Puranandananda, Director, Queen Saovabha Memorial Institute, Bangkok, Thailand

Professor B. Rexed, Science Advisory Council, Stockholm, Sweden

Professor M. Roche, Director, Venezuelan Institute of Scientific Research, Caracas, Venezuela

Sir Max Rosenheim, President, Royal College of Physicians, London, England

Professor I. Ruzsnyak, President of the Hungarian Academy of Sciences; Director of the Academy's Central Institute of Medical Research, Budapest, Hungary

Professor P. G. Sergiev, Vice-President, Academy of Medical Sciences of the USSR; Director, Institute of Medical Parasitology and Tropical Medicine, Moscov, Union of Soviet Socialist Republics

Dr J. A. Shannon, Director, National Institutes of Health, Bethesda, Md., United States of America

Professor A. Vartiainen, Department of Pharmacology, University of Helsinki, Finland

Professor T. H. Weller, Richard Pearson Strong Professor of Tropical Public Health, and Chairman, Department of Tropical Public Health, Harvard University, Boston, Mass., United States of America

Dr A. Wolman, Emeritus Professor of Sanitary Engineering and Water Resources, Johns Hopkins University, Baltimore, Md., United States of America

Dr W. Barry Wood, Jr, Director, Department of Microbiology, Johns Hopkins University School of Medicine, Baltimore, Md., United States of America

Professor V. M. Ždanov, Director, Ivanovskij Institute of Virology, Academy of Medical Sciences of the USSR, Moscow, Union of Soviet Socialist Republics

Sessions attended

1, 2, 3
6, 7, 8, 9
1, 2, 3
6, 7, 8, 9
6, 7, 8, 9
6, 7, 8, 9
6, 7, 8, 9
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1, 2, 3, 4, 5
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8, 9
Annex 6

EXPERT ADVISORY PANELS

During the ten years 1958-1967 additional expert advisory panels were established on air pollution, bacterial diseases, the biology of human reproduction, cardiovascular diseases, food additives, food hygiene, the health of seafarers, human genetics and immunology. Conversely, some of the earlier panels were merged into larger ones. From the panels, which consist of leading specialists in many countries, are drawn the members of expert committees. The Director-General can also obtain technical advice from them by correspondence.

At the end of 1967 there were forty-two panels comprising some 2500 members from ninety countries. The panels are as follows:

- Air pollution
- Antibiotics
- Bacterial diseases ¹
- Biological standardization
- Biology of human reproduction
- Brucellosis
- Cancer
- Cardiovascular diseases
- Chronic degenerative diseases
- Dental health
- Drug dependence
- Environmental health
- Food additives
- Food hygiene
- Health education
- Health laboratory services
- Health of seafarers
- Health statistics
- Human genetics
- Immunology
- Insecticides
- International pharmacopoeia and pharmaceutical preparations
- International quarantine
- Leprosy
- Malaria
- Maternal and child health
- Mental health
- Nursing
- Nutrition
- Occupational health
- Organization of medical care
- Parasitic diseases
- Professional and technical education of medical and auxiliary personnel
- Public health administration
- Rabies
- Radiation
- Rehabilitation
- Trachoma
- Tuberculosis
- Venereal infections and treponematoses
- Virus diseases ²
- Zoonoses

¹ Incorporating the former panels for cholera, enteric diseases and plague.
² Incorporating the former yellow fever panel.
Annex 7

EXPERT COMMITTEES, SCIENTIFIC GROUPS
AND SIMILAR MEETINGS, 1958-1967

Air Pollution

1963 Atmospheric Pollutants — Expert Committee, Geneva, 15-21 October
1965 Identification and Measurement of Air Pollutants — Scientific Group, Geneva, 16-22 November

Antibiotics

1959 Antibiotics Research — Scientific Group, Geneva, 26-30 May
Establishment of a Centre for Antibiotics and for Micro-organisms producing them —
Scientific Group, Geneva, 18-22 July

Bacterial Diseases

Diarrhoeal Diseases — Study Group, Geneva, 18-24 November
1962 Cholera Research — Scientific Group, Geneva, 2-6 April
1963 Enteric Infections — Expert Committee, Geneva, 12-16 November
1964 Cholera Research — Scientific Group, Manila, 2-6 November
1966 Cholera — Expert Committee, Manila, 13-19 September
1967 Coccal Infections — Expert Committee, Geneva, 21-27 November

Biological Standardization

1958 Requirements for Biological Substances: General Requirements for Manufacturing Establishments and Control Laboratories; Requirements for Poliomyelitis Vaccine (Inactivated) — Study Group, Geneva, 2-7 June
Requirements for Biological Substances: Requirements for Yellow Fever Vaccine; Requirements for Cholera Vaccine — Study Group, Geneva, 1-6 September
Expert Committee, Geneva, 22-27 September
Requirements for Biological Substances: Requirements for Smallpox Vaccine — Study Group, Geneva, 3-8 November

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1 For convenience of presentation, these meetings have been grouped under the titles of the expert advisory panels (see Annex 6), even though the participants in some of the meetings were not drawn from those panels.

2 Leprosy and tuberculosis are shown under separate headings. For gonococcal infections, see under Venereal Infections and Treponematoses.

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1959 Requirements for Biological Substances: General Requirements for the Sterility of Biological Substances — Study Group, Geneva, 20-25 April
Expert Committee, Geneva, 31 August - 5 September
1960 Requirements for Biological Substances: Requirements for Poliomyelitis Vaccine (Oral) — Study Group, Geneva, 7-12 November
Expert Committee, Geneva, 26 September - 1 October
1962 Expert Committee, Geneva, 10-15 December
1963 Expert Committee, Geneva, 30 September - 5 October
1964 Expert Committee, Geneva, 28 September - 3 October
1965 Requirements for Biological Substances: Manufacturing Establishments and Control Laboratories; Poliomyelitis Vaccine (Inactivated); Poliomyelitis Vaccine (Oral), Smallpox Vaccine (Revised 1965) — Expert Group, Geneva, 16-22 March
Expert Committee, Geneva, 27 September - 2 October
1966 Expert Committee, Geneva, 28 November - 3 December
1967 Expert Committee, Geneva, 25-30 September

**Biology of Human Reproduction**

The Physiology of Lactation — Scientific Group, Geneva, 2-7 December
1964 The Effects of Labour on the Foetus and the Newborn — Scientific Group, Geneva, 12-18 May
Neuroendocrinology and Reproduction in the Human — Scientific Group, Geneva, 8-14 September
Mechanism of Action of Sex Hormones and Analogous Substances — Scientific Group, Geneva, 8-14 December
1965 The Biochemistry and Microbiology of the Female and Male Genital Tracts — Scientific Group, Geneva, 20-26 April
Immunological Aspects of Human Reproduction — Scientific Group, Geneva, 4-9 October
The Chemistry and Physiology of the Gametes — Scientific Group, Geneva, 2-8 November
Clinical Aspects of Oral Gestogens — Scientific Group, Geneva, 30 November - 6 December
1966 The Basic and Clinical Aspects of Intra-uterine Devices — Scientific Group, Geneva, 7-12 February
Biology of Fertility Control by Periodic Abstinence — Scientific Group, Geneva, 31 May - 6 June
Basic and Clinical Aspects of Intra-uterine Devices — Scientific Group, Geneva, 5-11 December

**Brucellosis**

1959 *Brucella* Vaccine Trials in Man — Scientific Group, Geneva, 8-10 December
1963 Expert Committee (FAO/WHO), Geneva, 3-9 December
Cancer
1958 Histopathology of Lung Tumours — Expert Committee, Oslo, 17-22 November
Histopathology of Soft Tissue Tumours — Expert Committee, Geneva, 22-27 June
Epidemiology of Cancer of the Lung — Study Group, Geneva, 16-20 November
Research in Leukaemias and Other Neoplastic Conditions of the Haematopoietic Cells — Scientific Group, Geneva, 12-18 December
1962 Cancer Control — Expert Committee, Geneva, 12-17 November
1963 Histopathological Nomenclature and Classification of Ovarian Tumours — Scientific Group, Geneva, 4-8 February
Histopathological Nomenclature and Classification of Bone Tumours — Scientific Group, Geneva, 20-26 August
1964 Viruses and Cancer — Scientific Group, Geneva, 12-16 October
1965 Cancer Treatment — Expert Committee, Geneva, 9-15 March
Histopathological Nomenclature and Classification of Skin Tumours — Scientific Group, Geneva, 18-23 October
Histopathological Nomenclature and Classification of Urinary Bladder Tumours — Scientific Group, Geneva, 6-11 December
1966 Immunotherapy of Cancer — Scientific Group, Geneva, 30 May - 4 June

Cardiovascular Diseases
1958 Hypertension and Coronary Heart Disease: Classification and Criteria for Epidemiological Studies — Expert Committee, Geneva, 13-18 October
1959 Cardiovascular Diseases — Scientific Group, Geneva, 16-18 March
1960 Cardiovascular Diseases of Animals — Scientific Group on Research in Comparative Medicine, Geneva, 3-8 October
Chronic Cor Pulmonale — Expert Committee, Geneva, 10-15 October
1961 Arterial Hypertension and Ischaemic Heart Disease: Preventive Aspects — Expert Committee, Geneva, 16-23 October
Comparable Methodology for the Epidemiological Study of Hypertension and Ischaemic Heart Disease — Scientific Group, Geneva, 5-11 December
1963 Rehabilitation of Patients with Cardiovascular Diseases — Expert Committee, Geneva, 23-29 July
1965 Cardiovascular Research Programme — Scientific Group, Geneva, 1-6 November

Chronic Degenerative Diseases
1964 Diabetes Mellitus — Expert Committee, Geneva, 24-30 November
1966 The Diffuse Connective Tissue Diseases — Scientific Group, Geneva, 27 June - 2 July
Dental Health

1958 Auxiliary Dental Personnel — Expert Committee, Geneva, 30 June - 6 July
1961 Standardization of Reporting of Dental Diseases and Conditions — Expert Committee, Geneva, 14-20 November
1962 Dental Education — Expert Committee, Geneva, 31 July - 6 August
1964 Organization of Dental Public Health Services — Expert Committee, Geneva, 13-19 October
1965 Research in Dental Health — Scientific Group, Geneva, 29 March - 2 April

Drug Dependence

1958 Addiction-Producing Drugs — Expert Committee, Geneva, 6-11 October
1959 Addiction-Producing Drugs — Expert Committee, Geneva, 19-24 October
1960 Addiction-Producing Drugs — Expert Committee, Geneva, 10-15 October
1961 Addiction-Producing Drugs — Expert Committee, Geneva, 21-27 November
Evaluation of Dependence-Producing Drugs — Scientific Group, Geneva, 9-14 December
1965 Dependence-Producing Drugs — Expert Committee, Geneva, 19-24 July
1966 Dependence-Producing Drugs — Expert Committee, Geneva, 4-9 July
Services for the Prevention and Treatment of Dependence on Alcohol and Other Drugs — Expert Committee, Geneva, 4-10 October

Environmental Health 1

1958 Hygiene and Sanitation in Aviation — Expert Committee, Geneva, 10-15 March
1961 Public Health Aspects of Housing — Expert Committee, Geneva, 19-26 June
Medicine and Public Health in the Arctic and Antarctic — Conference, Geneva, 28 August - 1 September
1964 Biological Estimation of Water Pollution Levels — Scientific Group, Geneva, 1-5 June
Biological Aspects of Microchemical Pollution of Water Systems — Scientific Group, Geneva, 8-12 June
Environmental Health Aspects of Metropolitan Planning and Development — Expert Committee, Geneva, 23-29 June
Research into Environmental Pollution — Scientific Group, Geneva, 20-25 July
Environmental Change and Resulting Impacts on Health — Expert Committee, Geneva, 11-17 August
Long-term Effects on Health of New Pollutants — Scientific Group, Geneva, 10-16 November
1965 Water Pollution Control — Expert Committee, Geneva, 6-12 April

1 See also Air Pollution.
       Treatment and Disposal of Wastes — Scientific Group, Geneva, 6-12 December
1967  The Education of Engineers in Environmental Health — Expert Committee, Geneva, 4-10 July
       Water Pollution Control — Expert Committee, Geneva, 12-18 December

**Food Additives**

1958  Expert Committee (FAO/WHO), Rome, 1-8 December
1959  Specifications for Identity and Purity of a Selected Group of Food Colours — Expert Committee (FAO/WHO), Rome, 30 November - 7 December
1960  Methods of Evaluation of the Carcinogenicity of Food — Scientific Group, Geneva, 15-19 February
       Evaluation of the Carcinogenic Hazards of Food Additives — Expert Committee (FAO/WHO), Geneva, 12-19 December
1961  Evaluation of the Toxicity of a Number of Antimicrobials and Antioxidants — Expert Committee (FAO/WHO), Geneva, 5-12 June
       Principles governing Consumer Safety in relation to Pesticide Residues — Expert Committee (FAO/WHO), Rome, 9-16 October
1962  The Public Health Aspects of the Use of Antibiotics in Food and Feedstuffs — Expert Committee, Geneva, 11-17 December
       Food Additives — Second Conference (FAO/WHO), Rome, 24-25 June
       Evaluation of the Toxicity of Pesticide Residues in Food — Expert Committee (FAO/WHO), Geneva, 30 September - 7 October
1964  Specifications for the Identity and Purity of Food Additives and their Toxicological Evaluation: Food Colours and some Antimicrobials and Antioxidants — Expert Committee (FAO/WHO), Geneva, 8-17 December
       Specifications for the Identity and Purity of Food Additives and their Toxicological Evaluation: Some Emulsifiers and Stabilizers and certain other Substances — Expert Committee (FAO/WHO), Geneva, 11-18 October
       Pesticide Residues in Food — Expert Committee (FAO/WHO), Geneva, 14-24 November
Pesticide Residues — Expert Committee (FAO/WHO), Rome, 4-11 December

Food Hygiene

1959 Food-borne Infections and Intoxications — Technical Conference, Geneva, 16-21 February
Milk Hygiene — Expert Committee (FAO/WHO), Rome, 1-8 December
1961 Meat Hygiene — Expert Committee (FAO/WHO), Rome, 18-25 September
1964 The Technical Basis for Legislation on Irradiated Food — Expert Committee (FAO/IAEA/WHO), Rome, 21-28 April
1967 Microbiological Aspects of Food Hygiene — Expert Committee, with the participation of FAO, Geneva, 10-16 October

Health Education

1959 Teacher Preparation for Health Education — Expert Committee (UNESCO/WHO), Geneva, 2-7 November
1962 Post-graduate Preparation of Health Workers for Health Education — Conference, Philadelphia, 8-17 July
1967 Planning and Evaluation of Health Education Services — Expert Committee, Geneva, 28 November - 4 December

Health Laboratory Services

1958 Hospital Laboratory Services — Expert Committee, Geneva, 27 October - 1 November
1961 Planning, Organization and Administration of a National Health Laboratory Service — Expert Committee, Geneva, 6-13 November
1965 Training of Laboratory Personnel (Technical Staff) — Expert Committee, Geneva, 7-13 December

Health of Seafarers

1961 Hygiene of Seafarers — Joint Committee (ILO/WHO), Geneva, 1-4 May
1965 Joint Committee (ILO/WHO), Geneva, 1-5 March

Health Statistics

1958 Expert Committee, Geneva, 29 September - 4 October
1960 Expert Committee, Geneva, 5-10 December
1962 Expert Committee, Geneva, 27 November - 3 December

**Human Genetics**

1959 New Methods for Research in Human Genetics — Scientific Group, Geneva, 19-20 May
1961 The Teaching of Genetics in the Undergraduate Medical Curriculum and in Postgraduate Training — Expert Committee, Geneva, 28 November - 4 December
1962 The Human Diploid Cell — Scientific Group, Geneva, 16-18 July
Research in Population Genetics of Primitive Groups — Scientific Group, Geneva, 27 November - 3 December
1963 Human Genetics and Public Health — Expert Committee, Geneva, 10-16 December
1965 Haemoglobinopathies and Allied Disorders — Scientific Group, Geneva, 14-20 December
Standardization of Procedures for the Study of Glucose-6-Phosphate Dehydrogenase — Scientific Group, Geneva, 5-10 December
1967 Genetics of the Immune Response — Scientific Group, Geneva, 2-7 October
Inborn Errors of Metabolism — Scientific Group, Geneva, 20-26 November

**Immunology**

1958 Immunological and Haematological Surveys — Study Group, Geneva, 15-19 December
1959 Control of Infectious Diseases through Vaccination Programmes — Technical Conference, Rabat, 23-31 October
1962 Immunoprophylaxis and Immunotherapy — Scientific Group, Geneva, 22-27 January
Immunopathology — Scientific Group, Geneva, 12-17 March
Tissue Antigens and Transplantation — Scientific Group, Geneva, 9-14 April
Imunochemistry — Scientific Group, Geneva, 7-12 May
Research Programme in Immunology — Scientific Group, Geneva, 4-9 June
1963 Research Programme in Immunology — Scientific Group, Geneva, 26-30 November
1964 Nomenclature of Human Immunoglobulins — Study Group, Prague, 29-30 May
Immunology and Parasitic Diseases — Expert Committee, Ibadan, 8-15 December
1965 Genes, Genotypes and Allotypes of Immunoglobulins — Scientific Group, Geneva, 31 May - 5 June
The Use of Human Immunoglobulins — Expert Committee, Geneva, 7-13 September
1966 Teaching of Immunology in the Medical Curriculum — Expert Committee, Geneva, 3-8 October
Insecticides (Vector Biology and Control) ¹

1959 Research on Insecticide Resistance and Vector Control — Scientific Group, Geneva, 5-9 January
Insecticide Resistance and Vector Control — Expert Committee, Geneva, 14-19 September
Research on the Evaluation and Testing of Insecticides — Scientific Group, Geneva, 30 November - 4 December
1961 Insect Biochemical and Physiological Research — Scientific Group, Geneva, 25-29 September
Toxic Hazards of Pesticides to Man — Expert Committee, Geneva, 23-30 October
1963 The Genetics of Vectors and Insecticide Resistance — Scientific Group, Geneva, 5-9 August
Application and Dispersal of Pesticides — Expert Committee, Geneva, 19-25 November
1964 Insecticide Resistance and Vector Control — Scientific Group, Geneva, 30 June - 4 July
Mosquito Ecology — Scientific Group, Geneva, 31 October - 5 November
1967 Cytogenetics of Vectors of Diseases of Man — Scientific Group, Geneva, 31 October - 6 November

International Pharmacopoeia and Pharmaceutical Preparations

1958 Non-proprietary Names — Sub-Committee of the Expert Committee on the International Pharmacopoeia, Geneva, 29 September - 1 October
International Pharmacopoeia — Expert Committee, Geneva, 10-15 November
1959 Non-proprietary Names — Sub-Committee, Geneva, 5-7 October
Specifications for Pharmaceutical Preparations — Expert Committee, Geneva, 9-14 November
1960 Non-proprietary Names — Sub-Committee, Geneva, 13-16 September
Specifications for Pharmaceutical Preparations — Expert Committee, Geneva, 5-9 December
1961 The Quality Control of Pharmaceutical Preparations — Technical Meeting, Warsaw, 29 May - 2 June
Non-proprietary Names — Sub-Committee, Geneva, 8-11 November
Specifications for Pharmaceutical Preparations — Expert Committee, Geneva, 27 November - 1 December

¹ See also Parasitic Diseases.
1962 Non-proprietary Names — Sub-Committee, Geneva, 31 October - 3 November
Specifications for Pharmaceutical Preparations — Expert Committee, Geneva, 19-23 November

1963 Evaluation of the Safety and Efficacy of Drugs — Scientific Group, Geneva, 4-8 March
Non-proprietary Names — Sub-Committee, Geneva, 5-8 November

1964 Specifications for Pharmaceutical Preparations — Expert Committee, Geneva, 3-9 November
Monitoring of Adverse Drug Reactions — Scientific Group, Geneva, 23-28 November
Non-proprietary Names — Sub-Committee, Geneva, 1-4 December

Non-proprietary Names — Sub-Committee, Geneva, 2-5 November
International Drug Monitoring — Scientific Group, Geneva, 15-20 November

1966 Principles for Pre-clinical Testing of Drug Safety — Scientific Group, Geneva, 21-26 March
Non-proprietary Names — Sub-Committee, Geneva, 6-9 September
Principles for the Testing of Drugs for Teratogenicity — Scientific Group, Geneva, 14-19 November

1967 Non-proprietary Names for Pharmaceutical Preparations — Expert Committee, Geneva, 26-28 April
Principles for the Clinical Evaluation of Drugs — Scientific Group, Geneva, 13-18 November

Leprosy

1959 Leprosy Research — Scientific Group, Geneva, 16-20 February
Expert Committee, Geneva, 3-8 August

1961 Rehabilitation in Leprosy — Scientific Meeting, Vellore, Madras, 21-29 November

1965 Expert Committee, Geneva, 27 July - 2 August

Malaria

1958 Expert Committee, Lisbon, 15-23 September

1959 Malaria Research — Scientific Group, Geneva, 23-27 November

Chemotherapy of Malaria — Technical Meeting, Geneva, 14-19 November

1962 Expert Committee, Geneva, 2-10 April

1963 Expert Committee, Rio de Janeiro, 12-19 September

1964 Expert Committee, Geneva, 16-22 June
Resistance of Malaria to Drugs — Scientific Group, Geneva, 13-20 October

1965 Expert Committee, Geneva, 21-27 September

1966 Expert Committee, Geneva, 13-19 September
1967 Chemotherapy of Malaria — Scientific Group, Geneva, 25 April - 1 May
Expert Committee, Geneva, 12-18 September
Immunology of Malaria — Scientific Group, Geneva, 20-26 September

Maternal and Child Health

1962 The Care of Well Children in Day-Care Centres and Institutions — Expert Committee
(UN/WHO, with the participation of FAO, ILO and UNICEF), Geneva, 23 October - 1 November
1964 The Health Problems of Adolescence — Expert Committee, Geneva, 3-9 November
1965 The Midwife in Maternity Care — Expert Committee, Geneva, 19-25 October
1967 Paediatric Research — Scientific Group, Geneva, 28 November - 4 December

Mental Health

1958 Mental Health Problems of Aging and the Aged — Expert Committee, Geneva, 1-6 September
Mental Health Problems of Automation — Study Group, Geneva, 10-15 November
1959 Epidemiology of Mental Disorders — Expert Committee, Geneva, 8-13 June
1960 The Undergraduate Teaching of Psychiatry and Mental Health Promotion — Expert Committee, Geneva, 13-17 June
Programme Development in the Mental Health Field — Expert Committee, Geneva, 3-8 October
1961 The Role of Public Health Officers and General Practitioners in Mental Health Care
— Expert Committee, Geneva, 31 October - 7 November
1963 Psychosomatic Disorders — Expert Committee, Geneva, 22-28 October
1964 Mental Health Research — Scientific Group, Geneva, 6-10 April
1965 Research on Genetics in Psychiatry — Scientific Group, Geneva, 8-13 November
1966 Research in Psychopharmacology — Scientific Group, Geneva, 5-10 December
1967 Neurophysiological and Behavioural Research in Psychiatry — Scientific Group, Geneva, 4-9 September
Organization of Services for the Mentally Retarded — Expert Committee, Geneva, 26 September - 2 October
Nursing

1958 Public Health Nursing — Expert Committee, Geneva, 6-11 October
1959 Post-basic Nursing Education Programmes for Foreign Students — Conference, Geneva, 5-14 October
1963 Nursing Research — Scientific Group, Geneva, 4-8 November
1966 Expert Committee, Geneva, 26 April - 2 May

Nutrition

1958 Iron Deficiency Anaemia — Study Group, Geneva, 29 September - 4 October
Vo Deficiency Anaemia — Scientific Group, Geneva, 6-7 October
1960 Nutrition Research — Scientific Group, New York, 5-6 March
1961 Expert Committee (FAO/WHO), Geneva, 18-25 April
Calcium Requirements — Expert Group (FAO/WHO), Rome, 23-30 May
Medical Assessment of Nutritional Status — Expert Committee, Geneva, 21-27 August
1963 Research in Nutritional Anaemias — Scientific Group, Geneva, 2-7 September
Protein Requirements — Expert Group (FAO/WHO), Geneva, 8-17 October
1964 Nutrition in Pregnancy and Lactation — Expert Committee, Geneva, 6-12 October
Requirements of Vitamin A, Thiamine, Riboflavine and Niacin — Expert Group (FAO/WHO), Rome, 6-17 September
1966 Expert Committee (FAO/WHO), Rome, 12-20 December

Occupational Health ¹

1962 Occupational Health Problems in Agriculture — Joint Committee (ILO/WHO), Geneva, 9-16 April
1966 Joint Committee (ILO/WHO), Geneva, 29 August - 6 September
1967 Health Factors involved in Working under Conditions of Physical Stress — Scientific Group, Geneva, 29 August - 4 September

Organization of Medical Care ²

1959 Role of Hospitals in Ambulatory and Domiciliary Medical Care — Expert Committee, Geneva, 16-21 March

¹ See also Health of Seafarers.
² See also Public Health Administration.
1963 General Practice — Expert Committee, Geneva, 2-8 July
1967 Hospital Administration — Expert Committee, Geneva, 3-9 October

Parasitic Diseases

1959 Research in Bilharziasis (Molluscicides) — Scientific Group, Geneva, 9-13 February
Ophthalmological Aspects of Onchocerciasis — Scientific Group, Geneva, 24-29 August
Research in Bilharziasis (Chemotherapy) — Scientific Group, Geneva, 19-24 October
Filaria and Non-ophthalmological Aspects of Onchocerciasis — Scientific Group, Geneva, 16-21 November

1960 Chagas' Disease — Study Group, Washington, D.C., 7-11 March
Bilharziasis — Conference (CCTA/WHO), Lourenço Marques, 30 March - 8 April
Research in Bilharziasis (Assessment of Medical and Public Health Importance) — Scientific Group, Geneva, 18-22 July
Bilharziasis (Molluscicides) — Expert Committee, Geneva, 26 September - 1 October

1961 Filaria (Wuchereria and Brugia Infections) — Expert Committee, Geneva, 25 July - 1 August
Research in Bilharziasis (Immunological Diagnosis) — Scientific Group, Geneva, 7-12 August
Ancylostomiasis — Conference (CCTA/WHO), Brazzaville, 22-29 August

1962 Trypanosomiasis — Expert Committee, Geneva, 18-23 June
Research in Bilharziasis (Pathobiology and Immunity) — Scientific Group, Geneva, 11-17 December

1963 Soil-Transmitted Helminths — Expert Committee, Rio de Janeiro, 26-31 August

1964 Chemotherapy of Bilharziasis — Scientific Group, Geneva, 14-18 September
Bilharziasis — Expert Committee, Geneva, 28 September - 3 October

1965 Onchocerciasis — Expert Committee, Geneva, 29 June - 5 July
Measurement of the Public Health Importance of Bilharziasis — Scientific Group, Geneva, 9-14 August

Epidemiology and Control of Schistosomiasis — Expert Committee, Geneva, 12-17 December

Control of Ascariasis — Expert Committee, Geneva, 26 June - 1 July

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1 Malaria is shown under a separate heading.
Professional and Technical Education of Medical and Auxiliary Personnel

1958 The Foreign Student and Post-graduate Public Health Courses — Expert Committee, Geneva, 7-12 July
Preventive Aspects in the Teaching of Pathology — Expert Committee, Geneva, 27 October - 1 November

1959 Appraisal of Fellowships — Study Group, Geneva, 6-10 July

The Use and Training of Auxiliary Personnel in Medicine, Nursing, Midwifery and Sanitation — Expert Committee, Geneva, 19-23 September
Recommended Requirements for Schools of Public Health — Expert Committee, Geneva, 12-16 December

1961 Internationally Acceptable Minimum Standards of Medical Education — Study Group, Geneva, 4-8 December

1962 Training of the Physician for Family Practice — Expert Committee, Geneva, 4-10 December


1964 Teaching of Sciences in Pre-medical Courses of Study — Expert Committee, Geneva, 10-16 November
Special Courses for National Staff with Higher Administrative Responsibilities — Study Group, Geneva, 1-7 December

1965 University Health Services — Expert Committee, Geneva, 27 April - 1 May
Training and Preparation of Teachers for Medical Schools with special regard to the Needs of Developing Countries — Expert Committee, Geneva, 30 November - 6 December

1966 The Use of Health Service Facilities in Medical Education — Expert Committee, Geneva, 26 July - 1 August
Conference of Directors of Schools of Public Health, Geneva, 29 August - 2 September

1967 Training of Medical Assistants and Similar Personnel — Expert Committee, Geneva, 4-8 September

Public Health Administration

1959 Local Health Service — Expert Committee, Geneva, 12-17 October

1960 Planning of Public Health Services — Expert Committee, Geneva, 1-6 August
Research in Public Health Practice — Scientific Group, Geneva, 29 August - 3 September

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1 See also Dental Health, Environmental Health, Health Education, Health Laboratory Services, Human Genetics, Immunology, Maternal and Child Health, Mental Health, and Nursing.
2 See also Organization of Medical Care, and Health Laboratory Services.
1961 Research in Public Health Practice — Scientific Group, Geneva, 1-8 May
1962 Urban Health Services — Expert Committee, Geneva, 15-22 October
1964 Integration of Mass Campaigns against Specific Diseases into General Health Services — Study Group, Geneva, 27 April - 2 May
1966 National Health Planning in Developing Countries — Expert Committee, Geneva, 27 September - 3 October

Rabies
1959 Expert Committee, Geneva, 14-19 December
1965 Expert Committee, Geneva, 1-7 June

Radiation
1959 Use of Radioisotope Teletherapy Units and Supervoltage Radiation in Radiotherapy — Study Group (IAEA/WHO), Vienna, 3-5 August
Research Aspects of the Treatment of Radiation Injury — Scientific Group, Geneva, 27-29 April
Medical Supervision in Radiation Work — Expert Committee, Geneva, 28 September-3 October
1960 Radiobiology — Scientific Group, Geneva, 25-27 April
1961 Radiation Hazards in Perspective — Expert Committee, Geneva, 24-30 October
1962 Public Health Responsibilities in Radiation Protection — Expert Committee, Geneva, 11-17 September
1964 Public Health and the Medical Use of Ionizing Radiation — Expert Committee, Geneva, 8-14 December
Planning of Radiotherapy Facilities — Joint Meeting (IAEA/WHO), Geneva, 15-19 December
1967 Medical Radiation Physics — Expert Committee (IAEA/WHO), Geneva, 12-18 December

Rehabilitation
1
1958 Medical Rehabilitation — Expert Committee, Geneva, 24-28 February

Trachoma

1 See also Cardiovascular Diseases.
1961 Trachoma Research — Scientific Group, Geneva, 22-28 August
   Expert Committee, Geneva, 29 August - 4 September
1963 Trachoma Research — Scientific Group, Geneva, 17-21 December
1965 Trachoma Research — Scientific Group, Geneva, 9-14 August

Tuberculosis

1959 Tuberculosis Research — Scientific Group, Geneva, 26 January - 2 February
   Expert Committee, Geneva, 28 September - 3 October
1960 Research in Tuberculosis — Scientific Group, Geneva, 23-28 May
1964 Expert Committee, Geneva, 18-24 August

Venereal Infections and Treponematoses

1959 Expert Committee, Geneva, 21-26 September
   Treponematoses Research — Scientific Group, Geneva, 30 November - 5 December
1962 Gonococcal Infections — Expert Committee, Geneva, 19-26 November

Virus Diseases

1958 Virus Research — Scientific Group, Geneva, 17-21 November
   Respiratory Virus Diseases — Expert Committee, Stockholm, 11-15 August
1959 Research on Birds as Disseminators of Arthropod-Borne Viruses — Scientific Group,
   Geneva, 9-14 March
   Arthropod-Borne Viruses — Study Group, Geneva, 5-10 September
1961 Scientific Group, Geneva, 15-21 August
1962 Yellow Fever Research in East Africa — Scientific Group, Geneva, 30 May - 1 June
1963 Rickettsial Diseases in Man — Scientific Group, Geneva, 8-13 July
   Measles Vaccines — Scientific Group, Geneva, 15-20 July
   Yellow Fever in East Africa — Scientific Group, Geneva, 29-31 October
   Hepatitis — Expert Committee, Geneva, 10-16 December
1964 Smallpox — Expert Committee, Geneva, 14-20 January
1965 Human Viral and Rickettsial Vaccines — Scientific Group, Geneva, 4-9 October
1966 Arboviruses and Human Disease — Scientific Group, Geneva, 26 September - 1 October
   Scientific Group, Geneva, 5-12 October
1967 Respiratory Viruses — Scientific Group, Geneva, 9-14 October
   Smallpox Eradication — Scientific Group, Geneva, 17-24 October

1 Rabies and trachoma are shown under separate headings.
Zoonoses 1

1958 Expert Committee (FAO/WHO), Stockholm, 11-16 August
1966 Current Problems in Leptospirosis Research — Expert Group, Moscow, 18-21 July
Expert Committee (FAO/WHO), Geneva, 6-12 December

COMMITTEE ON INTERNATIONAL QUARANTINE 2

1958 Sixth session, Geneva, 20-24 October
1959 Seventh session, Geneva, 26-30 October
1960 Eighth session, Geneva, 17-22 October
1961 Ninth session, Geneva, 6-10 November
1962 Tenth session, Geneva, 3 May
1962 Eleventh session, Geneva, 15-19 October
1964 Twelfth session, Geneva, 10-14 February
1965 Thirteenth session, Geneva, 22-26 February
1967 Fourteenth session, Geneva, 28 November - 7 December

1 Brucellosis and rabies are shown under separate headings.
2 The Committee on International Quarantine, which has special functions defined by the World Health Assembly, is included in this annex for convenience of presentation.
# Annex 8
## WHO-ASSISTED PROJECTS, 1958-1967
### 1. Number of Projects in Operation Each Year

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<td>25 (4)</td>
<td>28 (6)</td>
<td>27 (11)</td>
<td>39 (6)</td>
<td>39 (10)</td>
<td>38 (15)</td>
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1 Excluding fellowships, which are shown separately in Annex 9.
2 In order to present a balanced picture of the health programme, this annex also shows, in brackets, the figures for PAHO-assisted projects in the Americas for which no WHO funds were allocated.
3 Until 30 November 1967.
4 Including vector control.
5 Including health laboratory services, hospital and medical care, and rehabilitation.
WHO-ASSISTED PROJECTS, 1958-1967

2. NUMBER OF PROJECTS IN OPERATION IN EACH REGION DURING THE DECADE

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<th>European Region</th>
<th>Eastern Mediterranean Region</th>
<th>Western Pacific Region</th>
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<td>9</td>
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<td>27</td>
<td>8</td>
<td>1</td>
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<td>4</td>
<td>8</td>
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<td>6</td>
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1 Excluding fellowships, which are shown separately in Annex 9.
2 In order to present a balanced picture of the health programme, this annex also shows, in brackets, the figures for PAHO-assisted projects in the Americas for which no WHO funds were allocated.
3 Including vector control.
4 Including health laboratory services, hospital and medical care, and rehabilitation.
### Annex 9

**FELLOWSHIPS AWARDED BY WHO, 1957-1966**

#### 1. Number by Subject and Year

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1 Awarded by WHO and financed from regular, UNDP and UNICEF funds; excluding fellowships financed by PAHO. Fellowships awarded in 1967 (not included in this table) were 2674 (provisional figure).

2 The classification follows that used in The First Ten Years of WHO and in the Annual Reports of the Director-General.
# Annex 9

**Fellowships Awarded by WHO, 1957-1966**

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1 Awarded by WHO and financed from regular, UNDP and UNICEF funds; excluding fellowships financed by PAHO.
Annex 10

COLLABORATIVE RESEARCH, 1958-1967: CONTRACTS CONCLUDED WITH INSTITUTIONS AND WITH INDIVIDUAL INVESTIGATORS FOR NEW PROJECTS

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<td>168</td>
<td>198</td>
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Sub-total — Contracts with institutions | 5    | 12   | 100  | 69   | 117  | 94   | 127  | 155  | 166  | 172  | 1017  |

Sub-total — Contracts with individual investigators | —    | —    | 1    | 3    | 3    | 10   | 8    | 13   | 32   | 13   | 83    |

1 A new contract is required for each year that a project is continued; only the initial contracts are included in the above table.

* Including haematology and microbiology.
COLLABORATIVE RESEARCH, 1958-1967: CONTRACTS CONCLUDED WITH INSTITUTIONS AND WITH INDIVIDUAL INVESTIGATORS FOR NEW PROJECTS

2. NUMBER BY SUBJECT AND REGION

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<th>Region of the Americas</th>
<th>South-East Asia Region</th>
<th>European Region</th>
<th>Eastern Mediterranean Region</th>
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<td>516</td>
<td>68</td>
<td>96</td>
<td>1100</td>
<td>1017</td>
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</table>

Sub-total — Contracts with institutions

|                  | 145 | 184 | 67 | 476 | 65 | 80 | 1017 |

Sub-total — Contracts with individual investigators

|                  | 1   | 19  | 4  | 40  | 3  | 16 | 83   |

* A new contract is required for each year that a project is continued; only the initial contracts are included in the above table.

* Including haematology and microbiology.
### Annex II

GRANTS AWARDED BY WHO FOR TRAINING AND EXCHANGE OF RESEARCH WORKERS, 1961-1967

**Number by Subject**

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<th>Subject</th>
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**TOTAL** 204 232 436

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1 Revised figures.
2 Including clinical endocrinology, haematology, medical cartography, microbiology, and molecular biology.
Annex 12

WHO REFERENCE CENTRES, 1958-1967

Below are listed the institutions that have served or been designated during the decade as international or regional reference centres.

**BACTERIAL DISEASES**

**Enteric Infections**

*International Reference Centre for Enteric Phage-Typing*

Central Public Health Laboratory, London, England

*International Escherichia Centre*

Statens Seruminstitut, Copenhagen, Denmark

*International Salmonella Centre*

Institut Pasteur, Paris, France

*International Shigella Centres*

Central Public Health Laboratory, London, England

National Communicable Disease Center, Atlanta, Ga., United States of America

*International Reference Centre for Vibrio Phage-Typing*

Indian Institute of Experimental Medicine, Calcutta, India

**Staphylococcal Infections**

*International Reference Centre for Staphylococcal Phage-Typing*

Central Public Health Laboratory, London, England

**Streptococcal Infections**

*International Reference Centre for Streptococcus Typing*

Streptococcus Reference Laboratory, Institute of Epidemiology and Microbiology, Prague, Czechoslovakia

**BIOLOGY, PHARMACOLOGY AND TOXICOLOGY**

**Antibiotics**

*International Centre for Information on Antibiotics*

Laboratoire de Microbiologie générale et médicale, University of Liège, Belgium

**Biological Standardization**

*International Laboratories for Biological Standards*

Statens Seruminstitut, Copenhagen, Denmark

National Institute for Medical Research, London, England

Central Veterinary Laboratory, Ministry of Agriculture, Fisheries and Food, Weybridge, England

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1 The reference centres for tuberculosis are shown under that heading, and the centre for gonococci under Venereal Diseases and Treponematoses.
International Centre for Information on Type Cultures
Institut d'Hygiène et de Bactériologie, University of Lausanne, Switzerland

Human Genetics
International Reference Centre for Abnormal Haemoglobins
Medical Research Council Abnormal Haemoglobin Research Unit, Department of Biochemistry, University of Cambridge, England
International Reference Centre for Glucose-6-Phosphate Dehydrogenase
Department of Medicine — Medical Genetics, University of Washington, Seattle, Wash., United States of America
International Reference Centre for Serum Protein Groups
Zoology Department, University of Texas, Austin, Tex., United States of America
Regional Reference Centres for Glucose-6-Phosphate Dehydrogenase
Department of Haematology, Tel-Hashomer Government Hospital, Jerusalem, Israel
Sub-Department of Haematology, University College Hospital, Ibadan, Nigeria

Immunology
International Reference Centre for Genetic Factors of Human Immunoglobulins
Centre départemental de Transfusion sanguine et de Génétique humaine, Bois-Guillaume, Seine-Maritime, France
International Reference Centre for Immunoglobulins
Institut de Biochimie, University of Lausanne, Switzerland
International Reference Centre for the use of Immunoglobulin Anti-D in the Prevention of Rh Sensitization
Medical Research Council Experimental Haematology Research Unit, St Mary's Hospital Medical School, London, England
International Reference Laboratory for the Serology of Autoimmune Disorders
Rheumatoid Research Department, Middlesex Hospital Medical School, London, England

International Reference Centre for Testing of Natural Resistance Factors
Department of Immunology, Institute of Epidemiology and Microbiology, Prague, Czechoslovakia

International Reference Centre for Tumour-Specific Antigens
Division of Immunology and Oncology, Gamaleja Institute of Epidemiology and Microbiology, Moscow, Union of Soviet Socialist Republics

Regional Reference Centres for Genetic Factors of Human Immunoglobulins
Department of Medical Microbiology, University of Lund, Sweden
Department of Biology, Western Reserve University, Cleveland, Ohio, United States of America

Regional Reference Centres for Immunology (Research and Training)
Department of Microbiology and Immunology, School of Medicine, University of São Paulo, Brazil
Department of Chemical Pathology, University College Hospital, Ibadan, Nigeria
Institut de Biochimie, University of Lausanne, Switzerland

Pharmaceuticals
International Reference Centre for Chemical Reference Substances
Centre for Authentic Chemical Substances, Apotekens Centrallaboratorium, Solna, Stockholm, Sweden

Chronic and Degenerative Diseases

Cancer
International Reference Centre for Comparative Oncology
Armed Forces Institute of Pathology, Washington, D.C., United States of America

International Reference Centre for the Histopathology of Bone Tumours
Latin American Registry of Bone Pathology, Osteo-articular Pathology Centre, Italian Hospital, Buenos Aires, Argentina
International Reference Centre for the Histopathology of Genito-urinary Tract Tumours
Armed Forces Institute of Pathology, Washington, D.C., United States of America

International Reference Centre for the Histopathology of Leukaemias and other Neoplastic Conditions of the Haematopoietic Cells
Institut de Cancérologie et d’Immunogénétique, Hôpital Paul-Brousse, Paris, France

International Reference Centre for the Histopathology of Lung Tumours
Institute for General and Experimental Pathology, University of Oslo, Norway

International Reference Centre for the Histopathology of Mammary Tumours
Bland Sutton Institute of Pathology, Middlesex Hospital, London, England

International Reference Centre for the Histopathology of Odontogenic Tumours
Department of Oral Pathology, Royal Dental College, Copenhagen, Denmark

International Reference Centre for the Histopathology of Oral Precancerous Conditions
Department of Oral Pathology, Royal Dental College, Copenhagen, Denmark

International Reference Centre for the Histopathology of Oropharyngeal Tumours
Sarojini Naidu Medical College, Agra, Uttar Pradesh, India

International Reference Centre for the Histopathology of Ovarian Tumours
Institute of Oncology, Leningrad, Union of Soviet Socialist Republics

International Reference Centre for the Histopathology of Salivary Gland Tumours
Bland Sutton Institute of Pathology, Middlesex Hospital, London, England

International Reference Centre for the Histopathology of Skin Tumours
Pathology Department, University of Western Australia, Perth, Australia

International Reference Centre for the Histopathology of Soft Tissue Tumours
Armed Forces Institute of Pathology, Washington, D.C., United States of America

International Reference Centre for the Histopathology of Thyroid Gland Tumours
University Institute of Pathology, Cantonal Hospital, Zurich, Switzerland

International Reference Centre for the Histopathology of Uterine Tumours and Related Conditions
Institute of Radiopathology, Karolinska Institute, Stockholm, Sweden

International Reference Centre for the Provision of Frozen Transplantable Tumour Strains
Department of Tumour Pathology, Karolinska Institute, Stockholm, Sweden

International Reference Centre for the Provision of Tumour-bearing Animals
Netherlands Cancer Institute, Amsterdam, Netherlands

Cardiovascular Diseases

Centre for Cardiovascular Diseases (Research and Training)
Makerere College, University of East Africa, Kampala, Uganda

Centre for Comparative Cardiovascular Studies
Comparative Cardiovascular Studies Unit, University of Pennsylvania, Philadelphia, Pa., United States of America

Rheumatic Diseases

International Reference Centre for the Study of the Diffuse Connective Tissue Diseases
Hôpital Cochin, Paris, France

MALARIA

International Malaria Reference Centre
Laboratory of Parasite Chemotherapy, National Institute of Allergy and Infectious Diseases, National Institutes of Health, Bethesda, Md., United States of America

Regional Malaria Reference Centres
Horton Malaria Reference Laboratory, Epsom, England
National Institute of Communicable Diseases, New Delhi, India
MENTAL HEALTH

International Reference Centre for Information on Psychotropic Drugs
National Institute of Mental Health, Chevy Chase, Md., United States of America

International Reference Centre for the Study of Adverse and Side Effects of Psychotropic Drugs
Centre psychiatrique Sainte-Anne, Paris, France

Regional Reference Centres for the Study of Psychotropic Drugs
Faculty of Medicine, Hokkaido University, Sapporo, Japan
Clinique neuropsychiatrique, Faculté mixte de Médecine et de Pharmacie, University of Dakar, Senegal

NUTRITION

Anaemias

International Reference Centre for Anaemias
School of Medicine, University of Washington, Seattle, Wash., United States of America

Regional Reference Centres for Anaemias
Department of Pathology, St Bartholomew’s Medical College, London, England
University of Witwatersrand, Johannesburg, South Africa

PARASITIC DISEASES

Leishmaniasis

International Reference Centre for Leishmaniasis
Department of Parasitology, Hadassah Medical School, Jerusalem, Israel

Schistosomiasis

Snail Identification Centre
Danish Bilharziasis Laboratory, Copenhagen, Denmark

Trypanosomiasis

International Reference Centre for Trypanosomiasis
East African Trypanosomiasis Research Organization, Tororo, Uganda

TUBERCULOSIS

Tuberculosis Diagnostic Reference Laboratory
Tuberculosis Research Institute, Prague, Czechoslovakia

International Reference Centre for BCG Seed-Lots and Control of BCG Products
BCG Department, Statens Seruminsitut, Copenhagen, Denmark

VECTOR BIOLOGY AND CONTROL

International Reference Centre for the Diagnosis of Diseases of Vectors
Department of Zoology and Entomology, Ohio State University, Columbus, Ohio, United States of America

International Reference Centres for the Evaluation and Testing of New Insecticides
Toxicology Research Unit, Medical Research Council Laboratories, Carshalton, Surrey, England
Tropical Pesticides Research Unit, Porton Down, Wiltshire, England
Department of Entomology, University of California, Riverside, Calif., United States of America
Entomological Research Division, Agricultural Research Service, US Department of Agriculture, Gainesville, Fla., United States of America
Technical Development Laboratories, National Communicable Disease Center, Savannah, Ga., United States of America
Laboratoire d’Entomologie, Centre Muraz, Bobo-Dioulasso, Upper Volta

International Reference Centre for Maintenance and Distribution of Standardized Strains of Anopheles
Ross Institute, London School of Hygiene and Tropical Medicine, London, England

International Reference Centre for Maintenance and Distribution of Standardized Strains of the Culex pipiens Complex
Institute of Genetics, Johannes Gutenberg University, Mainz, Federal Republic of Germany

1 The reference centres for malaria are shown under a separate heading.
International Reference Centre for Maintenance and Distribution of Standardized Strains of Musca domestica
Institute of Zoology, University of Pavia, Italy

Veneral Diseases and Treponematoses

International Reference Centre for Endemic Treponematoses
Institut Alfred Fournier, Paris, France

International Reference Centre for Gonococci
Neisseria Department, Statens Seruminstitut, Copenhagen, Denmark

International Treponematosis Laboratory Centre
Johns Hopkins University, Baltimore, Md., United States of America

Sero logical Reference Centres for Treponematoses
Treponematoses Research Laboratory, Statens Seruminstitut, Copenhagen, Denmark
Venereal Disease Research Laboratory, National Communicable Disease Center, Atlanta, Ga., United States of America

Virus Diseases

Arbovirus Diseases

International Reference Centre for Arboviruses
Department of Epidemiology and Public Health, Yale University School of Medicine, New Haven, Conn., United States of America

Regional Reference Centres for Arboviruses
Queensland Institute of Medical Research, Brisbane, Australia
Institute of Virology, Bratislava, Czechoslovakia
Service de la Fièvre jaune et des Arbovirus, Institut Pasteur, Paris, France
Department of Virology and Rickettsiology, National Institute of Health, Tokyo, Japan
Institut Pasteur, Dakar, Senegal
East African Virus Research Institute, Entebbe, Uganda

Viral Encephalitides Section, Institute of Poliomyelitis and Viral Encephalitides, Moscow, Union of Soviet Socialist Republics
Virology Section, National Communicable Disease Center, Atlanta, Ga., United States of America

Cell Cultures

International Reference Centre for Cell Cultures
American Type Culture Collection, Rockville, Md., United States of America

Enterovirus Diseases

International Reference Centre for Enteroviruses
Department of Virology and Epidemiology, Baylor University College of Medicine, Houston, Tex., United States of America

Regional Reference Centres for Enteroviruses
Enterovirus Department, Statens Seruminstitut, Copenhagen, Denmark
Section de Virologie, Laboratoire national de la Santé publique, Lyons, France
Department of Enteroviruses, National Institute of Health, Tokyo, Japan
Department of Bacteriology, University of Singapore
South African Institute for Medical Research, Johannesburg, South Africa
Institute of Poliomyelitis and Viral Encephalitides, Moscow, Union of Soviet Socialist Republics

Influenza

World Influenza Centre
National Institute for Medical Research, London, England

International Influenza Centre for the Americas
Virology Section, National Communicable Disease Center, Atlanta, Ga., United States of America

Mycoplasmas

International Reference Centre for Human Mycoplasmas
Laboratory of Viral Diseases, National Institute of Allergy and Infectious Diseases, National Institutes of Health, Bethesda, Md., United States of America

1 Not including rabies, shown under Zoonoses.
FAO/WHO International Reference Centre for Animal Mycoplasmas
Institute of General Pathology and Bacteriology, University of Aarhus, Denmark

Respiratory Virus Diseases other than Influenza

International Reference Centres for Respiratory Virus Diseases other than Influenza
Common Cold Research Unit, National Institute for Medical Research, Harvard Hospital, Salis­bury, England
Laboratory of Viral Diseases, National Institute of Allergy and Infectious Diseases, National Institutes of Health, Bethesda, Md., United States of America

Regional Reference Centres for Respiratory Virus Diseases other than Influenza
Epidemiological Research Unit, Fairfield Infectious Diseases Hospital, Melbourne, Australia
Institute of Epidemiology and Microbiology, Prague, Czechoslovakia
Respiratory Virus Laboratory, National Institute of Health, Tokyo, Japan
South African Institute for Medical Research, Johannesburg, South Africa
Ivanovskij Institute of Virology, Moscow, Union of Soviet Socialist Republics
Respirovirus Unit, Virology Section, National Communicable Disease Center, Atlanta, Ga., United States of America

Rickettsioses

Regional Reference Centre for Human Rickettsioses
Rocky Mountain Laboratory, National Institute of Allergy and Infectious Diseases, Hamilton, Mont., United States of America

Smallpox

Regional Reference Centres for Smallpox
National Communicable Disease Center, Atlanta, Ga., United States of America
Research Institute of Virus Preparations, Moscow, Union of Soviet Socialist Republics

Trachoma

International Reference Centre for Trachoma
Francis I. Proctor Foundation for Research in Ophthalmology, University of California Medical Center, San Francisco, Calif., United States of America

VITAL AND HEALTH STATISTICS

Centres for the Classification of Diseases
Department of Public Health Statistics, Semaško Institute of Social Hygiene and Public Health Administration, Moscow, Union of Soviet Socialist Republics

ZOOONES

Brucellosis

FAO/WHO Brucellosis Centres
Department of Zoonoses, Ministry of Agriculture and Animal Husbandry, Buenos Aires, Argentina
Commonwealth Serum Laboratories, Parkville, Victoria, Australia
State Veterinary Serum Laboratory, Copenhagen, Denmark
Central Veterinary Laboratory, Ministry of Agriculture, Fisheries and Food, Weybridge, England
Centre de Recherches sur la Fièvre ondulante, Institut Bouisson-Bertrand, Montpellier, France
Veterinary Microbiological Institute, Athens, Greece
Indian Veterinary Research Institute, Mukteswar-Kumaon, Uttar Pradesh, India
Centre for the Study of Brucellosis, Institute of Hygiene and Microbiology, University of Florence, Italy
National Institute of Animal Health, Tokyo, Japan
Medical Research Institute, General Hospital, Mexico City, Mexico
Onderstepoort Veterinary Laboratory, Onderste­poort, South Africa
Institut Pasteur, Tunis, Tunisia
Institute of Veterinary Bacteriology and Serology, Istanbul, Turkey
Department of Medicine, University of Minnesota, Minneapolis, Minn., United States of America
Brucellosis Centre, State Laboratory of Hygiene, Rijeka, Yugoslavia

WHO Brucellosis Centre
Gamaleja Institute of Epidemiology and Microbiology, Moscow, Union of Soviet Socialist Republics
Leptospirosis

WHO/FAO Leptospirosis Reference Laboratories
Laboratory of the Department of Health and Home Affairs, Brisbane, Australia
London School of Hygiene and Tropical Medicine, London, England
Israel Institute for Biological Research, Ness-Ziona, Israel
Istituto Superiore di Sanità, Rome, Italy
National Institute of Health, Tokyo, Japan
Institute for Tropical Hygiene and Geographical Pathology (Royal Tropical Institute), Amsterdam, Netherlands
Division of Veterinary Medicine, Walter Reed Army Medical Center, Washington, D.C., United States of America

WHO Leptospirosis Reference Laboratory
Gamaleja Institute of Epidemiology and Microbiology, Moscow, Union of Soviet Socialist Republics

Rabies

International Reference Centres for Rabies
Institut Pasteur, Paris, France
Pasteur Institute of Southern India, Coonoor, India
Wistar Institute, Philadelphia, Pa., United States of America

Regional Reference Centre for Rabies in the Americas
Rabies Laboratory, National Communicable Disease Center, Atlanta, Ga., United States of America

Other Fields

Blood Groups

International Blood Group Reference Laboratory
Medical Research Council Blood Group Reference Laboratory, Lister Institute of Preventive Medicine, London, England

Serum Reference Banks

World Serum Reference Bank
Department of Epidemiology and Public Health, Yale University School of Medicine, New Haven, Conn., United States of America

Regional Serum Reference Banks
Institute of Epidemiology and Microbiology, Prague, Czechoslovakia
South African Institute for Medical Research, Johannesburg, South Africa
Annex 13

WHO PUBLICATIONS, 1958-1967

1. Monographs, Public Health Papers and Non-Series Publications

Titles in the Monograph Series and in Public Health Papers that were published in the languages indicated during the period 1958 to 1967, together with non-series publications, are listed below. The languages of publication are shown in parenthesis (E = English; F = French; R = Russian; S = Spanish; E/F = bilingual edition).

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<td>23</td>
<td>Laboratory Techniques in Rabies, second edition</td>
<td>various authors</td>
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<td>31</td>
<td>Composting: Sanitary Disposal and Reclamation of Organic Wastes</td>
<td>Harold B. Gotaas</td>
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<td>32</td>
<td>The Training of Sanitary Engineers: Schools and Programmes in Europe and in the United States</td>
<td>Milivoj Petrik</td>
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<td>Meat Hygiene</td>
<td>various authors</td>
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<td>34</td>
<td>The Teaching of Hygiene and Public Health in Europe: A Review of Trends in Undergraduate and Post-graduate Education in Nineteen Countries</td>
<td>F. Grundy and J. M. Mackintosh</td>
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<td>An International Nomenclature of Yaws Lesions</td>
<td>C. J. Hackett</td>
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<td>Intermediate Hosts of Schistosoma: African Biomphalaria and Bulinus</td>
<td>G. Mandahl-Barth</td>
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<td>A. W. A. Brown</td>
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<td>Excreta Disposal for Rural Areas and Small Communities</td>
<td>Edmund G. Wagner and J. N. Lanoix</td>
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<td>D. Buckle and S. Lebovici</td>
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<td>Principles of Administration Applied to Nursing Service</td>
<td>H. A. Goddard</td>
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<td>Differential Diagnosis of Yaws</td>
<td>C. J. Hackett and L. J. A. Loewenthal</td>
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<td>46</td>
<td>Air Pollution</td>
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<td>47</td>
<td>Age-grouping Methods in Diptera of Medical Importance (with special reference to some vectors of malaria)</td>
<td>T. S. Detinova</td>
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<td>Operation and Control of Water Treatment Processes</td>
<td>C. R. Cox</td>
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<td>Snail Control in the Prevention of Bilharziasis</td>
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<td>Statistical Methods in Malaria Eradication</td>
<td>Satya Swaroop</td>
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<td>52</td>
<td>Trials of Prophylactic Agents for the Control of Communicable Diseases: A Guide to their Organization and Evaluation</td>
<td>T. M. Pollock</td>
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The Assessment of the Nutritional Status of the Community (with special reference to field surveys in developing regions of the world), by D. B. Jelliffe (E, R)

Hospital Planning and Administration, by R. Llewelyn-Davies and H. M. C. Macaulay (E, R)

Laboratory Techniques in Brucellosis, by G. G. Alton and Lois M. Jones (E)

PUBLIC HEALTH PAPERS

1 Psychiatric Services and Architecture, by A. Baker, R. L. Davies and P. Sivadon (E, F, S)
2 Epidemiological Methods in the Study of Mental Disorders, by D. D. Reid (E, F, S)
3 Health Services in the USSR, report prepared by the participants in a study tour organized by the World Health Organization (E, F, S)
4 Aspects of Public Health Nursing, by various authors (E, F, R, S)
5 Trends in Juvenile Delinquency, by T. C. N. Gibbens (E, F, R, S)
6 Ionizing Radiation and Health, by B. Lindell and R. L. Dobson (E, F, R, S)
7 Basic Nursing Education Programmes: A Guide to their Planning, by Katharine Lyman (E, F, R, S)
8 The Role of Immunization in Communicable Disease Control, by various authors (E, F, R, S)
9 Teaching of Psychiatry and Mental Health, by various authors (E, F, S)
10 Control of Soil-transmitted Helminths, by P. C. Beaver (E, F, R, S)
11 Maternal and Child Health in the USSR, report prepared by the participants in a study tour organized by the World Health Organization (E, F, S)
12 Road Traffic Accidents: Epidemiology, Control and Prevention, by L. G. Norman (E, F, R, S)
13 Aspects of Water Pollution Control, by various authors (E, F, R, S)
14 Deprivation of Maternal Care: A Reassessment of its Effects, by various authors (E, F, S)
15 Epidemiology of Air Pollution, report on a symposium, by P. J. Lawther, A. E. Martin and E. T. Wilkins (E, F, R, S)
16 The Scope of Epidemiology in Psychiatry, by T.-Y. Lin and C. C. Standley (E, F, R, S)
17 Paying for Health Services: A Study of the Costs and Sources of Finance in Six Countries, by B. Abel-Smith (E, F, R, S)
18 Medicine and Public Health in the Arctic and Antarctic, selected papers from a conference, by various authors (E, F, R, S)
19 Health Education in the USSR, report prepared by the participants in a study tour organized by the World Health Organization (E, F, R, S)
20 Preparation of the Physician for General Practice, by various authors (E, F, R, S)
21 The Staffing of Public Health and Outpatient Nursing Services: Methods of Study, by Doris E. Roberts (E, F, R, S)
22 The Nurse in Mental Health Practice, report on a technical conference, by Audrey L. John, Maria O. Leite-Ribeiro and D. Buckle (E, F, R, S)
24 Care of Children in Day Centres, by various authors (E, F, R, S)
25 Housing Programmes: The Role of Public Health Agencies, by various authors (E, F, R, S)
26 Domestic Accidents, by E. M. Backett (E, F, R, S)
27 Trends in the Study of Morbidity and Mortality, by various authors (E, F, R, S)
28 Aspects of Family Mental Health in Europe, by various authors (E, F, R, S)
29 Mass Campaigns and General Health Services, by C. L. Gonzalez (E, F, R, S)
30 Noise: An Occupational Hazard and Public Nuisance, by A. Bell (E, F, R)
31 A Guide for Staffing a Hospital Nursing Service, by Marguerite Paetznick (E, R)
32 An International Study of Health Expenditure and its Relevance for Health Planning, by Brian Abel-Smith (E)
NON-SERIES PUBLICATIONS

Pharmacopoea Internationalis, first edition, Supplementum (E, F, S)
Specifications for the Quality Control of Pharmaceutical Preparations, second edition of the International Pharmacopoeia (E, F)
Specifications for Reagents mentioned in the International Pharmacopoeia (E, F)
International Non-proprietary Names for Pharmaceutical Preparations : Cumulative List, 1962 (E, F, R)
International Non-proprietary Names for Pharmaceutical Preparations : Cumulative List No. 2, 1967 (E, F)
International Standards for Drinking-Water, first edition (E, F)
International Standards for Drinking-Water, second edition (E, F, R, S)
European Standards for Drinking-Water (E, F, R)
Specifications for Pesticides Used in Public Health : Insecticides - Rodenticides - Molluscicides - Repellents - Methods, third edition (E)
Equipment for Vector Control : Guide to Major Items, Specifications, Use Descriptions, and Field Tests (E, F, R, S)
Methods of Radiochemical Analysis (E, R)
International Histological Classification of Tumours No. 1 : Histological Typing of Lung Tumours (E, F, R, S)
World Directory of Dental Schools (E, F)
World Directory of Dental Schools, second edition (E)
World Directory of Medical Schools, second edition (F)
World Directory of Medical Schools, third edition (E, F, R)
World Directory of Post-basic and Post-graduate Schools of Nursing (E, F, R)
World Directory of Schools of Pharmacy, 1963 (E, R)
World Directory of Venereal Disease Treatment Centres at Ports, first and second editions (E/F)
World Directory of Veterinary Schools (E, F)
Bibliography on Bilharziasis, 1949-1958 (E/F)
Bibliography on the Epidemiology of Cancer, 1946-1960 (E/F, R)
Bibliography of Hookworm Disease (Ancylostomiasis), 1920-1962 (E/F)
Medical Education : Annotated Bibliography, 1946-1955 (E, F)
Bibliography on Yaws, 1905-1962 (E/F, R)
International Sanitary Regulations, second and third annotated editions (E, F, R)
International Medical Guide for Ships (including the Ship's Medicine Chest and the Medical Section of the International Code of Signals) (E)
Guide to Ship Sanitation, by V. B. Lamoureu (E)
Guide to Hygiene and Sanitation in Aviation (E, F, S)
Terminology of Malaria and of Malaria Eradication, report of a drafting committee (E, F, R, S)
Diagnosis and Treatment of Acute Radiation Injury, proceedings of a scientific meeting jointly sponsored by the International Atomic Energy Agency and the World Health Organization, October 1960 (E, F, R)
Protection of the Public in the Event of Radiation Accidents, proceedings of a seminar jointly sponsored by the Food and Agriculture Organization of the United Nations, the International Atomic Energy Agency and the World Health Organization, November 1963 (E, F, R)
Malnutrition and Disease : Freedom from Hunger Campaign : Basic Study No. 12 (E, F, S)
Trends in Cancer Research (E, F, R)
The First Ten Years of the World Health Organization (E, F, R, S)
The Medical Research Programme of the World Health Organization, 1958-1963, report by the Director-General (E, F, R, S)
## 2. Annual Output of Publications

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* Incomplete figures.

* New format as from Volume 21, 1959.
## 2. Annual Output of Publications (concluded)

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*Incomplete figures.*
### Annex 14

**NON-GOVERNMENTAL ORGANIZATIONS IN OFFICIAL RELATIONS WITH WHO**

at 31 December 1967

<table>
<thead>
<tr>
<th>Name of organization</th>
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<tr>
<td>Council for International Organizations of Medical Sciences</td>
<td>1949</td>
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<tr>
<td>Inter-American Association of Sanitary Engineering</td>
<td>1948</td>
</tr>
<tr>
<td>International Academy of Legal Medicine and of Social Medicine</td>
<td>1948</td>
</tr>
<tr>
<td>International Air Transport Association</td>
<td>1959</td>
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<tr>
<td>International Association for Child Psychiatry and Allied Professions</td>
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<tr>
<td>International Association of Logopedics and Phoniatrics</td>
<td>1963</td>
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<tr>
<td>International Association of Microbiological Societies</td>
<td>1951</td>
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<tr>
<td>International Association for Prevention of Blindness</td>
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</tr>
<tr>
<td>International Astronautical Federation</td>
<td>1964</td>
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<tr>
<td>International Brain Research Organization</td>
<td>1963</td>
</tr>
<tr>
<td>International Commission on Radiological Protection</td>
<td>1956</td>
</tr>
<tr>
<td>International Commission on Radiation Units and Measurements</td>
<td>1956</td>
</tr>
<tr>
<td>International Committee of Catholic Nurses</td>
<td>1954</td>
</tr>
<tr>
<td>International Committee of the Red Cross</td>
<td>1948</td>
</tr>
<tr>
<td>International Confederation of Midwives</td>
<td>1957</td>
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<tr>
<td>International Conference of Social Work</td>
<td>1950</td>
</tr>
<tr>
<td>International Council on Jewish Social and Welfare Services</td>
<td>1964</td>
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<tr>
<td>International Council of Nurses</td>
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<td>International Council of Scientific Unions</td>
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<tr>
<td>International Council of Societies of Pathology</td>
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<td>International Epidemiological Association</td>
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<td>International Federation of Gynecology and Obstetrics</td>
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<tr>
<td>International Federation for Housing and Planning</td>
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</tr>
<tr>
<td>International Federation for Medical and Biological Engineering</td>
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<td>International Federation of Physical Medicine</td>
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<tr>
<td>International Federation of Sports Medicine</td>
<td>1958</td>
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<tr>
<td>International Federation of Surgical Colleges</td>
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<td>International Fertility Association</td>
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<td>International Hospital Federation</td>
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<td>International Hydatidological Association</td>
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<tr>
<td>International League of Dermatological Societies</td>
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<tr>
<td>International League against Rheumatism</td>
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<tr>
<td>International Leprosy Association</td>
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<tr>
<td>International Organization against Trachoma</td>
<td>1955</td>
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<td>International Paediatric Association</td>
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<td>International Pharmaceutical Federation</td>
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<tr>
<td>International Planned Parenthood Federation</td>
<td>1966</td>
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<td>Year in which official relations were established</td>
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<td>International Society of Biometeorology</td>
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<td>International Society of Blood Transfusion</td>
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<tr>
<td>International Society of Cardiology</td>
<td>1960</td>
</tr>
<tr>
<td>International Society for Criminology</td>
<td>1955</td>
</tr>
<tr>
<td>International Society of Radiographers and Radiological Technicians</td>
<td>1967</td>
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<tr>
<td>International Society for Rehabilitation of the Disabled</td>
<td>1951</td>
</tr>
<tr>
<td>International Union of Architects</td>
<td>1959</td>
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<tr>
<td>International Union against Cancer</td>
<td>1948</td>
</tr>
<tr>
<td>International Union for Child Welfare</td>
<td>1948</td>
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<tr>
<td>International Union for Health Education</td>
<td>1955</td>
</tr>
<tr>
<td>International Union of Local Authorities</td>
<td>1958</td>
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<tr>
<td>International Union of Pure and Applied Chemistry</td>
<td>1963</td>
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<tr>
<td>International Union against Tuberculosis</td>
<td>1948</td>
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<tr>
<td>International Union against the Venereal Diseases and the Treponematoses</td>
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<tr>
<td>International Water Supply Association</td>
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<tr>
<td>League of Red Cross Societies</td>
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<tr>
<td>Medical Women's International Association</td>
<td>1954</td>
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<tr>
<td>Permanent Commission and International Association on Occupational Health</td>
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<tr>
<td>World Confederation for Physical Therapy</td>
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<tr>
<td>World Federation of the Deaf</td>
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<tr>
<td>World Federation for Mental Health</td>
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<tr>
<td>World Federation for Neurology</td>
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<td>World Federation of Occupational Therapists</td>
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<td>World Federation of Societies of Anaesthesiologists</td>
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<td>World Federation of United Nations Associations</td>
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Annex 15

CONFERENCES, SEMINARS AND SIMILAR MEETINGS
(INCLUDING SHORT COURSES), 1958-1967

<table>
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<th>Year/Place</th>
<th>Subject</th>
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<td>Congo (Brazzaville)</td>
<td>CCTA/WHO inter-regional seminar on mental health</td>
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<tr>
<td>Congo, Democratic</td>
<td>CCTA/FAO/WHO course on brucellosis</td>
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<tr>
<td>Republic of Mali</td>
<td>Course on onchocerciasis</td>
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<tr>
<td><strong>AFRICAN REGION</strong></td>
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<tr>
<td>Brazil</td>
<td>Conference on teaching of medical statistics</td>
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<tr>
<td></td>
<td>Seminar on leprosy control</td>
</tr>
<tr>
<td></td>
<td>Working seminar on nursing education</td>
</tr>
<tr>
<td>Colombia, Venezuela</td>
<td>Seminar on paediatric education</td>
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<tr>
<td>Trinidad</td>
<td>Course for waterworks operators</td>
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<tr>
<td>Venezuela</td>
<td>Course on classification of diseases</td>
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<td><strong>REGION OF THE AMERICAS</strong></td>
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<tr>
<td>Burma</td>
<td>National course on health education</td>
</tr>
<tr>
<td>Ceylon, India</td>
<td>Study tour on filariasis</td>
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<tr>
<td>India</td>
<td>Conference on industrial and occupational health</td>
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<tr>
<td></td>
<td>Inter-regional conference on auxiliary nursing</td>
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<tr>
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<td>Inter-regional course for health physicists</td>
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<td></td>
<td>Inter-regional course on public health laboratory techniques for virus and rickettsial diseases</td>
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<td>National courses for nurses</td>
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<td></td>
<td>Seminar on certification and classification of mortality and morbidity</td>
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<td>Thailand</td>
<td>Study tour on medical education</td>
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<td>Conference on child health</td>
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<tr>
<td><strong>SOUTH-EAST ASIA REGION</strong></td>
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</table>

1 The aim of this illustrative list is to show the range of subjects of meetings and courses organized or assisted by WHO, and the countries (under present names) in which they were held. The list has been abridged — for example, recurrent meetings and courses are mentioned once only — and now has some 400 entries. Activities organized by PAHO without financial participation from WHO are not listed. Except where shown as national or inter-regional, the activities were for participants from countries of the region in which they took place. For advisory meetings see Annexes 5 and 7.
THE SECOND TEN YEARS

Year/Place (continued)

1958

EUROPEAN REGION

Belgium

Meeting on dental health services for children
Seminar on prevention of accidents in childhood

Denmark

Conference on preventive mental health work in children
Meeting on cardiovascular diseases
Meeting on neurotropic virus diseases
Seminar on the psychiatric treatment of criminals and delinquents

Finland

Conference on public health nursing

France

Course on rural public health
Seminar for sanitary engineers

France, Italy

Travelling seminar on occupational health

France, United Kingdom

Courses on radiation protection

United Kingdom

Courses on virus and rickettsial diseases

Norway

Meeting on the public health aspects of aging populations

Portugal

Meeting on malaria eradication for south-western Europe

Portugal, United Kingdom

Travelling seminar on public health administration

Romania

Malaria conference for south-eastern European countries

Sweden

Course for Scandinavian municipal engineers
Meeting on the collaboration of public health laboratories
Symposium on the relations between the hospital and its community

Switzerland

Conference on hospital statistics and their application in health administration

Turkey

Course on tuberculosis

Union of Soviet Socialist Republics

Inter-regional travelling seminar on public health administration

Yugoslavia

Conference on the control of communicable eye diseases

EASTERN MEDITERRANEAN REGION

Iran

Inter-regional seminar on health education of the public

United Arab Republic

Course on waterworks operation
FAO/WHO inter-regional nutrition conference
Inter-regional course on bilharziasis
Meeting on drinking-water standards and standard methods of water analysis

WESTERN PACIFIC REGION

Cambodia

National course in medicine

Japan

Inter-regional conference on leprosy
Seminar on venereal disease control
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<th>Year Place</th>
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<td>Papua and New Guinea</td>
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<td>Philippines</td>
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<td><strong>1959</strong></td>
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<tr>
<td>Congo (Brazzaville)</td>
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<td>Inter-regional conference on leprosy in Africa</td>
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<td>Meeting on malaria eradication</td>
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<td>Seminar on food and nutrition problems</td>
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<tr>
<td>Mexico</td>
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<tr>
<td>United States of America</td>
<td>Seminar on teaching of public health in schools of veterinary medicine</td>
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<td><strong>SOUTH-EAST ASIA REGION</strong></td>
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<tr>
<td>Afghanistan</td>
<td>National seminar on smallpox eradication</td>
</tr>
<tr>
<td>Burma</td>
<td>National course on health education</td>
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<tr>
<td>India</td>
<td>Inter-regional conference on malaria</td>
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<td>Study tour on medical education (anatomy)</td>
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<td><strong>EUROPEAN REGION</strong></td>
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<td>Denmark</td>
<td>Conference on medical rehabilitation</td>
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<td>Meeting on drinking-water standards</td>
</tr>
<tr>
<td>Federal Republic of Germany</td>
<td>Meeting on medical and public health aspects of radiation</td>
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<td></td>
<td>Conference on nursing administration</td>
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<td>FAO/WHO symposium on education and training in nutrition in Europe</td>
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<tr>
<td>Finland</td>
<td>Conference on mental hygiene practice</td>
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<td>Course on rural public health</td>
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<tr>
<td>France</td>
<td>Conference on the health and welfare of seafarers</td>
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<td>Inter-regional seminar on the public health aspects of radioactive waste disposal</td>
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<td>Italy</td>
<td>Inter-regional seminar on community water supply</td>
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<td>Seminar on the mental health of the subnormal child</td>
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<td>Morocco</td>
<td>Conference on the control of infectious diseases through vaccination</td>
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<tr>
<td>Netherlands, United Kingdom</td>
<td>Course on pest and rodent control</td>
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</table>
Year/Place  | Subject
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1959 (continued)  |  
Norway, Poland  | Travelling seminar on maternal and child health
Switzerland  | Conference on food-borne infections and intoxications
  | UN/WHO seminar on the role of health workers and social workers in meeting family needs
USSR  | Travelling seminar on public health administration
United Kingdom  | ILO/WHO conference on the medical officer's contribution to the psycho-social environment in industry
  | Inter-regional course on the determination of anopheline longevity
  |  
EASTERN MEDITERRANEAN REGION  |  
Ethiopia  | Conference on malaria eradication
Tunisia  | Inter-regional conference on trachoma
United Arab Republic  | Course on industrial health
  |  
WESTERN PACIFIC REGION  |  
Australia  | Inter-regional seminar on dental health
Fiji  | Course on tuberculosis for assistant medical officers
Japan  | Seminar on the education and training of sanitation personnel
  | Seminar on veterinary public health
Philippines  | Conference on maternity care
  | Inter-regional meeting on BCG vaccine production
  |  
1960  |  
AFRICAN REGION  |  
Kenya  | Seminar on tuberculosis
  | Seminar on veterinary public health
Mozambique  | Conference on bilharziasis
Nigeria  | Inter-regional course on freeze-dried smallpox vaccine production
  |  
REGION OF THE AMERICAS  |  
Chile  | Seminar on mental health (alcoholism)
Peru  | Seminar on nursing education
  |  
SOUTH-EAST ASIA REGION  |  
Afghanistan  | National orientation course in public health
India  | Conference on auxiliary personnel in sanitation
  | Inter-regional conference on smallpox
India, Thailand  | Study tour on medical education (biochemistry)
<table>
<thead>
<tr>
<th>Year/Place</th>
<th>Subject</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1960 (continued)</strong></td>
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<td>European Region</td>
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<tr>
<td>Austria</td>
<td>Seminar on nursing education for child care</td>
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<tr>
<td>Belgium</td>
<td>Seminar on child guidance</td>
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<tr>
<td>Bulgaria, France</td>
<td>Study tour on rural health administration</td>
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<tr>
<td>Czechoslovakia</td>
<td>Course on laboratory diagnosis of virus diseases</td>
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<td>Czechoslovak Cardiological Society/WHO symposium on the pathogenesis of essential hypertension</td>
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<td>Study tour on occupational health</td>
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<td>Symposium on laboratory and epidemiological studies of streptococcal infections in central Europe</td>
</tr>
<tr>
<td>Denmark</td>
<td>Meeting of national fellowships officers</td>
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<tr>
<td></td>
<td>Symposium on epidemiological aspects of air pollution</td>
</tr>
<tr>
<td>Federal Republic of</td>
<td>Course on radiation protection</td>
</tr>
<tr>
<td>Germany</td>
<td></td>
</tr>
<tr>
<td>Finland</td>
<td>Course on quality control of milk and milk products</td>
</tr>
<tr>
<td>France</td>
<td>Advanced course on radiation protection</td>
</tr>
<tr>
<td>Italy</td>
<td>Conference on malaria eradication in Europe</td>
</tr>
<tr>
<td></td>
<td>Inter-regional conference on techniques in epidemiology of mental disorders</td>
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<tr>
<td>Spain</td>
<td>Seminar for sanitary engineers</td>
</tr>
<tr>
<td>Sweden</td>
<td>Seminar on dental health services for children</td>
</tr>
<tr>
<td>USSR</td>
<td>Inter-regional course on natural foci of infection</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>Course on nursing administration</td>
</tr>
<tr>
<td></td>
<td>Course on radiation medicine for teachers in medical schools</td>
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<tr>
<td></td>
<td>ILO/UN/WHO course on the rehabilitation of physically handicapped adults</td>
</tr>
<tr>
<td>Yugoslavia</td>
<td>Seminar on the application of epidemiology in health administration</td>
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<tr>
<td><strong>Eastern Mediterranean Region</strong></td>
<td></td>
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<tr>
<td>Ethiopia</td>
<td>Inter-regional seminar on community water supply</td>
</tr>
<tr>
<td>Pakistan</td>
<td>Seminar on nursing</td>
</tr>
<tr>
<td>United Arab Republic</td>
<td>Meeting on paediatrics</td>
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<tr>
<td><strong>Western Pacific Region</strong></td>
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<tr>
<td>Australia</td>
<td>Seminar on tuberculosis</td>
</tr>
<tr>
<td>Japan</td>
<td>ILO/WHO seminar on occupational health</td>
</tr>
<tr>
<td>Malaya, Singapore</td>
<td>Inter-regional conference and study tour in public health</td>
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<tr>
<td>Philippines</td>
<td>Seminar on health laboratory services</td>
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<tr>
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<td>UN/WHO course on vital and health statistics</td>
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</table>
Year/Place

1961

African Region

Congo (Brazzaville)  Inter-regional conference on onchocerciasis
Niger  Symposium on hygiene and sanitation of housing

Region of the Americas

El Salvador  Seminar on public health nursing services
Guatemala  Seminar on nursing education
Honduras  Seminar on sanitary engineering
USA  Inter-regional conference on comparative studies on leukaemias
Venezuela  Conference of deans of schools of public health

South-East Asia Region

Burma  National course on nursing
Ceylon  Conference on nursing administration
India  National course on radiation protection
India, Indonesia, Singapore  Study tour on medical education (pharmacology)
Indonesia  Inter-regional conference on yaws
Thailand  Inter-regional course on freeze-dried smallpox vaccine production

European Region

Czechoslovakia  Inter-regional course on poliomyelitis
Denmark  Conference on the role of the nurse in mental health practice
Inter-regional refresher course on anaesthesiology
France  Conference on mortality statistics
Course on radiation medicine for teachers in medical schools
UNESCO/WHO symposium on the preparation of school-teachers for health education
Ireland  ILO/WHO seminar on health services in small factories
Symposium on planning and administration of national environmental sanitation programmes
Poland  Meeting on quality control of pharmaceutical preparations
Switzerland  ECE/FAO/IAEA/WHO inter-regional conference on the control of water pollution
Symposium on maternal and child health problems
Switzerland, Iran  Inter-regional course for administrative officers in malaria eradication programmes
Turkey  Conference on the control of communicable eye diseases
Inter-regional conference on leprosy
<table>
<thead>
<tr>
<th>Year/Place</th>
<th>Subject</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1961 (continued)</strong></td>
<td></td>
</tr>
<tr>
<td>USSR</td>
<td>Inter-regional travelling seminar on health education</td>
</tr>
<tr>
<td></td>
<td>Inter-regional travelling seminar on venereal diseases</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>Conference on the training of the doctor for his work in the community</td>
</tr>
<tr>
<td><strong>EASTERN MEDITERRANEAN REGION</strong></td>
<td></td>
</tr>
<tr>
<td>Pakistan</td>
<td>Course on waterworks design and operation</td>
</tr>
<tr>
<td>Sudan</td>
<td>Inter-regional conference on the training of health auxiliary personnel</td>
</tr>
<tr>
<td>United Arab Republic</td>
<td>Inter-regional course on occupational health</td>
</tr>
<tr>
<td><strong>WESTERN PACIFIC REGION</strong></td>
<td></td>
</tr>
<tr>
<td>Japan</td>
<td>Inter-regional course on radiation health and safety</td>
</tr>
<tr>
<td></td>
<td>Seminar on nursing administration</td>
</tr>
<tr>
<td>Philippines</td>
<td>Inter-regional course on leprosy</td>
</tr>
<tr>
<td></td>
<td>UNESCO/WHO seminar on child health and the school</td>
</tr>
<tr>
<td>Western Samoa</td>
<td>Course on integrated rural health for assistant medical officers</td>
</tr>
<tr>
<td><strong>1962</strong></td>
<td></td>
</tr>
<tr>
<td>Cameroon</td>
<td>Conference on malaria in Africa</td>
</tr>
<tr>
<td>Mali</td>
<td>Inter-regional course on leprosy</td>
</tr>
<tr>
<td><strong>AFRICAN REGION</strong></td>
<td></td>
</tr>
<tr>
<td>Jamaica</td>
<td>Seminar on advanced nursing education</td>
</tr>
<tr>
<td>USA</td>
<td>Inter-regional conference on the preparation of health workers in health education</td>
</tr>
<tr>
<td></td>
<td>Inter-regional course on enteric diseases</td>
</tr>
<tr>
<td><strong>REGION OF THE AMERICAS</strong></td>
<td></td>
</tr>
<tr>
<td>Burma, Ceylon, India</td>
<td>Study tour on medical education (microbiology)</td>
</tr>
<tr>
<td>Ceylon, India</td>
<td>Inter-regional seminar on smallpox</td>
</tr>
<tr>
<td>India</td>
<td>FAO/UNICEF/WHO inter-regional seminar on nutrition</td>
</tr>
<tr>
<td></td>
<td>Inter-regional conference on trachoma</td>
</tr>
<tr>
<td>Thailand</td>
<td>Seminar on health statistics</td>
</tr>
<tr>
<td><strong>SOUTH-EAST ASIA REGION</strong></td>
<td></td>
</tr>
<tr>
<td>Belgium</td>
<td>Seminar for sanitary engineers</td>
</tr>
<tr>
<td>Denmark</td>
<td>Meeting on exfoliative cytology in the public health control of cancer</td>
</tr>
<tr>
<td></td>
<td>Symposium on tropical medicine</td>
</tr>
<tr>
<td>Year/Place</td>
<td>Subject</td>
</tr>
<tr>
<td>--------------------</td>
<td>--------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>1962 (continued)</td>
<td>Inter-regional conference on public health aspects of radiation protection</td>
</tr>
<tr>
<td></td>
<td>Course on occupational health</td>
</tr>
<tr>
<td></td>
<td>Inter-regional travelling seminar on occupational health</td>
</tr>
<tr>
<td></td>
<td>Seminar on mental health and the family</td>
</tr>
<tr>
<td></td>
<td>Travelling seminar on public health administration</td>
</tr>
<tr>
<td></td>
<td>Conference on malaria</td>
</tr>
<tr>
<td></td>
<td>Symposium on hospital and domiciliary care</td>
</tr>
<tr>
<td></td>
<td>Conference on tuberculosis control</td>
</tr>
<tr>
<td></td>
<td>Seminar on the training and use of auxiliary nursing personnel</td>
</tr>
<tr>
<td></td>
<td>Symposium on the teaching of statistics to undergraduate medical students</td>
</tr>
<tr>
<td></td>
<td>Inter-regional course on natural foci of infection</td>
</tr>
<tr>
<td></td>
<td>Inter-regional travelling seminar on public health administration</td>
</tr>
<tr>
<td></td>
<td>Inter-regional travelling seminar on undergraduate medical education</td>
</tr>
<tr>
<td></td>
<td>Symposium on chronic non-specific lung diseases</td>
</tr>
</tbody>
</table>

**EASTERN MEDITERRANEAN REGION**

- Iran: Inter-regional conference on medical education
- Lebanon: Inter-regional meeting on malaria eradication

**WESTERN PACIFIC REGION**

- China (Taiwan): Seminar on rural health services
- Fiji: Course on vital and health statistics
- Japan: Inter-regional seminar on Japanese-B encephalitis and other arthropod-borne virus infections
- Philippines: Inter-regional conference on malaria
- Singapore: Inter-regional conference on techniques in epidemiology of mental disorders
- Singapore: Inter-regional meeting on cholera El Tor
- Singapore: Seminar on food sanitation
- Singapore: Seminar on maternal and child health nutrition

**AFRICAN REGION**

- Nigeria: Seminar on rural health
1963 (continued)

**REGION OF THE AMERICAS**

Argentina, Colombia, El Salvador

Mexico

Peru

**South-East Asia Region**

India

**European Region**

Austria

Bulgaria

Czechoslovakia

Denmark

Federal Republic of Germany

Finland

France

France, Federal Republic of Germany, Netherlands, Sweden, United Kingdom, Yugoslavia

Greece

Italy

Netherlands

Spain

Sweden

Switzerland

**Subject**

National courses on classification and coding of diseases

Seminar on nursing education

Seminar on teaching of public health in schools of veterinary medicine

Seminar on public health nursing services

Inter-regional course on laboratory and field techniques in human population genetics

Seminar on protein malnutrition in children

Conference on morbidity statistics

Inter-regional seminar on community water supply

Symposium on post-graduate medical education

Inter-regional course on home-care nursing services

Seminar on the in-patient psychiatric treatment of children

Course on rehabilitation of children

Seminar on public health demonstration, training and research areas

Travelling seminar for US professors on the organization and administration of schools of public health

Seminar on medical radiation (radiation protection and radiation measurements in relation to national health laboratory services)

Conference on the public health aspects of chronic rheumatoid arthritis and related diseases

Seminar on child health and the school

Inter-regional seminar on public health aspects of housing

Symposium on venereal disease control

ILO/WHO inter-regional symposium on the medical inspection of labour

Inter-regional symposium on criteria for air quality and methods of measurement

Meeting on the study of the incidence of leukaemia in patients treated with radiation for cancer of the cervix uteri
<table>
<thead>
<tr>
<th>Year/Place</th>
<th>Subject</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1963</strong> (continued)</td>
<td></td>
</tr>
<tr>
<td><strong>USSR</strong></td>
<td>Inter-regional seminar on respiratory virus diseases</td>
</tr>
<tr>
<td></td>
<td>Inter-regional travelling seminar on the public health aspects of housing</td>
</tr>
<tr>
<td></td>
<td>Inter-regional travelling seminar on the training and utilization of medical auxiliary personnel</td>
</tr>
<tr>
<td></td>
<td>Seminar on the health protection of the elderly and the aged and on the prevention of premature aging</td>
</tr>
<tr>
<td><strong>Yugoslavia</strong></td>
<td>Course on veterinary public health</td>
</tr>
<tr>
<td><strong>Eastern Mediterranean Region</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Ethiopia</strong></td>
<td>National courses on malaria eradication</td>
</tr>
<tr>
<td><strong>Iran</strong></td>
<td>Inter-regional course on enteric diseases</td>
</tr>
<tr>
<td><strong>Iran, Lebanon, Pakistan, United Arab Republic, India</strong></td>
<td>Inter-regional seminar on radiological health</td>
</tr>
<tr>
<td><strong>Pakistan</strong></td>
<td>Inter-regional seminar on the health aspects of industrialization</td>
</tr>
<tr>
<td><strong>Syria</strong></td>
<td>Seminar on vital and health statistics</td>
</tr>
<tr>
<td><strong>Tunisia</strong></td>
<td>Seminar on tuberculosis in infancy and childhood</td>
</tr>
<tr>
<td><strong>United Arab Republic</strong></td>
<td>FAO/UNICEF/WHO seminar on nutrition</td>
</tr>
<tr>
<td></td>
<td>Meeting on medical education</td>
</tr>
<tr>
<td></td>
<td>Meeting of national fellowships officers</td>
</tr>
<tr>
<td><strong>Western Pacific Region</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Fiji</strong></td>
<td>South Pacific Commission/WHO seminar on nursing</td>
</tr>
<tr>
<td><strong>Malaysia</strong></td>
<td>Course for malaria entomologists</td>
</tr>
<tr>
<td><strong>Philippines</strong></td>
<td>Conference of deans of medical schools</td>
</tr>
<tr>
<td></td>
<td>Seminar on health surveys and reporting</td>
</tr>
<tr>
<td></td>
<td>Seminar on immunization in the control of communicable diseases</td>
</tr>
<tr>
<td></td>
<td>Seminar on the role of the hospital in the public health programme</td>
</tr>
<tr>
<td><strong>1964</strong></td>
<td></td>
</tr>
<tr>
<td><strong>African Region</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Uganda</strong></td>
<td>Inter-regional seminar on the prevention and treatment of protein-calorie malnutrition</td>
</tr>
<tr>
<td><strong>Upper Volta</strong></td>
<td>Course on trypanosomiasis</td>
</tr>
<tr>
<td><strong>Region of the Americas</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Colombia</strong></td>
<td>Conference on rural water supplies</td>
</tr>
<tr>
<td><strong>Tobago</strong></td>
<td>Seminar on nursing services</td>
</tr>
<tr>
<td>Year/Place</td>
<td>Subject</td>
</tr>
<tr>
<td>-----------------</td>
<td>-------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>1964 (continued)</strong></td>
<td></td>
</tr>
<tr>
<td><strong>SOUTH-EAST ASIA REGION</strong></td>
<td></td>
</tr>
<tr>
<td>India</td>
<td>National course for nursing superintendents</td>
</tr>
<tr>
<td>India, Thailand</td>
<td>Study tour on medical education</td>
</tr>
<tr>
<td>Thailand</td>
<td>Inter-regional course on the fundamentals of nutrition and their application</td>
</tr>
<tr>
<td></td>
<td>Inter-regional seminar on haemorrhagic fevers</td>
</tr>
<tr>
<td><strong>EUROPEAN REGION</strong></td>
<td></td>
</tr>
<tr>
<td>Czechoslovakia</td>
<td>Symposium on viral hepatitis</td>
</tr>
<tr>
<td>Denmark</td>
<td>Conference on the application of automatic data-processing systems in health administration</td>
</tr>
<tr>
<td></td>
<td>Inter-regional course on nursing services administration</td>
</tr>
<tr>
<td></td>
<td>Symposium on sanitary inspection services</td>
</tr>
<tr>
<td></td>
<td>Symposium on the role of obstetricians in maternal and child health programmes</td>
</tr>
<tr>
<td>France</td>
<td>Symposium on schools of public health in Europe</td>
</tr>
<tr>
<td></td>
<td>Symposium on the teaching of the preventive aspects of medicine in medical schools</td>
</tr>
<tr>
<td>Italy</td>
<td>Symposium on occupational hazards in agriculture</td>
</tr>
<tr>
<td>Romania</td>
<td>Inter-regional course on enteric diseases</td>
</tr>
<tr>
<td>Switzerland</td>
<td>Inter-regional conference on the establishment of basic principles for medical education in developing countries</td>
</tr>
<tr>
<td>USSR</td>
<td>Inter-regional conference on midwifery services and education</td>
</tr>
<tr>
<td></td>
<td>Inter-regional seminar and course on rabies</td>
</tr>
<tr>
<td></td>
<td>Inter-regional travelling seminar on environmental sanitation</td>
</tr>
<tr>
<td></td>
<td>Inter-regional travelling seminar on obstetrics and gynaecology</td>
</tr>
<tr>
<td></td>
<td>Inter-regional travelling seminar on the organization of epidemiological services and their role in the control of communicable diseases</td>
</tr>
<tr>
<td></td>
<td>Inter-regional travelling seminar on the public health component in the training of medical personnel</td>
</tr>
<tr>
<td></td>
<td>Inter-regional travelling seminar on the scientific work of undergraduate medical students</td>
</tr>
<tr>
<td></td>
<td>Symposium on the toxicology of drugs</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>Course on geriatrics</td>
</tr>
<tr>
<td></td>
<td>Seminar on public health practice and the prevention of mental illness</td>
</tr>
<tr>
<td>Yugoslavia</td>
<td>Conference on public health administration</td>
</tr>
<tr>
<td></td>
<td>Conference on the endemic nephropathy of south-eastern Europe</td>
</tr>
<tr>
<td><strong>EASTERN MEDITERRANEAN REGION</strong></td>
<td></td>
</tr>
<tr>
<td>Iran, Pakistan</td>
<td>Inter-regional seminar on food hygiene, zoonoses control and veterinary public health practice</td>
</tr>
</tbody>
</table>
THE SECOND TEN YEARS

392

Year/Place

1964 (continued)

Libya
United Arab Republic
Burma, Ceylon, India, Singapore, Thailand
Malaysia
New Caledonia
Philippines

Subject

Conference on malaria in the Eastern Mediterranean and European Regions
Inter-regional course on enteric diseases
Travelling seminar on radiological health
Inter-regional seminar on tuberculosis
South Pacific Commission/WHO course on tuberculosis
Inter-regional seminar on cholera control
Seminar on methods to improve nutritional standards in villages
Seminar on national health planning
Seminar on the control of communicable diseases

African Region

Kenya
Nigeria
Uganda

FAO/WHO seminar on planning and evaluation of applied nutrition programmes
Course on trypanosomiasis
Meeting of professors of paediatrics

Region of the Americas

Brazil
USA

National courses on biostatistics
Inter-regional meeting on epidemiological studies in human radiobiology
Seminar on venereal diseases

South-East Asia Region

Ceylon
India
India, Thailand

Inter-regional malaria conference
Conference on nursing administration
Course on cholera control
Medical education study tour (paediatrics)

European Region

Bulgaria
Denmark
Hungary
Italy
Netherlands

Course in public health practice
FAO/WHO inter-regional course on meat hygiene
Inter-regional course on immunofluorescent techniques
Symposium on the estimation of hospital bed requirements
Conference on health statistics
FAO/WHO inter-regional meeting on planning and evaluation of applied nutrition programmes
Seminar for sanitary engineers
Seminar on paediatric education
Year/Place  
1965 (continued)

Norway  
Seminar on the early detection of cancer

Romania  
Conference on the prevention and control of cardiovascular diseases

Spain  
Conference on public health problems in Mediterranean countries

Switzerland  
Inter-regional conference on effective teaching methods in medical education

Inter-regional symposium on sanitary engineering education and training

Meeting on health recommendations regarding exposure to ionizing radiation

USSR  
Course on the medical and social aspects of the care of the elderly

Inter-regional seminar on occupational health in agriculture

Inter-regional seminar on organization of mental health services

Inter-regional travelling seminar on entomological methods in vector control

Inter-regional travelling seminar on plague control

United Kingdom  
Conference of chiefs of virological departments of public health laboratories

IAEA/WHO inter-regional conference on medical physics

Inter-regional course on the laboratory diagnosis of enterobacteriaceae

Inter-regional seminar on psychiatric diagnosis

Eastern Mediterranean Region

Ethiopia  
Inter-regional seminar on national health planning

Iran  
Course on cholera bacteriology

United Arab Republic  
FAO/WHO seminar on industrial canteens

Inter-regional seminar on the epidemiology, control and prevention of road traffic accidents

Meeting on vital and health statistics

Western Pacific Region

Philippines  
Inter-regional seminar on filariasis

Seminar on helminthic infections

Seminar on leprosy control

Seminar on nursing studies

Singapore  
Inter-regional seminar on public health programmes in radiation protection

1966

African Region

Cameroon  
Seminar on medical education

Kenya  
FAO/WHO inter-regional seminar on African trypanosomiasis
THE SECOND TEN YEARS

Year/Place

1966 (continued)

Subject

REGION OF THE AMERICAS

Brazil
Courses on the laboratory diagnosis of smallpox
Seminar on dental education

El Salvador
Symposium on administration of water supply services

USA
Inter-regional course on radiological health inspections
Inter-regional course on the use of computers in human genetics
Inter-regional seminar on prevention of the re-introduction of malaria

Venezuela
Seminar for directors of schools of nutrition and dietetics

SOUTH-EAST ASIA REGION

Burma, Thailand
Working seminars on medical education

Ceylon
National courses on radiation protection
Seminar on the teaching of preventive and social medicine

India
Conference of State engineers on rural water supplies
Course on cholera control
FAO/WHO inter-regional seminar on planning and evaluation of applied nutrition programmes in Asia and the Far East
Inter-regional course on cholera control
Seminar on hospital administration
Seminar on smallpox eradication

EUROPEAN REGION

Austria, Czechoslovakia
Travelling seminar on public health administration

Belgium
Symposium on collaboration between veterinary services and public health services

Denmark
Meeting on the early detection and treatment of handicapping defects in children
Seminar on the efficiency of medical care

France
Course on the medical and social aspects of the care of the elderly
Course on the physical therapy of children

Poland
Symposium on student health services

Portugal
Symposium on the education of the public health physician in relation to his work in the community

Sweden
Symposium on the use of electronic computers in health statistics and medical research

Switzerland
Course for industrial medical officers
Course at WHO for librarians from countries of the Eastern Mediterranean Region
Inter-regional study of the incidence of leukaemia in patients treated with radiation for cancer of the cervix uteri
Year/Place                      Subject

1966 (continued)

Turkey                           Course on cholera bacteriology
                                  Inter-regional seminar on advanced epidemiological methodology
USSR                             Inter-regional travelling seminar on community water supply
                                  Inter-regional travelling seminar on helminthic diseases
                                  Inter-regional travelling seminar on nursing
                                  Inter-regional travelling seminar on the preparation of teachers for medical schools
                                  Symposium on the control of virus diseases
United Kingdom                   Conference on the organization of general hospitals
                                  Meeting on the study of the prevalence of ischaemic heart disease

EASTERN MEDITERRANEAN REGION

Iran                             Inter-regional symposium on developmental work in community water supply
                                  Seminar on nursing
Kuwait                           Seminar on school health education
Lebanon                          Inter-regional course on cholera control
Pakistan                         Inter-regional course on cholera
United Arab Republic             Inter-regional seminar on cholera control
                                  Meeting on medical research

WESTERN PACIFIC REGION

Philippines                      Seminar on cholera control
                                  Seminar on health education
                                  Seminar on hospital medical records and statistics
                                  Seminar on integration of health services
                                  Seminar on training of auxiliary health personnel
Tonga                            Course on environmental health in the South Pacific

1967

AFRICAN REGION

Uganda                           Inter-regional course in methods and techniques for parasitic disease surveys
Upper Volta                      Seminar on cerebrospinal meningitis

REGION OF THE AMERICAS

Argentina                        Seminar on rabies
Argentina, Ecuador, Venezuela    Travelling seminar on leprosy
Bolivia                          Seminar on silicosis
Year/Place                     Subject

1967 (continued)               
Peru                           Seminar on teaching of preventive medicine and public health in schools of veterinary medicine
USA                            WHO/PAHO/International Biological Programme — inter-regional meeting on biology of populations at altitudes

SOUTH-EAST ASIA REGION

India                         Inter-regional course on cholera control
                                Inter-regional course on ergonomics
                                Inter-regional seminar on food-borne diseases and intoxications and food hygiene practice
                                Inter-regional seminar on water pollution control
                                Seminar on goitre control
                                Seminar on health statistics
                                Seminar on planning, implementation and evaluation of health education

Nepal                          Course for nursing personnel

Thailand                      Conference on nursing
                                Course on leprosy control

EUROPEAN REGION

Belgium                       Symposium on the teaching of epidemiology in medicine and public health
Czechoslovakia                Course on dental public health
                                Symposium on the health effects of air pollution
Denmark                       FAO/WHO inter-regional training centre on meat hygiene
                                Inter-regional course on malacology
                                Inter-regional course on planning and organization of in-service education programmes in nursing
                                Meeting on epidemiological study of stomach cancer
                                Meeting on the undergraduate teaching of basic medical sciences

Federal Republic of Germany   Symposium on methods of evaluation of public health programmes
France                        Conference on the health aspects of regional socio-economic development
                                Course for coding instructors
                                Inter-regional course on immunofluorescent techniques
                                Inter-regional seminar on psychiatric diagnosis, classification and statistics

Italy                         Symposium on human factors in road accidents
Netherlands                   Seminar on rehabilitation of patients with cardiovascular diseases
<table>
<thead>
<tr>
<th>Year/Place</th>
<th>Subject</th>
</tr>
</thead>
<tbody>
<tr>
<td>1967 (continued)</td>
<td></td>
</tr>
<tr>
<td>Poland</td>
<td>Symposium on pneumoconiosis</td>
</tr>
<tr>
<td>Poland, United Kingdom</td>
<td>Travelling seminar on psychiatric hospital care and rehabilitation</td>
</tr>
<tr>
<td>Switzerland</td>
<td>Inter-regional meeting on the genetics of primitive groups</td>
</tr>
<tr>
<td></td>
<td>Inter-regional meeting on routine surveillance for radionuclides in air and water</td>
</tr>
<tr>
<td></td>
<td>Inter-regional seminar on integration of community water supplies into planning for economic development</td>
</tr>
<tr>
<td>Turkey</td>
<td>Inter-regional conference on international co-operation in the prevention of cholera</td>
</tr>
<tr>
<td>USSR</td>
<td>Inter-regional seminar on air pollution control</td>
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<tr>
<td></td>
<td>Inter-regional seminar on organization of mental health services</td>
</tr>
<tr>
<td></td>
<td>Inter-regional travelling seminar on leishmaniasis</td>
</tr>
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<td></td>
<td>Inter-regional travelling seminar on plague</td>
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<tr>
<td></td>
<td>Inter-regional travelling seminar on the organization of medical care</td>
</tr>
<tr>
<td></td>
<td>Inter-regional travelling seminar on the training and utilization of medical assistants (feldshers)</td>
</tr>
<tr>
<td></td>
<td>Seminar on the organization of resuscitation and casualty services</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>Course for coding instructors</td>
</tr>
<tr>
<td></td>
<td>Course on coronary intensive care</td>
</tr>
<tr>
<td></td>
<td>Course on the medical and social aspects of the care of the elderly</td>
</tr>
<tr>
<td></td>
<td>Inter-regional seminar on organization and management of laboratory services</td>
</tr>
<tr>
<td>Yugoslavia</td>
<td>Inter-regional course on biological standardization</td>
</tr>
</tbody>
</table>

**EASTERN MEDITERRANEAN REGION**

| Ethiopia | Inter-regional conference on global impacts of applied microbiology |
| Iraq | Meeting on medical education |
| United Arab Republic | Meeting on health education |

**WESTERN PACIFIC REGION**

| China (Taiwan), Malaysia, Philippines, Republic of Korea, Republic of Viet-Nam Philippines Singapore | Travelling seminar on paediatric education |
| | ILO/WHO seminar on occupational health |
| | Inter-regional conference of directors of schools of public health |
| | Seminar on international quarantine |
| | Seminar on health planning in urban development |
### Annex 16

**NUMBERS AND DISTRIBUTION OF STAFF, 1957 AND 1967**

<table>
<thead>
<tr>
<th>Location</th>
<th>Number of staff at 31 December</th>
<th>Location</th>
<th>Number of staff at 31 December</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Headquarters</strong></td>
<td>1957 244</td>
<td><strong>South-East Asia Region</strong></td>
<td>1957 257</td>
</tr>
<tr>
<td>Internationally recruited</td>
<td>257</td>
<td>Internationally recruited</td>
<td>24</td>
</tr>
<tr>
<td>Locally recruited</td>
<td>433</td>
<td>Locally recruited</td>
<td>87</td>
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1 Including staff on loan to WHO or on leave without pay. Not including short-term consultants.
2 Including the staff of liaison offices with the United Nations and related agencies; rotational administration and finance staff; staff seconded to other organizations.
3 Including agents in the Democratic Republic of the Congo.
4 Not including staff financed exclusively from PAHO funds.
### ANNEX 16

#### Number of staff at 31 December

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#### SOURCES OF FUNDS

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¹ In 1957, the Expanded Programme of Technical Assistance.

* Not including staff on secondment or leave without pay (10 in 1957 and 48 in 1967).
### INCOME (ALL SOURCES) AND EXPENDITURE

#### INCOME

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<td>7. International Agency for Research on Cancer</td>
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#### EXPENDITURE

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<td>5. Other purposes</td>
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<td>6. International Agency for Research on Cancer</td>
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<td>7. Financing of Working Capital Fund</td>
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<td><strong>TOTAL — EXPENDITURE</strong></td>
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*The loans granted by the Swiss Federal Government and the Republic and Canton of Geneva towards the costs of the headquarters building are not included in this statement. As at the end of 1967, they amounted to $8,912,037.

**Deficits in the regular budget were covered by advances from the Working Capital Fund.
## Annex 17

### EXPENDITURE, 1958-1967

**US dollars**

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|       | 34 209 525    | 36 463 824    | 45 700 102    | 47 911 865    | 52 363 796    | 62 020 827    | 72 234 180    |

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<tr>
<td>ACC</td>
<td>Administrative Committee on Co-ordination</td>
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<tr>
<td>CCTA</td>
<td>Commission for Technical Co-operation in Africa</td>
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<tr>
<td>ECA</td>
<td>Economic Commission for Africa</td>
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<tr>
<td>ECAFE</td>
<td>Economic Commission for Asia and the Far East</td>
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<tr>
<td>ECE</td>
<td>Economic Commission for Europe</td>
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<tr>
<td>ECLA</td>
<td>Economic Commission for Latin America</td>
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<tr>
<td>FAO</td>
<td>Food and Agriculture Organization</td>
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<tr>
<td>IAEA</td>
<td>International Atomic Energy Agency</td>
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<tr>
<td>ICAO</td>
<td>International Civil Aviation Organization</td>
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<tr>
<td>ILO</td>
<td>International Labour Organisation (Office)</td>
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<tr>
<td>IMCO</td>
<td>Inter-Governmental Maritime Consultative Organization</td>
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<tr>
<td>INCAP</td>
<td>Institute of Nutrition of Central America and Panama</td>
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<tr>
<td>ITU</td>
<td>International Telecommunication Union</td>
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<tr>
<td>PAHO</td>
<td>Pan American Health Organization</td>
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<tr>
<td>PASB</td>
<td>Pan American Sanitary Bureau</td>
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<tr>
<td>UNDP</td>
<td>United Nations Development Programme</td>
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<tr>
<td>UNESCO</td>
<td>United Nations Educational, Scientific and Cultural Organization</td>
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<tr>
<td>UNICEF</td>
<td>United Nations Children's Fund</td>
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<tr>
<td>UNRWA</td>
<td>United Nations Relief and Works Agency for Palestine Refugees in the Near East</td>
</tr>
<tr>
<td>WMO</td>
<td>World Meteorological Organization</td>
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