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**THE COST OF SICKNESS  
AND THE PRICE OF HEALTH**



# THE COST OF SICKNESS AND THE PRICE OF HEALTH

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*“ Les dépenses faites pour la sauvegarde  
de la santé publique sont les seules produc-  
tives de la richesse puisqu'elles protègent le  
capital humain.”*

*A. CALMETTE*

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## CONTENTS

	Page
Preface . . . . .	7
1. The cost of sickness . . . . .	9
2. Methods of reducing the burden of disease, and the economic results attained . . . . .	18
3. Planning a national health programme and its cost . . . . .	49
4. Interrelationships of poverty and disease . . . . .	75
5. Programme of technical assistance . . . . .	85
Index . . . . .	95

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## PREFACE

As a result of recommendations of the Executive Board of the World Health Organization at its sixth session, special technical discussions were held at the Fourth World Health Assembly on the subject of "Education and training of medical and public-health personnel".

The success of these discussions led the Fourth Health Assembly to resolve that technical discussions should take place at future Health Assemblies. Subsequently the Executive Board decided that discussions at the Fifth World Health Assembly should open with a general presentation of the economic value of preventive medicine, to be followed by more detailed consideration of the methodology of health protection for local areas as determined by the health, social, and economic needs of those areas. The present paper has been prepared as a basis for the discussions on the first subject.

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## CHAPTER 1

### THE COST OF SICKNESS

The modern public-health movement was foreshadowed by Johann Peter Frank at the close of the 18th century and by a far-sighted group of French physicians in the early 19th century. It actually took shape as a result of the epoch-making report of Sir Edwin Chadwick in England a trifle more than a century ago.

The Great Sanitary Awakening, which began about 1850 and has achieved such astonishing results during the past hundred years, was based in the very beginning on recognition of the fundamental problem which is the concern of the present discussion—the relation between disease and poverty. The title of Chadwick's report was *The sanitary condition of the labouring population of Great Britain*. It was clear to these early pioneers that poverty and disease formed a vicious circle. Men and women were sick because they were poor; they became poorer because they were sick, and sicker because they were poorer.

Investment in health promised large dividends in life capital and those nations which had prosperous economies and financial capital to spare quickly applied this principle. In the United Kingdom and its Dominions, in the United States of America, in the Netherlands and the Scandinavian countries, outstanding results were achieved which will be noted in succeeding chapters. In other areas of the world, however, there was no surplus capital to invest in the profitable enterprise of health; and the vicious cycle of poverty and disease pursued its disastrous course unchecked.

The 20th century faces on a global scale the same problem which Chadwick faced on a national scale a century ago. He recognized that London could not continue to exist half rich and half poor, half sick and half well. Today men realize that the united world which they desire to build cannot be established and maintained by constituent nations handicapped by overwhelming burdens of poverty and disease.

The task is a vast and difficult one. It is particularly challenging to the World Health Organization, because it seems clear that a public-health programme adapted to the individual needs of each area offers the most economical method of breaking the chains of disease and poverty and initiating an upward cycle of social evolution. To accomplish the end in view, two things are necessary. The first essential is an analysis by each country—at whatever stage of health evolution it may be—of the most vital health problems which may be attacked with maximum results

at minimum cost. The second essential is the development of co-operative programmes of technical assistance, in which the more fortunate areas may co-operate with those of less advanced development for the common goal of a healthful, prosperous, and peaceful world.

### **Economic Burden of Premature Death**

The values of human health are not to be measured in monetary terms alone. The Preamble to the Constitution of the World Health Organization states that the enjoyment of the highest attainable standard of health is one of the fundamental rights of every human being. There is a moral, not merely a financial, issue involved.

It is clear, however, that it will be easier to obtain the support needed for an effective health programme if it can be shown that such a programme will not only enrich the individual human life but will also bring to the community which invests in health tangible economic benefits. Prevention is not only better than cure; it is also cheaper than cure. It is hoped that the efforts of the health administrator to obtain funds for protective health services may be facilitated by the data summarized in the present study.

The first measure of the economic burden of disease in a given country is the mean life-expectancy of its population. How premature death may be controlled is well exemplified by experience in those countries which have a public-health programme of long standing. The oldest mortality records which are available are those of Sweden. In that country the expectation of life in 1755-76 was 34 years. Conditions improved, gradually but slowly, to yield a mean life-expectancy of 41 years for 1816-40. With the development of public-health science in the 19th century, progress was much more rapid, giving a mean life-expectancy of 57 years for 1911-20 and of 66 years for 1936-40, representing a doubling of the length of human life.

In the USA, the mean life-expectancy in 1900-2 was 48 years for males and 51 years for females. By 1948 the corresponding figures had risen to 65 and 71 years respectively. According to the mortality tables of 1900-2, only three-quarters of the babies born would live to the age of 25. According to the 1944 tables, three-quarters of the babies born would still be alive at the age of 57 years.

US statistics have been recently reviewed in detail by Cohn & Lingg<sup>1</sup> with special reference to changes at various age-periods and to alteration in deaths by specific causes.

A recent WHO study<sup>14</sup> traces the trend of mortality-rates in 15 countries of Western Europe since 1900. All these countries show a progressive

and steady decrease in death-rates (except for wartime peaks in three cases). For 13 of these countries the analyst, Dr. M. Pascua, was able to compare actual mortality in 1900 and in 1947 on a population basis. At the mortality-rate which prevailed in 1900, there should have been 4,187,000 deaths in these countries in 1947; there were actually 2,430,000 deaths, a saving of 42%. The "saving in human life" was 60% among babies, 69% for children aged one to five, and 18% for persons of 75 years and over.

Various observers have attempted to translate the figures of life-expectancy into terms of financial value to the community.<sup>9, 20</sup> Dublin, Lotka & Spiegelman<sup>3</sup> have elaborated these figures in their book *The money value of a man*. The detailed analyses would apply only to conditions in the USA. There are, however, several conclusions of general application which may be deduced with reasonable certainty. The first of these conclusions is the obvious fact that the period of infancy and early childhood represents a drain upon family and community resources, an investment made toward a productive return in later life. Dublin, Lotka & Spiegelman assume that for the USA this non-productive phase of life extends to the age of 18 and estimate the investment in a child up to that age at nearly US \$10,000 for a family of \$2,500 annual income. In less prosperous areas, particularly in agricultural areas and those in which child labour in industry still persists, the child begins to be productive at a much earlier age. It would probably be safe to estimate, however, that up to the age of 15 years the investment made in a child greatly exceeds its economic return.

The US studies indicate that for high-income groups of the population the peak of earning capacity is not reached till the age of 55 years; but for low-income groups it is reached at 35-40 years of age. For these low-income groups, which represent the greater part of the population, the curve of earnings does not vary greatly between 25 and 65 years. It would be reasonable to assume that a death at 15 years or under represents a net economic loss to society; that a death at the age of 40 represents a net economic gain; and that a death at 65 represents a net gain more than twice as great.

Nations like Sweden and the USA, which have been able to make the relatively small investment involved in a sound public-health programme, have reaped a rich harvest in life capital as a result.

How different the picture is in other parts of the world is well illustrated by tabulations contained in a pamphlet recently issued by the US Department of State.<sup>17</sup> The table divides the world into three major areas, as follows: developed areas (Australia, Canada, New Zealand, USA, and Western Europe); intermediate areas; and underdeveloped

areas (large parts of Central and South America, nearly all Africa, and all Southern Asia). The figures are, of course, approximations. Official estimates of per capita income are only estimates and probably understate the economic status of areas where a high subsistence economy obtains. On the other hand, mortality-rates are also too low for underdeveloped areas, where a considerable number of infant deaths remains unrecorded. On balance, it is probable that the figures cited are not far from the truth. The relation between poverty and disease is overwhelmingly obvious.

	<i>Developed areas</i>	<i>Intermediate areas</i>	<i>Underdeveloped areas</i>
Proportion of world population . . . . .	One-fifth	less than one-sixth	two-thirds
Annual per capita income, in US dollars . . . . .	461	154	41
Food supply, calories per day . . . . .	3,040	2,760	2,150
Physicians per 100,000 po- pulation . . . . .	106	78	17
Life-expectancy at birth, in years . . . . .	63	52	30

An important United Nations document<sup>16</sup> notes that :

"In twenty-five other nations and most of the Non-Self-Governing Territories, comprising together substantially more than half the world's population, average income was less (often much less) than \$100 per year. Moreover, in many of the less developed countries the extremes of wealth and poverty are particularly striking, whereas in the more highly developed countries there has recently been a marked tendency towards greater equality of incomes." (page 4)

In countries such as China, Egypt, and India, where the average expectation of life at birth is in the neighbourhood of 30 years, only 54 out of every 100 children born ever reach the age of 15 and enter the period of maximum economic productivity. Of those who reach young adulthood all but 15 die or are incapacitated long before completing the normal span of working life at the age of 60. In contrast, in other areas, 92 out of 100 children born reach the age of 15, and 70 live a productive life-span to the age of 60. "Reduction of the death rate in the under-developed areas will mean an increase in the human resources available for production in proportion to population."<sup>17</sup>

In the fifteen countries of the more fortunate economic group the expectancy of life at birth was, for males, between 52 and 66 years. In eight countries of the least fortunate economic group the corresponding life-expectancy was between 27 and 48 years.

## Economic Burden of Physical and Mental Disability

In addition to the loss of life-capital through premature death, preventable disease imposes a heavy burden in the loss of productive power, due to non-fatal but disabling illness, and in increased needs for the medical and institutional care of those afflicted.

Unfortunately, quantitative studies of the extent of disablement, and estimates of the economic burden involved, have been made only in countries where the incidence of preventable diseases is comparatively low. They may serve as a background for future estimates of the handicaps suffered in less fortunate areas.

In the USA, somewhat intensive investigations carried out by the National Health Survey,<sup>18</sup> a project executed by the US Public Health Service with the aid of grants from the Work Projects Administration, indicated that, on a given day, 4.5% of the population were so disabled by illness or physical or emotional handicap of some kind as to be unable to go to work. Nearly a quarter of these (1% of the total population) had been incapacitated for a full year previous to the survey. This study was made in winter when respiratory diseases were prevalent and included family members away from home and under institutional care.

Another study by the US Committee on the Costs of Medical Care covered 9,000 families over a period of one year but did not include institutional cases.<sup>2</sup> In this sample, seven days a year were lost on account of illness. It has been estimated<sup>19</sup> that between \$3,000,000,000 and \$4,000,000,000 (between 1% and 2% of the national income) is the annual cost of temporary and permanent disability in the USA.

Finally, there remain, of course, the large sums involved in the care and treatment of disease. It has recently been reported that in 1949 the USA had a total national income of \$217,000,000,000 of which \$10,600,000,000 (5%) was spent on medical and institutional care of the diseased.<sup>5</sup>

The economic burden incurred on account of certain individual diseases reaches staggering proportions. Deaths from tuberculosis have been reduced to about one-tenth of what they were a century ago; but they still cost the USA 1,000,000 years of future working-life and \$350,000,000 a year for medical care and related services.<sup>12</sup> The annual loss of income from male cases of paresis alone has been estimated at \$112,000,000.<sup>8</sup>

Macchiavello<sup>10</sup> has estimated that, in Ecuador, economic loss due to shortened duration of life costs that country 200,000,000 sucres (13.5 sucres = US \$1.00),<sup>a</sup> premature disablement another 100,000,000 sucres, and temporary loss of productive capacity 150,000,000 sucres.

<sup>a</sup> Unless otherwise specified, the exchange rates given are those used by WHO for accounting purposes, in accordance with the list of 16 July 1951. — Ed.

A Swedish economist<sup>11</sup> has recently demonstrated that illness costs that country more than 1,000,000,000 kroner (5.18 kroner = US \$1.00) a year, amounting to \$50 per capita per year.

Ewing<sup>4</sup> estimates that the annual cost of illness in the USA reaches the following staggering total :

	<i>US dollars</i>
Cost of premature death . . . . .	11,000,000,000
Cost of total disability . . . . .	11,000,000,000
Cost of partial disability . . . . .	11,000,000,000
Cost of short-term illness . . . . .	5,000,000,000
Total . . . . .	<u>38,000,000,000</u>

As to the economic results involved in actual programmes of disease control, Hanlon<sup>7</sup> cites several striking examples. An intensive campaign against diphtheria in New York City between 1929 and 1939 reduced the cases of this disease from 14,000 to 543 and the annual deaths from over 1,000 to 22. The hospital, medical, and nursing bills for the care of diphtheria in 1939 were only about \$44,000. If to this figure is added the *total* cost of the diphtheria campaign for ten years, the figure was under \$500,000, or less than half of the medical, hospital, and nursing costs for the care of diphtheria in 1920 (\$1,027,000). In Detroit, a five-year programme for the control of tuberculosis cost \$200,000 a year, and saved \$1,400,000 a year in sanatoria costs alone. Between 1911 and 1925, the Metropolitan Life Insurance Company spent over \$20,000,000 on health education, early diagnosis, and nursing service among its policy-holders. During this period, the death-rate among these policy-holders decreased more than 30%—a decrease twice that of the corresponding population as a whole. It was estimated that the financial saving in insurance claims during this period amounted to \$43,000,000.

Hanlon himself presents an intricate but highly suggestive series of computations, taking into account various health risks and costs of living, which indicate that in the USA the cost of child-birth, and the bringing-up and education of, and provision of recreational facilities for, a child up to the age of 18 years costs \$20,055, with due allowance for interest on the amounts expended. The net prospective earning-power of the individual after the age of 18 (with accumulating interest but with his cost-of-living deducted) is estimated at \$29,000, from which may be subtracted \$15,600 for medical costs, and for risk of premature death and disability, with interest on these items. Thus, the child who dies before 18 represents (under the conditions obtaining in the USA) a net economic loss varying from \$800 (if the death is in child-birth) to \$20,000 (if the death is at the age of 18) ; while the person who lives beyond 18 represents during the rest of his life a net economic gain of \$34,000 (beyond his own actual living costs).

If such heavy burdens of preventable disease are involved for a country where the more outstanding diseases have been effectively controlled, it is clear that corresponding handicaps must be very much greater in less favoured regions. There are many areas where the toll of tuberculosis is ten times as high as in the USA. There are other areas where each summer four-fifths of the total population is incapacitated by attacks of malaria. There are others where a quarter to a half of the infants born die before reaching the age of 25 years, and where the total mortality is 30 per 1,000 or, among the less fortunate economic groups, 50-60 per 1,000. It would be helpful, as a solid basis for planning the health programme of the future, to estimate the economic burden incurred under such circumstances.

The United Nations report,<sup>16</sup> to which reference has been made above, reminds us that improvement in agricultural practice, such as in varieties of rice,

“beneficial as this would be, cannot achieve its full effect in areas where those who plant and harvest the rice are incapacitated by malaria, a disease which affects 300 million persons per year, accounts for 3 million deaths and is responsible for a work loss of twenty to forty days per person per year. Irrigation and drainage programmes are directly connected with such a disease as schistosomiasis, which is contracted through infection from polluted water. Such diseases prevail over wide areas of the African, Asian and American continents; it has been estimated that in the Middle East alone from 20 to 30 million persons, or 90 per cent of the rural population, are affected.” (page 25)

Dr. R. M. Morris, Secretary for Health, Southern Rhodesia, has recently reported in a communication to WHO that in his country the loss of man-power due to malaria amounts to 5%-10% of the total labour force of that country and that its heaviest incidence occurs just at the peak period of agricultural production. He also states that 100,000 man-days of production are lost each year through the ravages of venereal diseases.

Sinton<sup>15</sup> has calculated that malaria in India involves an economic loss of £80,000,000 (£1 = US \$2.80) a year. A study by Frimodt-Moller<sup>6</sup> in South India showed over 1% of the population suffering from tuberculosis, with a mortality-rate from this disease of 253 per 100,000.

Wright<sup>21</sup> estimates that bilharziasis costs Egypt approximately £E 20,000,000 (£E 1 = US \$2.87) per year, and decreases the productivity by 33%. He cites the case of a sisal estate in Tanganyika, where in a representative month 40.5% of the workers applied for treatment at the company hospital.

Dr. R. G. Padua, Under-Secretary of Health, Philippines,<sup>13</sup> in the discussions at the Fourth World Health Assembly, gave a vivid and comprehensive picture of the situation in the Philippines. He stated that, in a total population of 20,000,000 people, there were 2,000,000 victims of

malaria (with 10,000 annual deaths) and 1,300,000 sufferers from tuberculosis (with 35,000 annual deaths). He estimated the economic loss due to death and disability from these two diseases at \$660,000,000 or \$33 per person per year (on the basis of \$2,000 for each death and \$1.50 a day for disability).

How serious the health problem may be in countries where an initially low economic status has been intensified by war conditions is suggested by data recently submitted to WHO by the Medical and Health Service of Burma. In this country in 1949 a group of municipal areas reported death-rates of 2.2 per 1,000 for malaria, 2.1 per 1,000 for dysentery, and 1.9 per 1,000 for tuberculosis. Comparing the years 1947 and 1949, the birth-rate rose from 33 to 38 per 1,000, but the death-rate rose from 32 to 48 per 1,000 giving, for the latter year, a net loss of population of 10 per 1,000. The infant mortality-rate rose from 298 to 351 per 1,000. These statistics are, of course, approximate and refer only to municipal areas, so that mortality-rates are no doubt swollen by immigrants coming to the towns for hospitalization. Nevertheless, they indicate an appalling problem for the countries actually concerned.

It is certainly clear that the cost of preventable diseases imposes a staggering burden upon the human race.

Every step that can be taken toward lessening this burden will not only diminish suffering and prolong human life; it will also increase productivity and promote prosperity. This prosperity, in turn, must not be considered as an ultimate end in itself. If wisely conducted, economic improvement may make it possible for peoples—limited in the past to a struggle for bare existence—to enjoy a fuller and a richer existence. “That they might have life, and that they might have it more abundantly” is the objective of the programme of public health.

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## CHAPTER 2

### METHODS OF REDUCING THE BURDEN OF DISEASE, AND THE ECONOMIC RESULTS ATTAINED

Progress made in the public-health sciences during the past half century has made it clear that the heavy burdens of disease can, in large measure, be lifted by the application of scientific knowledge already available; and each year the results of public-health research are broadening the area of possible control.

#### Review of Achievements in Environmental Sanitation

The most dramatic results have been attained in the sphere of environmental sanitation, particularly through improvements in water-supply and waste disposal and in the control of the arthropod vectors of disease.

##### *Intestinal diseases*

A substantial part of the reduction of mortality-rates in Western Europe and North America has been due to purification of water-supplies and improvement in the disposition of faecal wastes. In these areas, not only cholera and typhoid fever, but also the various forms of dysentery, have almost disappeared; and the rare cases of intestinal infection which occur are due to personal contact or food-handling by healthy carriers.

In Latin America striking results have been achieved in various countries in co-operation with the national health agencies and the Institute of Inter-American Affairs. In the Amazon Valley of Brazil there was an area two-thirds the size of the USA in which only two cities had adequate and safe public water-supplies: <sup>62</sup>

“The incidence of typhoid fever and other water-borne diseases was extremely high, as was the infant mortality rate and intestinal parasite infection rate. One of the most important parts of the engineering and sanitation phase of the work has been construction of safe public water supplies in the smaller communities, ranging in size from 500 to 10,000 inhabitants.” (page 156)

In one of these towns, where there had been 20-30 cases of typhoid fever each year, not a single case occurred after the installation of a small and economical water-supply. In Mexico, at a ceremony inaugurating

the installation of nine new water-supply systems in 1948, a Cabinet Minister said :<sup>62</sup>

"Water supplies and storage services in our cities are very important when we consider that 22 percent of the general mortality rate is caused by waterborne diseases. In 1940 less than 1 percent of the cities and towns in Mexico had water supply systems and only 5 of these cities and towns had really potable water." (page 157)

An interesting programme is now under way for rendering safe the village water-supplies of rural Iran by a simple and inexpensive filter devised for the purpose.<sup>62</sup>

Some of the earliest and most striking demonstrations of the possible achievements of sanitary reform were obtained in the international campaign for the control of hookworm disease, initiated by the Rockefeller Foundation nearly forty years ago. Balfour,<sup>8</sup> for example, quotes a report by Clayton Lane on such a campaign in India. He estimated that 45,000,000 workers in that country were suffering from hookworm disease and that the annual earnings of these workers amounted to 4,500,000,000 rupees (4.76 Rs = US \$1.00). An intensive control programme in the Darjeeling district was believed by the managers of a large tea-garden to have increased labour efficiency by over 25%. If the figure were placed at only 10%, the application of a similar programme to all India would have increased production to the value of £30,000,000 a year.

As a more recent example of the fruits of sanitary handling and disposal of excreta, a programme carried out in Peru on the Amazonian watersheds may be cited.<sup>62</sup> Before the campaign, 99% of the school-children in the area were infected with intestinal parasites. Four years later the percentage infected with hookworm had fallen from 99% to 58%.

A competent medical investigator has pointed out that in certain semi-tropical countries the worms infesting the population metabolize a substantial fraction of the food ingested by their human hosts.<sup>33</sup> A considerable proportion of the work of a sick peasantry goes into the cultivation of food for the worms that make them sick.

Control of louse-borne diseases was admirably demonstrated in Naples in 1944. Typhus infection had been introduced from North Africa, and by January 50 cases a day were developing in the city. Dusting with DDT was introduced and, in the course of a few weeks, 1,300,000 persons were thus disinfested. By the end of March the epidemic, which might have spread all over Europe, was at an end. During the present year notable results have been achieved in the control of typhus in Afghanistan by similar methods.

Paul Bierstein, leader of a WHO malaria-control demonstration team in India, reported that the control of an epidemic of plague in Shimoga

Town was effected by the use of residual insecticides at an expense of 0.17 rupee per capita.

### *Mosquito-borne diseases*

The control of yellow fever in the urban areas of South America represents another notable victory of sanitation. Jungle fever provides a basic reservoir of infection—which, so far as is known, cannot be eliminated either in South America or in Africa. Cities, however, where the domestic *Aedes aegypti* is the only effective carrier, have been freed from yellow fever for many years. Soper & Wilson<sup>58</sup> cite data for 21 Brazilian cities. The total population of these 21 cities was 3,500,000, and the total number of houses approximately 784,507. Before mosquito-control measures were put into force (in 1937) 200,000 of these premises in the fourth quarter of the year and nearly 500,000 in the second quarter were found to be breeding *aegypti* mosquitos. After the eradication programme in 1938, the highest number of infested premises did not exceed 13 in any quarter of the year; and in 1939-41, the number of infested premises varied from 0 to 8, for different quarters, out of the nearly 800,000 premises involved.

In malaria control, convincing experience is available from every continent on the globe, and in many instances it is possible to obtain at least some measure of the economic advantages which have been attained.

The most dramatic demonstration of control possibilities has been made in connexion with the transmission of malaria by *Anopheles gambiae*.<sup>49, 57</sup> Twice this African mosquito, which is a peculiarly deadly agent of disease transmission, has been introduced into an area in which it was not indigenous. This insect was brought into Brazil (probably by ship) in 1930. It spread over an area of 12,000 square miles (31,070 km<sup>2</sup>), and, in 1939, 114,000 persons were treated for malaria in this region. A vigorous campaign by the Brazilian Government, with co-operation from the Rockefeller Foundation, completely eradicated the invading mosquito in the next two years. In 1942 the same dangerous mosquito found its way northward by way of the Nile Valley to Egypt and caused the most serious epidemic of malaria in the history of that country with 135,000 deaths. Reports from one plantation indicated a monetary cost of \$600,000, representing the loss of one-half of the wheat crop and one-third of the sugar crop.<sup>62</sup> By February 1945, *A. gambiae* had been entirely eliminated from Egypt (in part, perhaps, as a result of favourable climatic conditions) and the imminent danger of its spread to other Mediterranean countries had been checked.<sup>54</sup>

With indigenous mosquitos, complete elimination of the vector is much more difficult; but reduction of the numbers of mosquitos to a point where actual transmission of disease does not occur has been achieved in

many areas. Certain aspects of this experience have been admirably reviewed by Pampana.<sup>47</sup>

So far as South America is concerned there is the following record. In Chile, malaria has been completely eradicated since April 1945, and the most important mosquito vector has apparently disappeared.<sup>48</sup> In Bolivia, DDT treatment in five affected areas (at a cost of \$0.70 per inhabitant) reduced the infection-rate in two years by 73% and the parasite-rate by 86%. A recent report to WHO from this country indicated that, in Bolivia as a whole, nearly 12% of all cases of sickness are due to malaria, but that in DDT-treated localities, with initial spleen-rates of 80% and parasite-rates of over 40%, both these rates have been reduced to less than 5%. Twenty-three localities of Brazil showed between 1945 and 1949 a reduction of malaria to 4% of its earlier prevalence.

For British Guiana, Giglioli<sup>29</sup> provides the following computations. In 1943 the cost of hospital treatment of malaria amounted to \$1.47 BWI (BWI \$1.71 = US \$1.00) per inhabitant. At an annual cost of \$0.63 per capita for DDT control, the hospital bill was reduced for 1947 to \$0.32 BWI per capita. Both *Anopheles darlingi* and *Aedes aegypti* have been entirely eliminated from the coastal zones. In Peru, DDT residual spraying in four highly malarious regions reduced parasite indices to less than 2% of their earlier values. Fernandez<sup>24</sup> computes that to extend this programme to the entire country would cost 21,000,000 soles (15.24 soles = US \$1.00) while malaria now costs the country 400,000,000 soles. In Venezuela, control by residual spraying reduced the annual incidence of malaria from 22% of the population to less than 1%.<sup>62</sup>

Long-term residual spraying programmes are less dramatic than eradication programmes but far more important in the long run.

In the USA, malaria was widely prevalent a century ago, even in the northern States. As early as 1913, an active control programme was sponsored by the Rockefeller Foundation in two southern mill villages with notable success. Carter (quoted by Wilson<sup>71</sup>) noted that :

"The first work done at Roanoke Rapids was done by the cotton mills. The managers stated in a letter to me that they did not undertake this as a business matter, but because they were sorry to see [so many] people so miserable. But that as business men they had never before received such enormous returns on any investment ... They showed over a hundred percent the first year ...

... Malaria, like any other health problem, is primarily a problem of the people who suffer from it, and also a problem of the business men who must deal and trade with those people." (page 168)

Thus, disease in Asia or Africa or the South Seas may create economic problems for merchants in London or New York. Dr. Paul Russell (personal communication) made computations of what he called "the malaria

tax" on imports to the USA. He estimated that on a limited group of commodities, brought from malarious regions to the USA, the extra cost to the US purchasers due to disease in the exporting countries was \$750,000,000 a year.

So far as the USA itself is concerned, even in 1936, 13 southern States reported more than 130,000 cases of malaria, with over 4,000 deaths per year in 1934 and 1935. In 1949, 4,000 cases were reported, and check-up studies indicated that only a fraction of these cases were really malaria cases. Out of 28,872 suspicious blood-samples submitted to the laboratories of the US Public Health Service between July 1948 and June 1949 only 4 actually showed malaria parasites.

From the Philippines comes the following extremely suggestive report : <sup>64</sup>

"Reduction in school absenteeism. — 1946 surveys showed absenteeism among students of primary and grade schools to be from 40 per cent to 50 per cent daily, practically all of which was attributed to malaria. Surveys in 1949 showed that absenteeism among this group had dropped to approximately 3 per cent daily.

Reduction in production cost. — During the surveys conducted in 1946, it was revealed by the management of numerous large enterprises that it was necessary to maintain a constant labor enrollment panel in the ratio of approximately 300 employees for each 200 men actually required to conduct daily operations at that time. This daily absenteeism of 35 per cent was attributed largely to malaria.

During the course of surveys conducted in 1949, industrial enterprises reported that their daily time lost from all causes barely exceeded from 2 per cent to 4 per cent of their current payroll. During the course of the 1949 inquiries, it was also of interest to note that the comment was made to the effect that a given task was then possible with 75 per cent to 80 per cent of the number of laborers required for a similar task in 1946." (page 63)

In Europe, Greece and Italy present similarly striking case-histories. Greece, as far back as any specific records go, has been heavily infested with malaria. In 1946 the United Nations Relief and Rehabilitation Administration (UNRRA) introduced DDT spraying (as well as continuing methods of larval control). Co-operative efforts have been applied by the Greek Government in collaboration with WHO and an Economic Co-operation Administration (ECA) Mission.<sup>67</sup> In 1942 there were at least 2,000,000 cases of malaria in Greece; in 1949 there were 50,000. It is estimated that 30,000,000-60,000,000 man-work-days a year have been saved by this operation, which is equivalent to adding 100,000-200,000 workers a year, with no additional mouths to be fed.<sup>62</sup> Recently, a team of six malaria experts who went into a typical area of Greece, with a very small outlay for DDT and spraying equipment, so reduced malaria that crop production in the area increased by 20%-30%. The cost of residual spraying and larvicidal measures in 1948 was \$0.28 per inhabitant. Dr. Oswald Hedley<sup>32</sup> of the ECA mission to Greece notes that

before the war the Greek people consumed more than one-fifth of the entire world output of quinine at an annual cost of \$1,300,000. The present annual cost of DDT is \$300,000.

The story of malaria in Italy is almost as striking. Before 1933, from 2,000 to 20,000 malaria deaths per year were reported, with rates from 5 to 71 per 100,000. The number of deaths dropped to nil in 1949.<sup>47</sup> In Sardinia a particularly significant experiment has been conducted by the Rockefeller Foundation, aimed at the complete eradication of the local vector, *Anopheles labranchiae*.<sup>38</sup> Sardinia has always been the worst malarious area in Italy and one of the most malarious areas in the world. The Rockefeller Foundation began work in certain Sardinian villages 25 years ago, but a vigorous island-wide campaign was launched in 1946. The anopheles has not yet been fully eliminated from the island, but transmission of disease has ceased. Not a single case of primary malaria could be discovered in 1949. The economic aspects of this programme can be realized from the fact that a plan is now under way for settling 1,000,000 Italians from the overcrowded mainland on this island, where malaria has been the only barrier to rich agricultural development.

In Asia, achievements in Ceylon have been highly dramatic. Malaria has in the past represented the major public-health problem on this island,<sup>69</sup> and here the use of DDT was introduced (for the first time in Asia) on a national scale in 1947. The cost was about \$0.22 per person in the area treated. The death-rate—from all causes—varied between 20 per 1,000 and 24 per 1,000 before 1947. In the three years since the DDT programme was introduced the corresponding rate has been between 12.6 and 14.3 per 1,000. This means that 50,000 lives a year have been saved. Infant mortality has been halved since 1946.<sup>49</sup> Incidentally, it may be remarked that—as a result of malaria control and other factors—the population of Ceylon has increased by 2,000,000, creating somewhat serious problems of re-settlement. This fact illustrates the interdependence between public-health work and social and economic planning, which will be discussed in later chapters of this study.

Excellent results have been attained in malaria control in the Bombay Province of India. In the district of Kanara <sup>68</sup> both spleen-rate and parasite-rate have been reduced to one-tenth of their earlier values.

In Pakistan, one season's work on malaria control in an Eastern Bengal area is said to have increased the rice crop yield by 15%. Dr. G. Gramiccia, leader of a WHO malaria-control demonstration team, has reported that the overall cost of malaria and kala-azar control operations in Iswarganj Thana has come to 0.5 rupee (3.32 Rs = US \$1.00) per person per year and that the saving of wages lost through malaria would pay for all the expenses of DDT spraying, without taking into account savings on drugs and funerals or the economic benefits due to increased

agricultural production. A canvass of 360 families indicated that 80% of the family heads were agreeable to contributing 0.3 rupee per head per year for the continuation of the programme.

Such demonstrations as this have been made in somewhat restricted areas, and their ultimate significance will depend on their success in promoting more general programmes on a long-term basis. It is encouraging to note that the work of a malaria team for two years in Pakistan has been so successful that it will be continued and extended to two other areas by the national government. In Thailand, where Dr. P.B. Vejajakar, Minister of Public Health,<sup>66</sup> reports a reduction of malaria case-rates from 50 per 1,000 to 7 per 1,000 in one year for an area where WHO and the United Nations Children's Emergency Fund (UNICEF) jointly worked, the government has initiated a comprehensive five-year programme of control.

In Africa, the island of Mauritius represents a clear-cut demonstration of malaria control. Here, at a cost of 1.96 rupees (4.76 Rs = US \$1.00) per inhabitant, *Anopheles funestus* (the chief malaria carrier) and *Aedes aegypti* have been practically eliminated, and the general death-rate from all causes has been halved.<sup>47</sup>

The continental problem of malaria control has been somewhat confused by a school of theorists who maintain that completely infected and immunized populations are better off than they might be with partial control-measures. It may be that, where funds are limited, non-hyperendemic areas should be given priority; but Macdonald,<sup>40</sup> in a helpful study of this problem, points out the tremendous burden of morbidity in so-called hyperendemic areas. In typical employed groups, cases of infection occurred at rates between 22 and 183 annual attacks (or relapses) per 100 persons employed, each illness causing three to four days' absence from work. Macdonald's study of schoolchildren in such an area showed that one-third to one-half of the children in *actual attendance* were suffering from malarial pyrexia. In four major areas (Gambia, Gold Coast, Nigeria, and Uganda) from 30% to 42% of the total population is under 15 years of age. As Macdonald says:

"The meaning of these figures is that the population spends a major part of its effort in the fruitless production and partial up-bringing of children who do not survive to become the 'economic units' who are said to be the important group of the population. Lynn Smith summed up part of the situation in the statement that, as a result, every breadwinner has more mouths to feed than is the case in areas where persons in the dependent ages do not make up such high proportions of the population."

Cambournac<sup>14</sup> cites most striking results obtained as a result of large-scale malaria-control programmes both in the Transvaal and in Natal. Before the campaigns 30%-40% more workers than necessary were recruited in order to leave a margin for absenteeism on account of sickness, whereas today, with the disappearance of malaria, only the necessary number is



recruited, thus effecting a gain of at least 30%. According to Annecke,<sup>6, 7</sup> only a very short time ago the effect of malaria in certain regions of the Transvaal was so serious that the most fertile zones along the Drakensberg escarpment could not be successfully exploited on account of the ravages of this disease. Now that residual spraying has brought about the almost complete disappearance of malaria, the town of Groblersdal has grown very rapidly and more than 300 families are established where previously there were only very few. In the hyperendemic zones of Pongola—a few years ago an almost deserted region—the disappearance of malaria gives a fair chance that within five years the area will be producing about 20% of the sugar-cane grown in the Union of South Africa, and in the frontier zones of Bechuanaland and of the Limpopo 15,000-20,000 acres (6,050-8,100 ha) now produce tobacco and ground-nuts. In the region of Letaba, one of the richest on the continent, there are now 12,000 acres (4,850 ha) of irrigated land, whereas in 1940 there were only 700 acres (280 ha). In the Tuinplaats area the price of the ground, which was £5 per “morgen” (about 2 acres), has risen to £22 and production has increased by 400%. This great development is attributable entirely to the disappearance of malaria, and some idea of the improvement effected in the country may be gathered from the fact that the General Post Office annual returns for Tzaneen have increased from about 5,500 units in 1938 to 12,200 in 1949.

In Southern Rhodesia, Blair<sup>9</sup> observed that absenteeism from work was about 25% during the harvest season in the Mazoe valley, whereas malaria is now negligible as a cause of absence in the region treated with BHC, and the co-operation of the inhabitants of the same region in the malaria-control programme has been due in great part to the improvement they have seen as a result of the antimalaria campaign.

In the Copperbelt area of Northern Rhodesia statistics show that, for a comparable number of workers in the mines before and after the drainage work commenced in 1935, the number of working days lost, which had already considerably decreased, was 2,030 for the year 1945. In 1946 the drainage work was extended still further and treatment of houses with DDT began. In 1949 the number of working days lost was 270.

In Africa, as in many other areas, the importance of concentrated international action in the field of malaria control is obvious. Sir John Hathorn Hall<sup>31</sup> pointed out at the Malaria Conference in Equatorial Africa, held in Uganda last autumn, that if there is to be a successful programme of control in Equatorial Africa

“it must be planned and executed on the widest inter-territorial basis. Where there are no natural boundaries preventing the spread of an insect-borne disease, its eradication from a continental area will clearly require the most co-ordinated form of human effort.”

Dr. L. A. Scheele, Surgeon General of the US Public Health Service,<sup>51</sup> in his presidential address at the Fourth World Health Assembly, estimated that on a global basis over 50,000,000 people have already been protected against malaria by the application of DDT.

It seems clear that the expenditure of \$0.20-\$0.25 a year per inhabitant will result, in many parts of the world, in a phenomenal decrease in both morbidity and mortality from malaria. The corresponding increase in individual efficiency and national prosperity is less easy to measure. Perhaps the most astonishing claims for the economic gains from an antimalarial campaign (by conventional antimosquito measures, before the days of DDT) were made by Balfour.<sup>8</sup> He reported that an antimalarial campaign on a rubber estate in the Federated Malay States reduced the malaria death-rate among the workers from 232 per 1,000 population in 1911 to 3 per 1,000 in 1923. The cost of medical care was \$12,444 Malayan (\$3.06 Malayan = US \$1.00) in 1911 and \$6,209 Malayan in 1923, while the cost of control measures amounted to \$9,531 Malayan in the latter year. The output of rubber increased, on the other hand, from 100 pounds (45 kg) per worker to 1,700 pounds (770 kg) per worker. Balfour gives the following picture of the population before and after control measures were introduced :

"In 1911 there were 870 coolies with practically no dependants. They were miserable, crawling wrecks with narrow shoulders and prominent bellies. They lived in squalid, dirty lines, void of gardens. They possessed no livestock and, saddest thing of all perhaps, no children born alive—a miserable and degraded folk without hope, without ambition. In 1923 there were only 450 coolies, but these were doing thrice the work accomplished in 1911. Their dependants were represented by 220 healthy old people and young children. Births, as the report puts it, have become a chronic habit. The coolies were fat, well liking, and clean. They had fine gardens, over sixty head of cattle, hundreds of goats, and thousands of chickens."

This was, of course, a small-scale experiment, conducted under very extreme conditions, but it is possible that there are parts of the world where such extreme conditions still exist.

The gains reported above from malaria control have, no doubt, in some instances been influenced by other factors, such as variations in seasonal conditions affecting crop yields, and care must be taken to avoid too rosy promises based on over-optimistic interpretations. Much more careful studies are needed to establish reliable quantitative estimates of economic return. The general consistency of reports from various countries and, particularly, the evidence from Italy and Greece leaves little doubt, however, as to the fact that malaria control is an investment which promises returns of very substantial economic value. Its possible importance in countries such as Burma, where over 600,000 cases of malaria have been hospitalized in a year with a malaria death-rate of 214 per 100,000 ;<sup>56</sup>

as India, where 60% of the population of Bengal has malaria each year with over 1,000,000 deaths a year in the whole peninsula; and as China, where malaria is a major health problem; can scarcely be over-estimated.

As the Secretary-General of the United Nations has said : <sup>59</sup>

"The control of malaria would not only save lives, reduce morbidity, improve general health and raise the living standard of the malarious countries. Such control would also contribute to the expansion of the world's food supply thereby illustrating one of the principles of the WHO Constitution, which states that 'The achievement of any State in the promotion and protection of health is of value to all'. As a consequence, in the present situation with the population of the world increasing at a rate greater than ever (now estimated at 25 millions per year) while food production lags behind, world-wide control of malaria appears to be almost an emergency measure." (page 256)

It is important to note that, at the time of writing, shortage in the world supply of certain vital insecticides constitutes a serious problem. It is estimated that some 10,000,000 pounds (4,540,000 kg) of such insecticides could be profitably employed for public-health protection in the last half of the year 1951 ; <sup>76</sup> and every possible effort should be made to secure priorities for this purpose.

### **Review of Achievements in Control of Diseases Spread from Man to Man**

The control of diseases due to an insanitary environment can, obviously, often be accomplished in sudden and dramatic fashion. No such easy victories can be achieved with the contact-borne diseases, since man is much less susceptible to control than his surroundings. Such maladies as tuberculosis and syphilis have been fought almost as effectively but at a slower pace.

#### *Tuberculosis*

At the beginning of the 19th century the growing industrial cities of the USA had tuberculosis mortality-rates of 400 per 100,000 habitants.<sup>41</sup> Gradually these very high rates were eliminated and by 1900 the death-rate for the whole USA from this cause was about 200 per 100,000. By 1920 it had decreased to about 100, and during the past 30 years it has fallen steadily, year by year, to a figure of about 30 per 100,000.<sup>45</sup> Exactly the same thing has happened in Western Europe, Australia, and other areas.

Today, however, there are many parts of the world where the 19th century tuberculosis death-rates still persist. It is estimated<sup>62</sup> that in the more fortunate countries the mean death-rate is about 64 per 100,000, in the middle group 143 per 100,000, and in the countries of lowest economic status 333 per 100,000. In Brazil, Chile, India, Japan, the Philippines, Poland, and Venezuela, the rate is above 200, and in China it is estimated at over 400. Tests of schoolchildren in northern China showed 85% positive to tuberculin at the age of 16 years.<sup>56</sup>

An analysis published in the autumn of 1950<sup>42</sup> shows that during the last twelve years the tuberculosis death-rate in Chile has fallen from over 250 to about 200 per 100,000, in Finland from about 200 to under 160 per 100,000, and in France from about 120 (with a rise to nearly 160 during the war) to less than 70 in 1949. In the same period (1937-49) the rate for the USA fell from 54 to 28, and for Denmark from 44 to 19. Such results as these have, of course, not been obtained primarily by the application of conventional measures of isolation and quarantine. They have involved the provision of clinics and sanatoria for treatment of the disease; and they have been intimately related to improvements in social conditions which have made possible more adequate nutrition and a higher hygienic status for the population as a whole.

The following definition, suggested many years ago,<sup>72</sup> represents the modern conception of the term "public health".

"Public health is the science and the art of preventing disease, prolonging life, and promoting physical health and efficiency through organized community efforts for the sanitation of the environment, the control of community infections, the education of the individual in principles of personal hygiene, the organization of medical and nursing service for the early diagnosis and preventive treatment of disease, and the development of the social machinery which will ensure to every individual in the community a standard of living adequate for the maintenance of health." (page 1)

No sound distinction, therefore, can be drawn between "sanitation", "preventive medicine", "curative medicine", "health promotion", and "improvements of standards of living". All are parts of a comprehensive public-health programme in the modern sense.

In the case of tuberculosis, control on the scale which has been possible in Western Europe and the USA is obviously a costly procedure. It involves an extensive development of diagnostic clinics equipped with x-ray machines, and of sanatoria for treatment of the disease. Case-finding procedures alone may cost as much as \$8 per person examined and about \$150 for each clinically significant case found.<sup>22</sup> Furthermore, reasonably complete control of tuberculosis is attainable only where nutritional and other hygienic standards are high.

Fortunately there is what may prove to be an economical short-cut to a considerable degree of tuberculosis control by active immunization

of persons not already affected by the use of BCG vaccine. By the end of September 1950, the WHO Tuberculosis Research Office at Copenhagen<sup>16</sup> had received detailed statistics on the tuberculin-testing of some 16,000,000 persons and the immunization of over 8,000,000 non-reactors (in such countries as Algeria, Austria, Czechoslovakia, Finland, Greece, Hungary, India, Morocco, Poland, and Yugoslavia). As the results of this programme are followed up in the future, the actual values of this procedure should be revealed. In countries where practically the whole population ultimately becomes infected, such immunization campaigns, protecting one-half of the child population tested, may well reduce the ultimate tuberculosis-rate to a substantial degree.

If these BCG programmes are to have a lasting effect, it is obvious, however, that they must be followed up by the establishment of permanent and continuing facilities for tuberculosis control, including clinics or travelling teams, to follow the extent to which protection is afforded and to protect the children born into a community heavily seeded with tubercle bacilli. The resistance of a temporarily immune person is not absolute and may be broken by lowering of vital resistance (as so often happens to the "recovered" case of this disease). BCG is not a magic wand which makes it possible to achieve victory at a single stroke.

### *Treponematoses*

The treponematoses present another major challenge to the public-health worker. In the past, in Europe and North America, emphasis has been largely on the control of venereal syphilis, in which notable results have been attained. More recently the enormous importance of bejel (in which *Treponema pallidum* is commonly transmitted by other than the genital route) and the related infections of *T. carateum* (pinta) and *T. pertenue* (yaws) in other parts of the world has been stressed.<sup>79</sup> The latter treponemal infections are communicable diseases spread by direct contact in juvenile play, by eating and drinking utensils, and perhaps by insects. Vast areas of endemic prevalence of these diseases exist in the Mediterranean and Pacific areas, in Africa, and in South America. Guthe & Reynolds<sup>30</sup> believe that the total burden of non-venereal treponematoses is fully equal to that imposed by venereal syphilis.

Recently, the discovery of treponema-immobilizing antibodies by Turner and his associates has made it possible to study more effectively the biological relationships between the causal agents of the various diseases mentioned above. The close antigenic relationships revealed, as well as the generally favourable response of all the organisms concerned to penicillin, have set the stage for a broad public-health approach to the control of the treponemal diseases as a group.

Statistical evaluation of results in the field of syphilis control are difficult, since in most areas accurate morbidity data are lacking. There is, however, in the story of Denmark, Norway, and Sweden during the present century, a striking demonstration of what a long-term control programme may accomplish in the course of years. In Denmark, the rate of new cases of syphilis per 100,000 population rose during the first World War from 88 in 1913 to 147 in 1919. With vigorous application of the treatment methods then available, this rate was gradually reduced to 14 in 1940 (less than one-tenth of its previous level).<sup>19</sup> The stresses of the second World War produced an increase to over 100 cases per 100,000 in 1944-6; but, with penicillin treatment available, the incidence-rate fell rapidly to less than 20 in 1949. The same phenomena appeared in Norway and Sweden although the war peaks were not nearly so marked.

In many areas the incidence of syphilis is, of course, far above that ever recorded in Europe. In the Straits Settlements the rate of incidence of syphilis was found in 1937 to be 494 per 100,000, 30 times that of England and Wales, 47 times that of the Netherlands, and 75 times that of Sweden.<sup>56</sup> In Northern China, 10% of persons offering to serve as blood donors were found to be syphilitic.

The possibilities offered by an organized programme based on penicillin treatment (with adequate continued health supervision) are enormous. In a demonstration carried out against endemic syphilis in a village in Yugoslavia, every single case of infection was discovered and treated, and after a ten-month period 65% of the patients were sero-negative and not a single new case had occurred.

It would be highly desirable to collect data for at least approximate estimates of the economic loss involved in disability due to syphilis and yaws, and of the economic gain following a control programme. Dr. R. M. Morris, Secretary for Health, Southern Rhodesia, estimates that in Southern Rhodesia 100,000 man-days of labour are lost each year as a result of venereal diseases.

Programmes of mass treatment with penicillin for the control of syphilis have been carried out with WHO assistance in such areas as Czechoslovakia, Poland, and Yugoslavia, with notable success, and similar methods have been used in yaws-control programmes in Haiti, Indonesia, and Thailand. In Haiti, where yaws is widely prevalent among the rural population, 35,000 to 55,000 persons have been treated monthly in a joint WHO/UNICEF treatment campaign. It has been estimated that by this simple programme 100,000 incapacitated persons have been returned to work, increasing the national production of Haiti by \$5,000,000 a year.<sup>62</sup>

As in the case of BCG programmes, penicillin campaigns—if they are to be of substantial value—must be integrated into a permanent health

programme. A good example of sound policy has been recently set in the WHO/UNICEF campaign against yaws in Indonesia. Twenty-two teams are in operation, each made up of six to eight sanitary inspectors and native "dressers", and some 20,000 people are being treated with pencillin each week. About 20% of the population is found to be infected, indicating 500,000 cases in the whole island of Java. The important thing to note, however, is that the emergency campaign is integrated with what is expected to be a permanent service by local treatment-centres. A mobile follow-up team will spend several months in each area studying problems of recurrence, with the aid of special laboratory services. In the first local area thus studied the 10,000 persons examined showed little tendency to relapse.

### **Achievements and Future Possibilities in Promotion of Positive Health**

The goals of the public-health programme in the mid-20th century are by no means limited to the control of specific communicable diseases. As the major pestilences, such as malaria, tuberculosis, and syphilis, are brought under control, health planners and health administrators are more and more concerned with the creative aim of raising the general level of vigour, efficiency, and satisfaction by a more positive physiological approach.

#### *Maternal and child health*

The problem of infant health represents a sphere in which sanitary, medical, and physiological factors all play a part.

In the USA the infant mortality-rate, which was 100 deaths per 1,000 births in 1915, had dropped in 1948 to 32 deaths per 1,000 births. In Iceland, the infant mortality-rate has shown a continuous decrease, amounting to 20%-22% per decade during the last century, so that it is now less than 10% of the figure for 100 years ago. From 1941 to 1947 the rate averaged 33.7 deaths, and in 1947 it fell to 22 deaths per 1,000 live births.<sup>55</sup> Yet today there are still countries with infant mortality-rates of approximately 200 deaths per 1,000 live births (Egypt, 175 per 1,000 in 1948<sup>48</sup>) and other countries with rates of only one-tenth of that figure.

The successes which have been won in this field are, of course, in large part due to the control of the specific epidemic diseases arising from lack of sanitation and from the spread of infection from person to person; but this is by no means the whole story. As WHO has stated:<sup>59</sup>

"Food production does not improve only by destruction of weeds. Health will not improve greatly only by attacking disease.

Successful work for maternal and child health is based on teaching people what they can do for themselves. Those carrying out such work can co-operate with the agricultural and animal husbandry departments to ensure that improvements in nutrition take place in the homes; with departments of education, social welfare and sanitation to improve the standard of living.

This function of medicine—the positive and educational—has in the past been relatively neglected. There is need for great expansion and experiment in making healthy living acceptable and available to large masses of humanity. It would seem scarcely justifiable to undertake measures to ensure that more children will live, unless we make efforts at the same time to ensure that their life is worth living.” (page 260)

Therefore WHO has wisely planned to further a constructive programme for maternal and child health by demonstrating adequate service in this field, by assigning trained personnel, by disseminating basic information, and by a continuing training programme.

A single nurse-midwife from the US Children's Bureau gave three-month courses for untrained midwives in certain provinces of Mexico. The director of maternal and child health work in Nuevo Laredo, State of Tamaulipas, reports that infant mortality-rates in that community dropped from 223 per 1,000 in 1946 to 112 per 1,000 in 1948 as a result of the improved training, supervision, and cooperation of the midwives who had taken such short courses.<sup>62</sup>

### *Nutrition*

The most basic factor in personal hygiene is, of course, nutrition. A small-framed adult man, at complete rest in a warm climate, would produce at least 1,400 heat calories a day, and clearly must obtain this amount of energy for survival. Beyond that point physical activity depends directly on additional food calories. The human body is an internal-combustion engine, and nothing can be got out of it in the form of physical work that is not put into it in the form of calories of food energy. The following quotation from Sherman<sup>53</sup> of the probable food requirement of a person weighing 154 pounds (70 kg) makes the basic problem clear:

8 hours of sleep at 65 Calories	=	520 Calories
2 hours' light exercise at 170 Calories	=	340 Calories
8 hours' carpenter work at 240 Calories	=	1,920 Calories
6 hours' sitting at rest at 100 Calories	=	600 Calories
Total food requirement for the day		<u>3,380</u> Calories

If a heavier task, such as stone working (400 calories per hour), is substituted the total rises to 4,660 calories per 24 hours.<sup>74</sup>

Studies made in the mines of the Ruhr during the second World War<sup>35</sup> showed the most direct correlation between calorie consumption and accomplishment of workers. In one study 20 workmen were building an embankment by dumping debris from railroad cars. While receiving a diet



supplying only 820 calories per day in excess of the 1,600-1,800 calories needed for resting metabolism they dumped 1.5 tons of debris per hour. They were then provided with a diet designed for workers in heavy industry and their output increased to 2.2 tons per hour (amounting to 1,300 calories of work energy); they also gained about 8.8 pounds (4 kg) of body-weight in a year. They were then offered cigarettes as a premium for accomplishment and raised their mean output to 3.4 tons, but lost 7.7 pounds (3.5 kg) of excess weight.

In a second study 31 miners had an allowance of 2,800 food calories (1,600 for basal metabolism and 1,200 for work) and produced 7 tons of coal per day (at a rate of 170 work calories per ton). Their rations were then increased to 3,200 calories, allowing 1,600 work calories per day. Production rose to 9.6 tons (155 work calories per ton) but the men lost weight. A further increase of 400 calories raised production to 10 tons per man per day and body-weights returned to normal. Experience in the mines of the Ruhr district between 1939 and 1944 confirmed these results on a large scale. The average work was heavier here and demanded a work-calorie allowance of 1,150-1,200 calories per ton of coal mined. Whenever the dietary allowance fell below this figure (2,800 total calories per day), production fell off in direct proportion, and when the diet was increased production rose.

A recent suggestive demonstration on the relation of diet to human productivity has been made in the construction of a new Pan-American highway connecting the continents of North and South America. In the construction of this highway through Central America local labour was employed—at first with unsatisfactory results. Instead of merely assuming that the native workers were inefficient, the North American engineers studied the problem and discovered that the diet of the workers employed was notably deficient. Upon the installation of kitchen and mess-hall facilities, where the labourers received three well-balanced meals daily, the men gained weight rapidly, showing an increase of 10-15 pounds (4.5-6.8 kg) within a few months. As a result, they were able to do an amount of work quite equal to that of the North American personnel. By this means, combined with adequate training and the use of modern construction methods, records on five successive projects showed a progression in production (of concrete paving) from 1.8 to 5.9 cubic yards (1.4-4.5 m<sup>3</sup>) per man per day. It is of interest to note that, in the opinion of the bureau in charge of this enterprise, the dietary deficiencies of the local population were not due to lack of capacity to produce food but to the lack of transportation to make such food production practicable and profitable—so that the building of roads makes possible more food, better nutrition, and the building of more roads. The experts concerned state (personal communication from T. Macdonald, Bureau of Public Roads,

US Department of Commerce) that quite similar conditions exist in Turkey and Ethiopia.

The US National Research Council<sup>65</sup> has estimated, on the basis of what it considers to be a standard level—2,900 calories per day—that a reduction of 20% below this figure will cause a 13% decrease of body-weight in one year, while a reduction of 40% will cause a weight loss of 25% in the same period. It considers a 25% decrease below the normal allowance as an emergency subsistence level, and a 40% decrease as a semi-starvation level.

All the figures quoted refer to adult males performing active physical work in a cold climate. Estimates of the needs for a given population as a whole involve, of course, allowance for variations in caloric requirements corresponding to body-build, age, and sex of the population, to climate, and to physical activity. The League of Nations report on the physiological bases of nutrition, 1936,<sup>37</sup> gave figures ranging from 3,000 to 4,800 calories per 8-hour working day for performance levels between “light work” and “very hard work”, and indicated, of course, lower requirements for women (rising to 2,400 in pregnancy and 3,000 during the period of nursing an infant) and for children (rising from 840 calories in the first two years of life to 2,400 calories at 12 years and over). The influence of these and other factors has been fruitfully analysed by the Committee on Calorie Requirements of the Food and Agriculture Organization (FAO).<sup>27</sup> The overall mean population-requirements vary from 1,860 calories per person per day with a mean environmental-temperature of 77°F (25°C), a small body-build, and high birth- and death-rates (giving a large proportion of children), to 2,390 calories per day for a mean environmental-temperature of 41°F (5°C) with a large body-build and a higher proportion of adults.

In the more prosperous areas of the world the daily per capita food-supply is close to 3,000 calories per day, which may be taken as an ample figure, including children and sedentary workers who need less. In the lower-income areas the mean figure fell (in 1934-8) to approximately 2,100 calories per day.<sup>25</sup> The FAO reports<sup>26</sup> that, in 1948-9, 28 out of 39 countries tabulated had an average food-supply of under 2,900 calories. Austria, Belgium, Chile, Czechoslovakia, Egypt, France, Germany, Greece, Italy, Peru, Poland, Spain, Turkey, the Union of South Africa, and Uruguay fell between 2,200 and 2,800 calories. For Burma the figure was 1,877 and for India and Pakistan 1,570 calories.

The figures quoted are only approximations. They do not include family subsistence-crops for which data are unavailable, particularly in such countries as India and Burma; and, on the other hand, they do not allow for wastage in the distribution and preparation of food. On the whole, however, it is clear that in most parts of the world (with the

exception of certain local areas in Asia, Africa, and South America) the available calorie-supply (while often insufficient for the maximum physical effort essential for economic development) is adequate for the basic needs of survival. Indeed, if this were not the case, the population would not have survived.

Even where calorie allowances are adequate, however, health and efficiency are affected in more subtle—but highly significant—ways by lack of essential food constituents, such as proteins, salts, and vitamins. In Burma, for example, which has a marginal calorie-supply, starvation is not apparent but malnutrition is obvious. Recent nutritional surveys in that country showed that from 6% to 24% of the children studied displayed obvious symptoms of malnutrition; and the observers pointed out that, while undernourishment was mainly due to poverty, it was also influenced by ignorance as to the selection of available dietary items, even among the relatively well-to-do.

Dr. R. C. Burgess, Senior Nutrition Officer at the Institute for Medical Research in Kuala Lumpur, Federation of Malaya, believes that capacity to metabolize food may be permanently injured as a result of a predominant rice diet from early years. He has observed that among Malay police recruits increased calorie allowances did not result in a corresponding increase of body-weight.

Similar, though less striking, effects of dietary deficiency occur even in the most prosperous areas. A suggestive study on aircraft workers in Southern California, USA,<sup>10, 11, 70</sup> dealt with this problem. One group of workers was given large doses of several vitamins five days a week for 9-12 months; a control group was given placebos. During the last six months, the vitamin group showed statistically significant superiority over the placebo group in absenteeism (3.90 days compared with 4.79 days), in turnover of labour force (8.4 per 100, as compared with 13.5), and in merit ratings based on a careful appraisal of efficiency.

It is possible, as indicated in the studies quoted, to have a diet providing sufficient energy but lacking the protein, mineral elements, and vitamins essential for health.<sup>36</sup> Anaemia, beriberi, pellagra, rickets, and scurvy, in such countries as Burma, Ceylon, China, the Federation of Malaya, and India, testify to this fact.

Enrichment of flour with certain vitamins was made compulsory in Newfoundland in 1944 with striking results. A drop of over 10% in the general death-rate, of 25% in the tuberculosis death-rate, and of 40% in infant mortality was attributed largely to this cause.<sup>63</sup> A similar experiment with enrichment of rice in Bataan produced a decline of 76% to 94% in the incidence of beriberi in seven municipalities. In the entire experimental area the death-rate from beriberi fell from 263 per 100,000 in 1947-8 to 28 per 100,000 in 1949-50.<sup>50</sup>

Brock & Autret<sup>12</sup> have recently reported on a disease known as kwashiorkor which is unduly prevalent in many parts of Africa. It is characterized by retarded growth in the early months of life, alteration in pigmentation of the hair and skin, fat infiltration and necrosis or fibrosis of the liver, oedema, and heavy mortality. This condition is clearly due to protein deficiencies and the authors suggest that it is the most serious and widespread nutritional disorder known to medical and nutritional science.

The general implications of inadequate diet have been well analysed by the International Labour Organization (ILO).<sup>34</sup> Crop deficiencies are grave in many areas of the world. De Castro<sup>15</sup> has recently pointed out that the South American continent, for example, can be divided into two general areas. The Eastern coast, including parts of Argentina, Brazil, Paraguay, and Uruguay, has moderately favourable conditions for agriculture and the diet contains an adequate calorie and protein content. The rest of the continent (including three-fourths of its territorial surface) has a diet inadequate in calories, unbalanced as to quality (excess of carbohydrates), and deficient in protein, salts, and vitamins. It is important to note, however, that de Castro believes the underlying causes of the food shortage to be socio-economic rather than environmental. He attributes it largely to a semi-feudal agricultural regime, a "colonial" system of exploiting the land for exports, inadequate communication facilities, and bad national food habits.

The incidence of dental caries and its relation to the presence of fluorine in drinking-water may also perhaps be classified as a nutritional problem. Studies in the USA have demonstrated that the addition to public water-supplies of one part per million of fluorine will decrease dental caries in children by one-half to two-thirds.<sup>1</sup> Over 50 water-supplies in the USA are now treated in this fashion.

### *Temperature and human life*

Another most important—and neglected—factor in personal hygiene is temperature, since human health and efficiency are closely dependent on a proper degree of heat loss to the surrounding atmospheric environment. This is a factor of major importance in industrial hygiene. One study at Pittsburg, Pa., USA, showed that an increase of temperature from 70°F to 95°F (21.1°-35°C) cut down by 55% the amount of heavy physical work which could be performed. Vernon, studying coal miners in England, found that raising the temperature from 66°F to 79°F (18.9°-26.1°C) decreased by 41% the amount of coal mined. Liberson, in France, recorded a decrease of 50% in work capacity by increasing the temperature from 18°C to 33°C (64.4°-91.4°F). Air conditioning in industry may therefore prove a highly profitable procedure.<sup>74</sup>

There are even wider implications of this problem of atmospheric temperature. The English meteorologist, Brunt,<sup>13</sup> has pointed out that the great civilizations of antiquity (Egypt, Palestine, Assyria, Sumeria, and Persia) arose close to the annual isotherm of 70°F (21.1°C). Only when the hypocaust for heating dwellings was invented, did the towering civilizations of Athens and Rome (isotherms of 63° and 60°F (17.2° and 15.6°C)) appear. The powerful and efficient nations of the past century have been those of North-Western Europe and North America where mean monthly-temperatures of 75°F (23.9°C) are rare and where winter cold has been controlled by indoor heating. It seems not impossible that vast areas of the subtropics, now in a retarded state, might produce, in their turn, mighty civilizations as summer air-conditioning meets human physiological needs with similar efficiency.

### *Hygiene of housing*

The sound planning of human habitations is another major objective of the modern public-health programme. As in other phases of health planning, there is a double objective—the protection of the occupants against insanitary conditions and accident hazards on the one hand and the provision of conditions which—in a positive sense—promote physiological and psychological health on the other.<sup>2</sup>

It is of interest to note that the study of this important subject, on an international scale, was initiated by the Health Organization of the League of Nations some 20 years ago. The American Committee on the Hygiene of Housing, which still functions actively, was created at the request of the Housing Commission of the League of Nations as its corresponding local body. The problems with which this committee has dealt<sup>3,4,5</sup> include the environment of the home (sanitary facilities, town-planning, and the like), the planning of the home for occupancy (involving consideration of the basic relations of space allotment and home planning to housekeeping efficiency and mental hygiene), and the construction and equipment of the home with regard to heating, lighting, sound control, and freedom from accident hazards. Nearly all the research in this field has, however, been carried out in relatively cool climates and among populations of highly developed countries (the Union of South Africa, the United Kingdom, and the USA having the more important laboratories in operation). There is great need for research institutes to develop standards of home construction suitable for tropical and semi-tropical conditions and for areas where maximum economy in construction is essential.

A most important pioneer study in this field has recently been made by a special mission of experts sent out to South and South-East Asia by the Department of Social Affairs of the United Nations. The members of the mission have reported on housing conditions in the Federation of

Malaya, India, Indonesia, Pakistan, the Philippines, Singapore, and Thailand.<sup>60</sup> The Mission calls attention to the appalling conditions which prevail, and cites the conclusion of a meeting of the ILO Asian Advisory Committee, held at Bandung, Indonesia, in December 1950, that "wage policy and workers' housing should constitute the two problems of top priority for a forthcoming Asian conference" (page 2). The Mission lists nine different types of experts needed for the formulation of sound housing policy in underdeveloped areas. Curiously enough, no expert on hygiene is included in the list.

Other technical fields, such as engineering and architecture, and planning, finance, and political science, obviously have their parts to play. The factor which should underlie all such activities, however, is the health needs of the human being since the home must primarily be considered as an instrument of health. It is most essential that the technical competence of WHO should be utilized in this field. The Fourth World Health Assembly took an important forward step in its adoption of a special resolution : <sup>75</sup>

"The Fourth World Health Assembly,

Recognizing the supreme importance of providing, as an essential part of the public-health programme, for the improvement of environmental hygiene and sanitation, including the development on sound lines of urban and rural planning and of housing schemes,

1. RECOMMENDS to all Member States that appropriate provision should be made to train, and to employ in their health administrations, adequate numbers of public-health engineers, town-planners, architects and other allied personnel; ..." (Resolution WHA4.19)

### *Industrial hygiene*

Another highly important area of public health is that concerned with the protection of the health of the worker in industry; and this is obviously a problem which has very direct relation to productive capacity.

The primary object here, as in the case of housing, is protection against the certain particular hazards which are involved. The sanitation of the factory and the provision of a safe water-supply are of obvious importance. Among the hazards of industry those involving the danger of accidents are also of primary importance; and this is particularly true of agriculture which, on a general scale, is the most universal form of industry. In the USA, it has been found that farm accidents are of major importance as causes of disability and death; and the same problem probably exists in underdeveloped countries where agriculture is the mainstay of the population but where statistics of accident prevalence are not yet available. Of less quantitative importance in industry, but more dramatic and more obvious, are the hazards due to toxic fumes and poisonous or irritating dusts in various special forms of employment.

Here again there is need for promotion of health in a positive sense as well as for protection against specific hazards of employment.<sup>73</sup> Ample statistical evidence as to improvement of industrial efficiency by maintaining atmospheric temperatures at a reasonably low level is available.<sup>74</sup> Data as to increase of production associated with adequate illumination and control of noise levels in the work-room are similarly conclusive. The importance of diet in influencing productive ability has been discussed in an earlier section of this chapter; and the role of mental and emotional disorders in causing industrial absenteeism will be considered in a succeeding one.

The hours of labour must be regulated; and the introduction of rest pauses has, in many cases, been shown to increase production. Industrial medical services and industrial nursing services are vitally important factors in promoting both health and industrial efficiency.

It is important to note that, in countries where industrialization is being introduced or developed at an accelerated rate, attention to the problem of industrial health is of special importance. The original stimulus to the evolution of the modern public-health campaign came as a reaction to the evils generated by the rapid and unprotected development of industrialization in Great Britain. The mistakes committed in Europe in the 19th century must not be repeated in Asia in the 20th.

### **Promotion of Mental Health**

Perhaps the most significant trend in the public-health programme of today is the growing recognition of the fact that mental and emotional diseases cannot be ignored as basic factors in the problem. In countries which have relatively ample facilities for institutional care, the number of beds occupied by patients suffering from mental and nervous diseases is almost as great as that required for the care of all other diseases taken together. It seems reasonably certain that minor conditions of this kind lay as heavy a burden on the average family and on society as do all the non-hospitalized cases of disorders of other kinds.

One way of estimating the economic burden resulting from mental diseases is to compute the direct cost of institutional treatment. A more significant approach has recently been made by Malzberg.<sup>43</sup> There were over 18,000 new admissions to the mental hospitals of New York State in 1948. Taking into account the age of each patient, the economic worth of a male or female at that age (as computed by Dublin, Lotka & Spiegelman<sup>20</sup>), and the average loss of working years associated with each diagnosis, Malzberg draws the following conclusions. The patients as a group lost over 8 years apiece of productive life. The loss of future earnings

for 9,051 males amounted to about \$90,000,000, and the loss for 9,356 females to over \$41,000,000, giving a grand total of \$131,465,463 for one year's first admissions in one State.

In addition, there is, of course, an additional economic burden due to minor emotional maladjustments which do not receive institutional care but interfere seriously with efficiency, cause absenteeism, and promote industrial accidents. Fraser et al.<sup>28</sup> reported that 10% of a group of workers in 13 engineering factories had suffered from definite and disabling neurotic illness, and an additional 20% from minor forms of neuroses, during a period of six months, with a loss of three working days a year for men and six days for women. This study, recently carried out by the British Medical Research Council, demonstrated that, in the factories surveyed, mental disorders caused a loss of productive time slightly greater than the common cold. The extent to which this finding is typical of industrial communities in underdeveloped areas is unknown, but emotional strains must be particularly serious in a community which is undergoing transition from a purely agricultural to a partially industrial economy. Serious beginnings are now being made at a fundamental study of this vitally essential health problem of the future.<sup>23, 44</sup>

The importance of emotional problems in relation to industrial efficiency has been emphasized by studies made by Dr. M. R. van Alphen de Veer at the Philips electric lamp factory in Eindhoven, Netherlands, and reported at the third annual meeting of the World Federation for Mental Health in Paris, 1950. Careful analysis of 160 workers, selected by a random-sampling method, showed that 40% were suffering from nervous or psychosomatic diseases. Dr. de Veer concludes that the estimate of Dr. Russell Fraser, some years ago, that one-quarter to one-third of industrial absenteeism may be due to such disorders, is perhaps not out of line.

A very similar ratio has been reported as to the proportion of soldiers invalidated from the US and British armies. In both cases, mental and emotional conditions exceeded any other single cause of such separations.

It should be noted that mental hygiene is not a separate speciality of public health, like tuberculosis or malaria. It is a universal and pervading problem which not only crops up in every case of illness of whatever kind, but directly influences the effectiveness of every regulative and every educational activity of the health department. Dr. J. V. Coleman,<sup>17</sup> in an address before the Alumni Association of the Menninger Foundation in October 1949, pointed out that :

“The mental-hygiene approach, based on a broad consideration of the welfare of the individual, is an integral and inseparable part of the philosophy of public-health practice. It is concerned with the individual's problem-solving capacities and potentials



in relation to his emotional needs, his personal difficulties, and the stresses in his social situation."

To secure integration of mental hygiene into the public-health programme requires, however, a constructive attitude on the part of the psychiatrist as well as on that of the health officer. Dr. Coleman says that :

"The contribution of psychiatry to public health is contingent upon an acceptance and approval of the philosophy and aims of public health, a willingness to work within its administrative and functional organization, and a recognition of the mental-hygiene objectives that public health has already achieved."

A valuable pilot-study made in the Eastern Health District of Baltimore, Md., USA,<sup>18</sup> indicated that the children in the clinic of a well-conducted Mothers' Advisory Service showed notable superiority in behaviour as compared with a carefully-chosen series of controls.

The importance of mental hygiene in the public-health programme has been clearly emphasized in the recent report on the second session of the WHO Expert Committee on Mental Health.<sup>77</sup> This report analyses the impact of problems of mental health on maternity services, on the care of the infant, the pre-school child, and the schoolchild, and on the treatment of the sick and of the aged. It rightly goes further, however, in stressing the vital importance of a sound mental hygiene approach in the health education of the public and in the efficient functioning of the health department staff itself. The public-health workers' concepts of mental hygiene have progressed from a programme for the rational treatment of maladjusted individuals to the provision of child-guidance clinics for the development of mental health in a positive sense ; thence, to a realization that sound mental hygiene techniques are vital in the success of all clinics, of public-health nursing services, and of every activity of medical and sanitary and other functionaries of the health department ; and, finally, to a conviction that these techniques are also essential in the internal relations of the department staff and its wider relations to the public as a whole. After all, the ideal objective for public-health workers is to change the habits and attitudes of mankind ; and this is a problem in mental hygiene and in health education.

There is one special point which should be emphasized in connexion with planning for the mental hygiene programme of the future. Economic and social progress in underdeveloped countries is certain to facilitate the control of malaria and tuberculosis and to further improvement in nutritional status. In the case of emotional health, it is quite possible that the reverse may be true. Authorities are not in complete agreement on the point, but many experts on underdeveloped areas believe that the mental health status of their inhabitants is higher than that characteristic of more

prosperous regions. It seems reasonably certain that rapid industrialization must produce neurotic stresses quite foreign to a simpler mode of life. This possibility should be kept in mind as a factor of real importance in governing the speed at which fundamental social changes may most profitably be made.

Actual demonstrations of control of emotional maladjustments on a statistical scale are, of course, still lacking, but advances in child psychology and psychiatry have made it certain that, in the individual case, such disturbances can very frequently be controlled with marked success. The WHO programme in this field contemplates the collection of factual data in various countries as to the extent of mental problems, the facilities for prevention and treatment, and the training of professional personnel.

The problem of alcoholism is closely related to that of mental hygiene and is, at long last, being recognized in certain countries as a public-health, rather than a moral, one.<sup>52</sup> In the USA, 26 States have instituted definite programmes for the control of alcoholism during the past five years.<sup>59</sup> It is estimated that over 3% of the population are uncontrolled drinkers. Remarkable success has been attained in many instances by a sound mental hygiene approach as well as by the use of special drugs. It is of particular interest to note that this campaign was initiated, not by the medical profession or the public-health leaders, but by the victims themselves. Their organization, called Alcoholics Anonymous, was founded by those who were in need of help and they themselves worked out an informal type of group mental-hygiene therapy which has proved highly effective. The organization has spread to other countries and held its first international congress at Cleveland, Ohio, in June 1950. The Alcoholism Subcommittee of the WHO Expert Committee on Mental Health, at its first session in December 1950, pointed out that :<sup>78</sup>

" Although experience of this movement is restricted to comparatively few countries outside the USA, many physicians engaged in the treatment of alcoholism who have had experience of its work consider it to be the most hopeful social development which has taken place in the handling of this disorder. On the other hand, it has been questioned whether such an organization can be transplanted without modification to communities in which the culture pattern is very different from that in which it first arose. The question can be answered only by intelligent experimentation. What is clearly capable of being transferred to any other setting, however, is the attempt to evoke the interest of the alcoholic who has achieved abstinence in the problem of helping those who have not."

This report of the Alcoholism Subcommittee deserves careful study.

Finally, the problems of drug addiction, which have been of major importance in certain countries, represent another allied field in which mental hygiene must play its part along with national and international

procedures for legal restriction. The Commission on Narcotic Drugs of the Economic and Social Council of the United Nations now receives reports from 45 States and 55 territories on this point.<sup>61</sup> Authorities in Canada consider the problem a serious one, and in the USA new drugs such as demerol and dolophine are creating an appreciable problem.

### **Opportunities for Research by the World Health Organization**

The writer's thesis, in the present chapter, has been that mankind suffers from many grave preventable diseases which involve not only human suffering but also impose a heavy burden on the economic resources of the regions involved. Data quoted from reports on progress in many countries indicate that such conditions can, in large measure, be controlled, and that such control has frequently resulted in substantial betterment of general economic status. The realization of this fact should prove of major importance in assisting the efforts of public-health officials to obtain support from their own governments for the extension of their work. It should also encourage the provision, in various international programmes of co-operative technical assistance, of continuing aid to underdeveloped countries unable at present to find adequate support from their own resources.

The data cited in preceding paragraphs appear to support this general thesis with reasonable certainty. Many of the statistics quoted, however, are open to criticism and fall far short of the quantitative exactness of a controlled experiment. It would seem that further studies of a more rigorous nature should prove of substantial value in providing not only encouragement to further progress but also assistance in planning the programme for the future.

WHO is clearly the body which should assume responsibility for the stimulation and guidance of such studies; and the following types of approach might well be given serious consideration:

(a) Increased stimulation of the less advanced national health services to improve the quality and extend the scope of their national vital-statistical services.

(b) Furtherance of research in the neglected field of morbidity statistics. The data obtained in an increasing number of countries from the records of social-insurance programmes should prove of great value. In countries where WHO has working teams it might be possible to carry out house-to-house surveys of typical areas.

(c) If the advice of competent social statisticians can be made available, it would be highly desirable to make at least approximate estimates in

certain areas of the cost of sickness, including loss of earnings and costs of medical care, and of the economic losses due to premature death, taking into account the potential financial value of the years of productive labour lost in relation to the average income of the population.

(d) The actual effectiveness of specific control campaigns should be given careful study. There is a need to know how far the reduction of malaria in a given area was due to drainage or to the use of DDT, and how far it was influenced by yearly climatic conditions or other factors. There is a need, as the Fourth World Health Assembly pointed out in a special resolution,<sup>75</sup> for

“control studies for determining the value of BCG vaccination, the duration of its effect, and related technical field and laboratory studies, limited to those bearing directly on evaluation and practice of vaccination; ...” (Resolution WHA4.7)

There is a need for much more light on the effectiveness of penicillin in the treatment of the treponematoses, in quantitative and not merely general terms. Studies of the type suggested might well be carried out by the personnel in charge of a local health-unit with guidance from WHO experts.

(e) Still more difficult, but essential to the formation of sound policy, is the intensive analysis in terms of actual economic return of the results obtained by the control of specific diseases. This would call for sound correlation of vital and economic statistics, with allowance for social traditions and psychological climates, as well as for conditions which may limit the potential labour market. It has been suggested, for example, that in certain areas of South-East Asia, whose economy is on a reasonably plentiful subsistence basis, better health may not lead to more labour and more production. The writer does not share this scepticism but the argument deserves consideration.

(f) A special approach which might yield fruitful results would be the intensive study of actual productive efficiency in certain industrial groups, as influenced by sanitary reforms or improved hygiene. The writer has cited in earlier paragraphs studies of this kind made in the mines of the Ruhr, in the building of the Pan-American highway, and on a rubber plantation in Malaya.

WHO could render a major service to the cause of public health by stimulating in various countries studies of the sort outlined, and—in suitable cases—by conducting through its own staff intensive demonstration studies. The task is a difficult one, but analyses of the type suggested would contribute greatly to sound national and international planning in public health.

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## CHAPTER 3

# PLANNING A NATIONAL HEALTH PROGRAMME AND ITS COST

The cost of sickness has been emphasized in chapter 2. It is desirable next to consider the cost of health, the expense which is justified and desirable for the control and the alleviation of preventable disease.

Discussion of this subject is difficult because the scope of the public-health programme differs so widely in various countries. The most basic difference lies in the extent to which the "public-health programme" includes the provision of routine medical care for the individual. In certain underdeveloped areas such health services as are provided include major emphasis on emergency personal medical care. At the other extreme, the work of official health authorities is primarily limited to prevention of disease, and the bulk of medical care is provided either by private physicians and hospitals or by health-insurance plans and public hospitals directed by some agency other than the health department. In many countries the two types of function are performed, in greater or less degree, by the health authorities themselves.

### Diverse Patterns of National Health Services

The diversity of the national public-health programme in various countries is so great that generalization is impossible. It would be undesirable even if it were feasible. Each pattern now in force has grown up in response to local needs, local traditions, and local psychology. Effective results can be reached by widely different roads.

First, national health systems vary in their degree of autonomy in the general framework of the national governmental organization. The national health programme of the USA is carried out by a Public Health Service which constitutes one division of a Federal Security Agency. The United States Public Health Service deals with international and interstate quarantine, conducts extensive programmes of research, and exerts wide powers of stimulation through the administration of grants-in-aid to the 48 States. Each State has its own state health department and each city (and most rural areas) has its own local health department.<sup>16</sup> In Belgium, health is placed under the Ministère de la Santé publique et de la Famille, its work being largely inspectorial. Bulgaria deals with health

under a Ministry of Public Health. In France there is a *Ministère de la Santé publique et de la Population*, again including health with some aspects of welfare. In Portugal the public-health administration is contained within the Ministry of the Interior. In Egypt, Greece, India, the United Kingdom, and other countries, there is a separate Ministry, or a Department of Health, which is free from general welfare responsibilities. The Minister of Health in some countries is a physician, in others a political leader with a professional in charge of the actual programmes. That the latter post should be held on a more or less permanent basis by a technically trained careerist would seem essential. The national health agency may often have the benefit of the advice of a central public-health council, as, for instance, in Greece and the Netherlands, or a group of consultant committees on various subjects, as in France.

Secondly, there are wide differences in the field covered by the national health organization. In some countries (as in the United Kingdom) health insurance and hospital service are separated from the preventive health services. In Scandinavia the relationships between local panel doctors and the public-health organization are very close. In other countries the central health administration is essentially responsible for all the health services received by the people in any area, and frequently in such cases curative medicine plays a major part in the programme. A recent report to the United Nations on public health in non-self-governing territories emphasizes this point.<sup>25</sup> This report indicates that the construction of hospitals is still a major interest in such areas as Madagascar, Nyasaland, and Trinidad and Tobago. The most striking feature is the programme for the extension of basic medical services to rural areas by the establishment of health centres or mobile dispensaries in the Belgian Congo, the French Overseas Territories in Africa, Kenya, North Borneo, Puerto Rico, St. Lucia, Sierra Leone, Trinidad and Tobago, Uganda, and Zanzibar. The need for basic sanitation is recognized in Nigeria ("the expansion of medical services will not itself achieve permanent improvement in the general health of the population, unless it is based on a sure foundation of environmental hygiene"), in the British West Indies (where about one-third of the estimates for a ten-year programme are for sanitation and two-thirds for medical and health services), in Jamaica ("the majority of the schemes which have been initiated . . . have as their aim, the improvement and extension of preventive health services and the promotion of the health of the whole population, while continuing to provide for the health of the sick"), and in Puerto Rico. The Governor of the Gold Coast, however, points out that: "While there can be no doubt of the great importance of preventive measures, public opinion will not be satisfied if those who are actually sick are neglected in favour of keeping well those who have so far been fortunate in escaping serious illness." The report points out that the tendency to neglect provision of basic preventive measures is

accentuated by the fact that most medical men are prepared for the treatment of disease alone, and that :

“ Much will have to be accomplished by medical educationalists before the satisfaction the average physician finds in his direct relation to his patient can be replaced by his satisfaction in his service to the community as a whole.”

It is of interest to note, however, that authorities in some of these non-self-governing territories are awake to the wider implications of modern public health. Several of them emphasize the importance of nutrition. The commission investigating conditions in the British West Indies points out that “ the unsatisfactory housing of many of the poor people is one of the main causes of ill health ”. In a ten-year plan for development and welfare in Nigeria <sup>24, 25</sup> it is stated that :

“ Permanent improvement in a nation's health cannot be secured by clinical medicine alone. There must be a steady advance in all factors which contribute towards healthy life, good water supplies, housing, sanitation, nutrition, and conditions of work.” <sup>25</sup>

The health administrator who must decide whether available financial resources shall be devoted to preventive purposes which, in the long run, will make a greater contribution to the welfare of the people, rather than to the immediate relief of human suffering, faces a serious and a difficult decision ; but “the greatest good of the greatest number ” should be the ultimate criterion of the soundness of a health programme.

Finally, the relations of the national health service to the local health services show the widest variations. At one extreme are countries where the national health administration provides all the health services which are available. At the opposite extreme is the USA where the national health administration has no powers of its own except in regard to overall quarantine regulations, otherwise serving merely as a stimulating agency to the State and local health departments. In Switzerland, also, the powers of the central health department are strictly limited by the Federal Constitution and each of the 22 cantons has its own separate health machinery. In other European countries the central administrator may deal directly with local health officers, as in Bulgaria. In the Netherlands, the national department supervises and, if necessary, supplements the provincial and municipal health services. In Norway, the central health administrator supervises the work of 380 health officers in provinces, districts, and towns, who divide their time between public-health work and private practice. In some countries, as in Greece, the national health department provides direct local service by maintaining health centres, health institutes, and hospitals and clinics in local areas.

In many countries a part of the health programme is delegated to non-official agencies : in Latin American countries to the churches and semi-private agencies ; and in Belgium, the Netherlands, and Norway to

voluntary agencies, such as the Red Cross, and to organizations formed for the control of tuberculosis or venereal diseases or for the promotion of maternal and child health.

As a result of these diversities in programme, and of the different relationships between the national health service and the central government as a whole on the one hand, and between that service and the local community on the other, the divisional organization of the national health service shows similar wide variations.

In Belgium, the Ministère de la Santé publique et de la Famille consists of a General Secretariat and 4 General Directorates :

- (1) General Directorate of Hygiene, which includes the control of communicable diseases, food, drugs, laboratories, and public-health works ;
- (2) General Directorate of Social Medicine, which includes medico-social works, nursing, and medical statistics ;
- (3) General Directorate of Public Welfare, covering the care of the family, housing, and public assistance ; and
- (4) General Directorate of Physical Training.

In Bulgaria, the following eight divisions were set up :

- Health services (administration, statistics, hygiene)
- Contagious diseases
- Social diseases (malaria, tuberculosis, venereal diseases)
- Medical institutions (including hospitals)
- Pharmacies and medical supplies
- Spas, climatic stations, seaside resorts
- Budget and control
- Institute of public health

Greece has ten divisions and units in its Ministry of Hygiene :

- Public health
- Social hygiene
- Statistics and research
- Medical relief
- Medical supplies (under Finance)
- Pharmacies
- Medical professions
- Quinine and narcotics
- Technical services (including sanitary engineering)
- Administration

The National Department of Health of Bolivia has the following divisions :

- Epidemiology
- Tuberculosis control

Venereal-disease control  
Leprosy control  
Nutrition  
School health  
Pharmacy  
Biostatistics, records, and personnel

It has also under its direction seven laboratories and a nursing school.

These four cases are merely cited as examples of diversity of practice. Probably fifty more different patterns would be provided by a comprehensive survey of all member nations of WHO ; and each pattern may (or may not) be the best for its particular country.

### **Universal Needs to be Met by a National Health Service**

In spite of the widely diverse responsibilities of national health services in various countries, which have been indicated above, there are certain fundamental objectives which all such services can—and should—provide for the local health departments and the people of their countries. These services are :

- (1) Planning for basic priorities on a national scale
- (2) Inspiration and leadership
- (3) Provision of technical assistance in specialized fields.

It is clear that the development of a sound public-health programme would be for all countries a profitable investment. Yet no investment can be made without the money to invest ; and in these days, when even the most prosperous nations are faced with inevitably great demands for basic national defence, serious attention must be given to costs. It seems essential, then, for each State and dependency to develop a health programme which will attain maximum results at minimum expense.

In many areas it may be wise to concentrate, for a time, available financial resources on problems such as safe water-supplies and sanitation, the control of malaria, immunization against tuberculosis, and the treatment of venereal diseases. In areas where these more dramatic hazards have already been brought under reasonable control, the formulation of a sound programme for the protection of maternal and child health may offer maximum possibilities of large returns.

Where these problems have been met, the next obvious step may be the development of a programme of positive health promotion by the expansion of public-health nursing and health education services. It

should be noted that in countries which have reached this stage of development the nurse has assumed an entirely different function from that of traditional bed-side care.<sup>3</sup> The public-health nurse may or may not render bed-side care, but she is primarily the messenger who carries the knowledge of health practices into the individual home (in the United Kingdom she is called a "health visitor"). The health educator is an invaluable aid to the health administrator in developing community participation in this programme. Where the process of industrialization is going forward, industrial hygiene may have high priority. In North America and Western Europe, where all the objectives listed above have been approached with reasonable effectiveness, the problems of mental hygiene and mitigation of the degenerative diseases, geriatrics, and the care of the aged and the infirm are today the "next steps" in the evolving public-health programme.

This is a period in the world's history when it behoves every nation, large or small, to take stock of its human and natural resources and do all that is possible to build up its material and its moral strength; and there is little time for delay. It would be highly desirable for the responsible health leaders of each country to analyse its present health problems, to survey its existing health machinery, and to make a definite plan for expansion during a succeeding period of years. Such a plan should recognize limitations of money, of physical facilities, and of health personnel. It should focus on those particular problems of death and disability which can be solved with minimum cost and maximum results; and it should take into account future possibilities of economic development and the influence of such development on national incomes and national governmental budgets. If effectively presented to governing authorities and to the public, there are few areas where substantial support for such a programme could not be obtained.

Dr. Ricardo Cappelletti, Chief of the Division of Hygiene, Ministry of Public Health, Uruguay, has reported in a recent communication to WHO notable achievements of a well-balanced public-health programme in Uruguay. In 1919 only 4 cities had safe water supplies; in 1949 the number had risen to 157. Progress has been particularly rapid during the past 15 years. Infant mortality-rates fell from 95.7 in 1934 to 42.1 in 1949; deaths from diphtheria decreased from 384 to 11 in the same period. It is of particular interest for the pessimist who fears that public-health measures will lead to overpopulation to note that, between 1900 and 1948, the death-rate fell from 14.1 to 8.3 per 1,000 while the birth-rate decreased from 33.4 to 21.1 per 1,000.

In countries where the national health service exerts direct local authority, the health programme which has been formulated can be readily put into force. In countries like the USA, guidance can be accomplished only indirectly by moral suasion and by concentration of grants-in-aid;

and it may be unwise in such countries to promulgate a specific plan. Even in such cases, however, a well-thought-out programme for the future should be at the back of the minds of the national health service leaders.

A second universal function of the central national health organization should be the provision of direction, guidance, or—at least—inspiration to the local health authorities in the actual conduct of their work. Many of the activities now assisted by WHO, while admirable in themselves, will prove of only transient value if they are not followed up through the years to come. BCG and penicillin campaigns require for their full effect continuing services for the control of tuberculosis, or syphilis or yaws. Only stimulation by a national health administration can secure the maintenance on a local level of the permanent machinery necessary to transform a “demonstration” into a vital element of community life.

Finally, the national health administration will necessarily be called upon to provide specialized technical services which cannot well be represented at the local level; and to conduct continuing investigations into the best procedure to be adopted.

### **Programme of Health Services for the Local Area**

The ultimate success of any public-health programme depends, of course, on the actual delivery of essential services to the families and the people in a rural area, a village, or a city. National health administrations primarily exist for the purpose of attaining this objective.

Emphasis on particular health problems will naturally differ widely in different areas. Yet there are certain fundamental types of personnel whose services will be required in every local area, whether it be in Western Europe or South-East Asia—the physician, the engineer, and the nurse.

In every local area, or in the regional organization in charge of that area, there should be a physician responsible for the general administrative control of the work. The word “administrative” should be strongly emphasized. The view that administration is an inconvenient interruption to clinical work is not a sound one. Actual studies of the daily routine of the health officer indicate that a very large proportion of his time is spent in dealing with problems which have no relation to the practice of medicine but which call for organizing ability and skill in applying the principles of mental hygiene to the difficult task of fostering co-operative effort. This is why postgraduate training or adequate experience in actual administration is such an important qualification for success in this field.

The medical administrator himself in a small area, or other medical specialists on his staff in a larger one, must also provide more specific guidance in connexion with such problems as communicable-disease

control, the control of venereal diseases and tuberculosis, and the promotion of maternal and child health. In regions where funds and personnel are severely limited, various forms of subprofessional aides may be employed as has been done in dealing with the treatment of yaws. In areas such as Scandinavia, as well as in many underdeveloped countries, the medical personnel of the local health department will be called upon to provide actual medical care for the population in addition to their primarily preventive work.

The public-health engineer is another type of professional worker whose services are essential to the success of the public-health team in every part of the world. Problems of environmental influences on health exist in New York and London as well as in the jungles of Africa, although their relative quantitative importance may not be as great. For a larger or a smaller local area, depending on such regional differences, there must be available the guidance and direction of a person trained in environmental sanitation. Overall planning should be in the hands of a qualified public-health engineer. In the immediate local area, however, there is ample opportunity for the use of subprofessional personnel. In medicine, the employment of auxiliary subprofessional workers is limited to cases of necessity. In the field of environmental control, on the other hand, the sanitary inspector, as an auxiliary to the professional engineer, has an almost universal role to play, in the most-developed as well as the least-developed areas.

The public-health nurse, and her subprofessional auxiliary (the "nursing aide" or "trained attendant"), constitutes a third vital element in any effective local health programme. In many areas the service of the midwife or the nurse-midwife may be of special importance. The function of the public-health nurse is a dual one—to provide direct nursing care in the home, and to carry on a programme of health education and health motivation. These functions in many areas are separated. There is one group of nurses (commonly under official governmental auspices) assisting in case-finding and providing health guidance in the home, and another group giving bed-side care. Many students of the subject believe that such a separation is unfortunate; and in the USA there is a growing trend even in urban areas toward a generalized nursing service in which bed-side care and health teaching are combined. After all, the primary reason why the nurse is so effective an agent in bringing health knowledge into the home and serving as a continuing health counsellor is that she has gained the confidence of the family by the direct service she has rendered. It must be borne in mind, however, that, when the number of nurses is limited, the absence of nurses whose time is specifically devoted to preventive work is likely to lead to neglect of this essential phase of the programme.



The nurse is needed as the ultimate point of contact with the home in every phase and at every stage of the public-health programme. Nurses are essential for case-finding and for securing attendance at clinics in tuberculosis and syphilis campaigns. They are essential in services for the protection of the health of mothers and children, for the development of sound nutritional practices and better mental hygiene attitudes, and for the promotion of the health of industrial workers. WHO has recently received many requests for public-health nurses from South-East Asia, from the Western Pacific, from the Eastern Mediterranean, and from the South American countries; and there are now nursing advisers on the WHO regional staffs of all these areas.

The physician, the engineer, and the nurse are vitally necessary in every effective health organization at the local level. Associated with them in a large local unit—or standing behind them as guides and consultants in the case of a smaller unit—there must be other specialists of various types. There must be a system (preferably on a national level) for the registration of births and deaths and the reporting of important diseases, for this forms the solid basis for the planning of any sound public-health programme. There must be a public-health laboratory service which provides the material and machinery for diagnosis and treatment of the particular diseases present in a given area. There must be epidemiological experts for the solution of difficult problems arising in that sphere. In many areas there are animal diseases which are transmissible to man, or which are of major public-health importance on account of their influence on food-supply; here, the public-health veterinarian comes into the picture. In industrial regions the expert on industrial hygiene is an essential member of the general public-health team; and, in the USA at least, public-health dentistry is represented in many State health departments.<sup>18</sup> Sound expert counsel on the basic questions of nutrition and mental hygiene should be available at some point in the framework of health machinery, since these are the two most significant and universal factors in the promotion of health in a positive sense.

There is still another member of the public-health team, the new professional worker called the health educator—the youngest member of the brotherhood of public health. The need for a specialist of this kind has arisen from the recognition that health is not primarily a problem of legislation. It is not something which can be imposed by a fiat from on high. Its attainment depends on the interest and willingness of individuals and groups to assume responsibility for the solution of their own problems on a well-informed basis. People are more prone to apply acceptable health practices in their daily lives if they have had a part in determining the changes desired in partnership with the professional health workers. This spirit of co-operation among health specialists and the people themselves,

at all stages of the development of a health programme, is destined to have far-reaching educational influence. At the same time it will serve to generate widespread public goodwill and support for the total health programme.

Understanding of the basic laws governing human motivation and human relationships comes ultimately from the psychiatrist, the psychologist, and the social anthropologist. The health educator provides an essential link between these experts in human behaviour and the doctor, the engineer, and, particularly, the nurse in contact with the people of a particular area. The health educator can provide aid in the preparation of what may be called the "tools of the trade"—special literature, posters, health films, and filmstrips. Primarily, however, he or she is concerned with individual and group motivation. The health educator assists in making effective contact between the health programme and schools, social agencies, and community groups which may contribute to health education, assists in developing school and community participation in that programme, and supplements in a continuous and organized way the work of other public-health workers and educators. It is more and more clearly recognized with every passing year that the counsel of a qualified expert of this type is essential to the fullest success of any public-health programme.

Broad principles can most profitably be illustrated by specific examples; and the results attained in Egypt during the past ten years furnish an excellent case-history of the development of a modern public-health programme adapted to local needs under particularly difficult conditions. Dr. M. A. Nasr Bey, Under-Secretary of State for Health, Ministry of Public Health, in a recent communication to WHO has provided interesting data on this programme. Out of the large area of Egypt only 3% is cultivable land; and a population of 19,000,000 people must seek a livelihood on only 12,000 square miles (31,000 km<sup>2</sup>) of territory. The average annual income of the individual is in the neighbourhood of £E 30 (£E 1 = US \$2.87) a year and the purchasing power of the Egyptian pound is estimated at one-fifth of its prewar value. Food deficiency, shortage of dwellings, and insanitation are general. Of admissions to mental hospitals, one-fourth are found to be suffering from pellagra. The death-rate in 1947 was 28 per 1,000, and the birth-rate 40 per 1,000; so that Egypt faces the problem "of fully utilizing available resources in order to meet the requirements for livelihood of a rapidly increasing population".<sup>19</sup>

It is now believed that neither plague nor cholera are any longer present in Egypt; but plague caused 393 deaths in 1944 and cholera 20,462 deaths in 1947. Of the major communicable diseases, typhus fever caused 8,252 deaths in 1943; relapsing fever, 2,414 deaths in 1946; smallpox, 1,016 deaths in 1944; typhoid, 1,257 deaths in 1942; and diphtheria, 1,932

deaths in 1941 (these all being peak years). Tuberculosis is estimated to cause a quarter of all annual deaths and Mantoux tests indicate that 70% of the rural population and 88% of the population of Cairo are infected by middle life.

The programme for dealing with these grave problems has been broadly and wisely planned, with funds amounting to 3.9% of the total national budget. It involves an active antituberculosis programme including the establishment of 24 chest dispensaries, with 17 branches, and a chain of hospitals, sanatoria, preventoria, and convalescent homes. It is of special interest to note that in many areas voluntary societies have been organized in the neighbourhood of the local dispensaries to promote the general welfare of the patients by improving their housing and nutritional conditions. Legislation for compulsory immunization by the use of BCG is to be introduced.

Gratifying results have been attained in control of the incidence of venereal diseases by hospital and clinic services provided in Cairo. The number of venereal cases in that city has been reduced from 19,490 in 1940 to 2,484 in 1950. It is estimated by Dr. Nasr Bey that this service has added to the national income the equivalent of nearly 20 days of work for every patient treated.

Maternal and child health centres are planned, with provision for supplying food, as well as medical care, to mothers and children, and it is hoped to recruit more visiting nurses trained in social service as well as in health care. There is also a programme for increasing institutional facilities for the care of mental diseases, as well as outpatient clinics, child-guidance clinics, and marriage-guidance clinics. The infant mortality-rate has decreased from a peak of 168 per 1,000 in 1942 to 127 per 1,000 in 1947.

A programme for rural health centres is under development in the initiation of which Sir Aly T. Shousha, Pasha, (formerly Under-Secretary of State, Ministry of Public Health, Cairo) now Director, WHO Regional Office for the Eastern Mediterranean, played a leading role. Some 200 such centres are being planned, each to serve a population of about 20,000 within a radius of 5-7 km (3-4.5 miles). For each five of such centres it is planned to develop a 100-bed hospital, with laboratory and ambulance services. Each of the small rural centres is to be provided with one full-time physician for preventive work and one half-time physician for curative services, one public-health nurse or nurse-midwife, a sanitary inspector, a laboratory technician, and a clerk.<sup>21</sup> In one such centre the infant mortality-rate was estimated at 181 in 1945 while in 1948 it had fallen to 80 per 1,000 total births. Not all of the centres have as yet been so developed as to produce such striking results; but the programme is basically a most promising one.

An aspect of the Egyptian planning to be noted is the fact that it is not limited to the more obvious problems of communicable-disease control but includes emphasis on health promotion in a positive and constructive sense, by the improvement of housing conditions and nutrition and the furtherance of better mental hygiene. The basis for a nutrition programme has been soundly laid by a competent study of dietary conditions in the villages. Furthermore, the work of the Ministry of Public Health forms a part of a much wider programme of national planning, including improvements in agriculture and in education, in which the Ministries of Agriculture, of Social Affairs, of Education, and of Municipal and Rural Affairs, as well as important voluntary agencies, take substantial part. The most effective correlation of all these approaches on a local level is one of the challenging tasks of the future.

### Problem of Personnel

One of the most serious difficulties which confronts the planner of a sound public-health programme is, of course, the almost universal shortage of personnel.

First and foremost stands the need for competent and trained public-health administrators. The time has gone by when any physician with political influence (or even with eminence in the clinical field) can adequately carry on the planning and the administration of a modern public-health campaign. Public health is not a speciality of medicine but a broad and vital field of social science and public service, including medicine as one of its chief components. This is why there have been established some 40 schools of public health (or institutes of hygiene). There are 10 or more such centres in North America, a similar number in Europe, 6 in South America, 5 in Asia, and several more in the Near East, Australasia, and the Pacific region. In such schools not only administrative health officers but also specialists in public-health laboratory service, biostatistics, and other fields are trained as essential members of the public-health staff.<sup>17</sup>

It seems most desirable that such training centres should be established in other areas, where students may be prepared to meet local situations in the most effective way. The mature and outstanding man may profit greatly by study in a country where conditions are widely different from those of his native land; but the average individual often finds it difficult to translate the philosophy and methodology of a socially more advanced country into terms applicable to his own area.

It should also be pointed out that, parallel with the establishment of training facilities, there must be an organized programme for the recruitment

of students, particularly of medical personnel with an interest in the problems of administration. In the USA, with its ten schools of public health, the actual registration of medical men and women in those schools is still far below a figure that would meet the pressing need for public-health administrators.

The success of a public-health programme, in a broad sense, is, of course, intimately dependent on the general level of medical care available to the population as a whole. Here the widest diversities appear. Argentina, Austria, Denmark, New Zealand, Palestine, the United Kingdom, and the USA have a ratio of 1,000 persons or less per physician. The ratio is between 5,000 and 10,000 persons per physician in Bolivia, Ceylon, El Salvador, Guatemala, Honduras, and India. At the other extreme, the ratio of inhabitants per physician is over 10,000 for Burma, Haiti, and Madagascar, 15,000 for Kenya and Manchuria, 25,000 for the Belgian Congo, China, and Uganda, and 50,000 or more for French West Africa and Indonesia.<sup>20, 23, 26</sup> These figures are several years old and the ratios may now be more favourable in certain cases; but it is obvious that the handicaps from which many countries suffer are very great.

In public-health engineering there are similar discrepancies. In medicine national differences are largely based on economic resources. The profession of the public-health engineer (provided with specific training in public health and not merely in the design of water-supplies and sewerage systems) is primarily a contribution of the USA; and much of the sanitation and vector control in Southern Europe and South America (and more recently in South-East Asia) has been done by American engineers or by those trained in the USA.<sup>9</sup> It is estimated that there are 5,000-6,000 such public-health engineers in the USA and, probably, not more than this number in the rest of the world. Much larger numbers of less fully trained personnel are, of course, employed as "sanitarians" or as the "sanitary inspectors" of the British Commonwealth.

Statistics as to nurses available in various countries are highly incomplete. In the USA, 1 professionally trained nurse is available per 300 population. In Kenya and Indonesia the ratio is 1 to about 50,000, and in French West Africa and India 1 to about 100,000.<sup>20, 23</sup>

Most nurses in most countries are employed in hospitals where they care directly for the sick. One of the most significant of all contributions made to the public-health programme in recent years has been the development of the concept of the "public-health nurse" or "health visitor" who renders bed-side care in the home and carries on a continuing programme of health education. Of the 500,000 trained nurses in the USA, 25,000 perform functions of this type. Thus, while the ratio of all nurses in the USA is 1 to 300 people the ratio of public-health nurses is 1 to 6,000 people. The United Kingdom makes a somewhat better showing

with 1 nurse to 250 people and 1 public-health nurse to 5,300 people. The Netherlands has an ideal ratio of 1 public-health nurse for every 2,000 people, the entire country being covered by such a service. India would require more than 80 times the total nursing force of the country to meet this ratio.

It should be remembered, however, in all such comparisons between different countries that quality is important as well as quantity. The standards of basic nursing training, of postgraduate public-health training, and of inservice supervision vary widely in different areas.

It is obvious that an essential and basic factor in health planning is consideration of the available—and the potential—supply of personnel. Funds, training facilities, and an effective recruitment programme present vital challenges to the public-health planners of every country.

In many areas the use of subprofessional auxiliary personnel is clearly indicated as an approach to a solution of the problems. Partially trained medical assistants have proved of great value in South-East Asia. In the economically most fortunate countries the “nursing aides” or “trained attendants” have been of important assistance to the public-health nurse; and in the USA special training courses and special certification are provided for this class of worker. “Sanitarians” are recognized as well as “sanitary engineers” in the USA, though many of them have graduate degrees placing them in the professional group. Subprofessional “sanitary inspectors” or “sanitary aides” are of fundamental importance in the daily routine of the health department. An interesting step has been taken in Ethiopia where a six-months’ course has been given (under WHO auspices) in Addis Ababa for workers of this type. The Emperor personally presented diplomas to the first class to graduate; and, later, the most promising members of this group will be sent to Uganda for a three-year course of professional grade.

It is of the greatest importance, in all such cases, that the work of subprofessional personnel of the types discussed should be guided and supervised by physicians, engineers, and nurses who are fully qualified in their special spheres.

### **Problem of Physical Facilities**

Curative medicine, of an effective scientific type, must rest on good hospital facilities as its basis; and preventive medicine must depend in large measure on outpatient services for the ambulant case and on centres for health promotion through individual instruction in the principles of personal hygiene.

Accurate data on the latter point—outpatient and health-centre services—are difficult to obtain on an international scale. In the provision of

hospitals, however, the same deplorable disparity between facilities in various areas which has been emphasized in previous sections of this report is met.

New Zealand and the USA show a ratio of close to 100 hospital beds per 10,000 population. In some Pacific areas reasonably satisfactory ratios are reported (61 in British Malaya). The figure falls to less than 10 per 10,000 for many other regions (9 for Indonesia and 7 for Burma). In India and Manchuria it is estimated that about 3 beds are available per 10,000 population; and in China proper the ratio has been assumed to be about 1 per 10,000. Great populations, then, are served by from one-tenth to one-hundredth of the proportion of hospital beds found in the most prosperous areas.<sup>20</sup>

Everywhere the deficiency in medical personnel and institutional facilities falls most heavily on the rural population. Mott & Roemer<sup>15</sup> show that States (in the USA) with less than 30% rural population report 1,126 days of hospital care per 1,000 population per year; while for States with 70% or more rural population the ratio fell to 517 days of hospital care per 1,000 population.

Even in the most prosperous areas it has been maintained that hospital facilities are not fully adequate. Studies in the USA<sup>7</sup> suggest that that country needs 245,000 more general-hospital beds, 325,000 more mental-hospital beds, and 260,000 more beds for chronic diseases, which would bring the ideal ratio up to about 150 per 10,000.

There are other trends of thought, however, which point toward more moderate goals. In Scandinavia, beds in tuberculosis sanatoria are now being used for the care of the aged. In the Montefiore Hospital of New York City, USA, a most promising programme is in force under which patients are discharged from the hospital much earlier than has been the case in the past but are provided in their own homes with all necessary medical and nursing care under the general supervision of the hospital staff.<sup>14</sup> In general, pressure for hospital beds in the USA has recently led to shortened periods of hospital stay. Furthermore, hospital procedures have been successfully simplified by development of "natural child-birth", without use of anaesthetics but with preparatory physical training and mental hygiene counselling, and by "rooming-in" (the keeping of the baby with the mother instead of in a separate infant ward where the dangers of contagion may be considerable). Both of these practices represent a return to natural processes, under scientific control. In many instances, home care or ambulant clinic care can be substituted for intra-mural care, with financial economy and benefit to the emotional health of the patient.

The proper integration of hospitals and clinic services with provision for home care, and with the public-health programme as a whole, is of

vital importance. The Fourth World Health Assembly wisely pointed out in one of its resolutions<sup>27</sup> that: "it is difficult as well as undesirable to draw a definite line of demarcation between curative and preventive medicine; ..." and suggested that a study should be made "on the work being done in Member countries to promote the health of their people through good hospitals and other facilities ... for the care of the sick" (Resolution WHA4.20). Dr. M. T. MacEachern, Director Emeritus, American College of Surgeons,<sup>12</sup> in supporting this resolution, said that "hospitals were becoming increasingly the health centres of the community". He gave an account of his personal experience in hospital administration in the USA and mentioned the growing interest in hospital work over the past ten years as evidenced by the founding of a number of schools and societies for hospital administrators. "Any effective health programme, whether curative or preventive, should be based on the closest integration of institutional care and public health in its preventive stage." He stressed that "a hospital should be a health centre working in close co-operation with public-health officials, each complementing the work of the other in all departments".

Professor J. M. Mackintosh, Professor of Public Health at the London School of Hygiene and Tropical Medicine, has recently emphasized the vital importance of considering seriously the question "What is a hospital for?"<sup>13</sup> He takes his text from a statement of Tacitus—"They build a hospital and call it health—they make a sick bay and call it a health centre". Mackintosh says that

"The appropriate field of study of a hospital is not sickness in the narrow sense but life in the broad sense. Sickness is an incident—grave, troublesome, or restful—in the life of a person, but to the hospital and its staff sickness is a challenge, a focus of inquiry from which prevention should radiate as well as the cure of the individual. Among the many factors that contribute to health the care of the sick is admittedly vitally important. Those who are ill have lost something both in confidence and in that balance of mind and body which we call wellbeing. Restoration is the object of hospital care for the individual so that he may survive and become once more productive in society. It is primarily in the restorative process that the hospital contributes to health, and therefore its essential function is to provide medical and restorative services which only a specialized institution can organize.

"The hospital which is equipped and staffed for highly skilled diagnosis and treatment should therefore be constantly on the watch to cut down non-essentials because technically each bed that it provides is more extravagant in both capital and maintenance than the most luxurious hotel. The cost is obviously growing as medical science becomes more exact and more specialized. In England today the cost per patient bed day is increasing at a colossal rate; each bed costs to begin with about £4,000 in capital, and in its services, including staff, upkeep, etc., its daily cost runs between £2 and £3. How many people are occupying these expensive services who do not really need them? How many are convalescing and could and should have been moved to a convalescent hospital with much simpler bed accommodation and much more simplified nursing care, or even to their own homes, one, two, three days or even weeks ago? How many should have been moved to other establishments with overheads perhaps one-fifth of the cost of this key



establishment? And if we ever get such lower-cost establishments we [had] better get some pretty soon before our costs increase still more and our waiting lists become still longer. Surely the cardinal rule of today is never to use persons or facilities for purposes below the level for which they are equipped." (page 5)

More hospital facilities are needed in most countries, but in all countries the hospital services which do exist need to be developed in the most economical manner (consonant with high standards), intramural care needs to be correlated with clinic and home care, effective integration with the public-health programme as a whole must be secured, and hospitals must become health centres in the full sense of that term.

### **Financing of Medical Care**

The economic burden involved in financing the cost of medical care—as distinguished from the cost of a preventive health service—is a very considerable one. The funds essential for this purpose have been provided in various countries from one or more of four different sources:

First, in historical order, is payment by the recipient of medical care from his own private funds. The kings and great lords had their private physicians attached to their own households; and the wealthy today have no difficulty in paying for the best available medical care. For those of moderate means, however, a real problem arises with regard to the unevenness of the burden involved. Many families with incomes fully adequate to pay the average costs of medical care are quite unable to meet the sudden burden of catastrophic illness. To meet this situation, systems of voluntary insurance have been devised, which involve regular contributions to a general fund from which whatever care is necessary in a given year may be paid.<sup>11</sup>

At the other end of the social scale is an equally long history of care provided for the indigent by religious and philanthropic bodies. In India, King Asoka founded a group of Buddhist hospitals in the third century B.C. The Catholic Church, from its early days, has established hospitals and nursing orders for this purpose; and, particularly in South-Western Europe and in Central and South America (to some extent in North America), the Church still plays a considerable role in providing medical care for the poor and needy. A similar contribution has been made during the past 500 years by the Protestant Churches and by various groups of philanthropic citizens. Many hospitals in the United Kingdom, in the Netherlands, Scandinavia, and Belgium, and in North America are supported by organizations of this kind. The whole development of public-health nursing services in some countries has been initiated by groups of public-spirited women organized specifically for this purpose.

A third—historically somewhat later—approach was the provision of funds by the State. This was originally initiated for the care of the indigent, stimulated by the “English Poor Laws” in the days of Queen Elizabeth. The tax levy, also, came to be used for the support of institutions, for the isolation of communicable diseases and for the care of the insane (whether indigency was involved or not). About two-fifths of all general-hospital beds and nearly all mental-hospital beds in the USA are provided in this way.<sup>22</sup> In the less economically fortunate areas of the world, almost the whole of the medical care available is financed either by religious philanthropy or by the government involved. In countries like Bulgaria, Poland, and the USSR plans are in force which socialize medicine completely, all services—preventive and curative alike—being provided for the whole population, or a major part of it, by physicians employed directly by the State.

A combination of individual payment for the higher-income level and of payment by the State or private philanthropy for the lower-income level leaves a large middle section of the population unprovided for. To meet this need, European countries and those of the British Commonwealth have developed a fourth method, the programme of “compulsory insurance” which it would be better to call “subsidized insurance”. Under this plan, the whole population (or the group below a certain income level) contributes to a common fund, in accordance with their income, and receives the benefits which the system provides, the lower-income members being thus subsidized by contributions from their employers, or from the higher-income contributors, or by the State. This system was first introduced in Germany in the 1880s.<sup>2, 4</sup> The United Kingdom has recently adopted an all-inclusive programme of this kind financed wholly by taxation so far as medical care is concerned. Czechoslovakia, Roumania, and Sweden also depend largely on State subsidies. In France, Hungary, Italy, Norway, and Spain, employer contributions also play a role. The cost of the programme in the United Kingdom is estimated at 4% and in New Zealand at 3.6% of the national income.

In general, the aim of the more modern programmes is to attain the objective of ultimately securing, in some fashion, for all members of the community, the services recommended by the International Labour Organization :<sup>10</sup>

“both general-practitioner and specialist out- and in-patient care, including domiciliary visiting; dental care; nursing care at home or in a hospital or other medical institutions; the care given by qualified midwives and other maternity services at home or in hospital; maintenance in hospitals, convalescent homes, sanatoria or other medical institutions; so far as possible, the requisite dental, pharmaceutical and other medical or surgical supplies, including artificial limbs; and the care furnished by such other professions as may at any time be legally recognised as belonging to the allied professions.” (page 233)

### Cost of Preventive and Curative Health Services

In chapter 2, data have been cited for the cost of certain specific public-health campaigns against certain diseases ; but estimates of the cost of the public-health programme as a whole are much more difficult to make.

Figures are often cited for the cost of the health programme in relation to the total national governmental budget, or in relation to the total income of the country as a whole. The fact that a nation spends 5% or 10% of its governmental budget on health is of little or no value, since both elements determining the ratio are highly variable, depending on local conditions. A ratio between the health budget and the total national income (not merely governmental income) is somewhat more significant. In the more prosperous areas it has been estimated that a purely preventive programme can be financed at a cost of about 0.5% of the national income, while curative medicine requires an expenditure of ten times that amount. In the United Kingdom, the total cost of both preventive and curative services is in the neighbourhood of 5% of the national income.<sup>5</sup> This type of estimate gives a false criterion of the needs of underdeveloped countries where the cost of essential health work goes up as the income goes down.

The least fallacious criterion would seem to be the actual (or the ideal) expenditure per capita, for a given area. On this point data for funds spent on a national scale are obtainable without great difficulty. Examination of recent figures from seven countries (Denmark, France, Italy, the Netherlands, Sweden, the United Kingdom, and the USA) seems to suggest that between \$0.50 and \$4.00 per person, primarily for preventive work, is spent by the respective health ministries concerned. There are, however, two errors involved in such a figure. The costs listed in a national budget statement seldom permit a sharp distinction to be made between preventive and curative activities ; and they, of course, omit health expenditures on a State or cantonal, or on a local basis. These contributions to the total health budget may be negligible in certain countries while in others they constitute a major part of the total effective health budget.

Except for those nations in which the entire local programme is carried on in all areas by the central government, very few countries are today in a position to give even an approximate estimate of the total funds spent on health services, including funds expended by national, regional, and local jurisdictions, and by voluntary agencies. Certainly no one could obtain such figures for a country like the USA. In the USA, however, the problem has been approached from another angle. The American Public Health Association has, for many years, been conducting surveys of individual State and local health programmes, has prepared study schedules which have been filled in for hundreds of communities, and has formulated

evaluation criteria on which quantitative appraisals of actual results may be based. From these studies it has been possible to formulate certain ideal standards of performance<sup>1</sup> by which the achievements of local health services of a preventive nature can be judged. The functions of such a local health service have been admirably analysed by Hiscock,<sup>6</sup> and the balance of work contemplated may be illustrated by the tabulation of eight major functions and their cost per person served per year (as approximate mean values between suggested minima and maxima):

	<i>US dollars per capita per year</i>
Administration . . . . .	0.19
Public-health education . . . . .	0.05
Vital statistics . . . . .	0.09
Control of preventable diseases (exclusive of hospitalization)	0.36
Maternal, child, and school health . . . . .	0.32
Public-health nursing . . . . .	1.11
Sanitation . . . . .	0.31
Laboratory service . . . . .	0.12
Total . . . . .	<u>2.55</u>

To conform with actual practice in the USA, to the sum of about \$2.50 per capita for the local budget an additional \$1.50 per capita for the supervisory and supplemental services rendered by state and federal governments should be added, making a total of about \$4.00 per capita, which is equivalent in the USA to the average income of the population for some two days a year per person. The apportionment of costs to a specific activity has, of course, no application to many other countries. It would be desirable, however, that the eight primary functions of health administrations—vital statistics, laboratory service, sanitation, control of preventable diseases, maternal and child health, public-health nursing, health education, and administration—should ultimately find their place in any sound health programme.

It is of interest to note that the figures cited above allot about 43% of the local health budget to nursing. This includes bed-side nursing care in the home, but in areas where hospital facilities are very limited the need for such care might be even greater.

It should be emphasized that even in the USA, where \$4.00 per capita is an easily attainable figure, this figure is not actually attained except in the most enlightened communities. The formulation of such ideal standards has, however, proved of substantial value. It is possible to tell a community which is spending only \$1.00 per capita what further appropriations it needs and for what purposes; and this approach is steadily improving actual practice throughout the country.

The particular standards cited are, of course, not suggested as applicable to any other countries. They serve only as illustrations of a general line of approach which *mutatis mutandi* might find useful application under widely different conditions.

The preceding discussion refers, of course, only to primarily preventive services (although including public-health nursing, which is largely a preventive function). When the cost of curative medicine, of hospitals, and of physician services is considered, the figures mount to astronomical proportions. The Ministry of Health in Denmark spends nearly three times as much on hospitals as on basic public-health work, the Ministry of Health in Sweden more than three times as much (although much of the hospital service in both countries is provided by private philanthropy). In Great Britain (i.e., England, Wales, and Scotland), it has been estimated (personal communication) that the cost of preventive services for the year 1949/50, after deducting fees, etc., paid by the public, was £67,500,000. The all-inclusive National Health Service cost for the same period £425,200,000, more than six times as much, giving an average cost of £8.6 per capita per year.

In the USA, where the cost of a reasonably complete preventive health service has been estimated above at \$4.00 per capita, medical care insurance (as demonstrated on a voluntary basis in many areas) costs about \$40 a year per person.

It is evident that in countries where financial resources are small and health problems serious, progress toward such ideals as those suggested above must be very slow. There is great danger in such instances that the preventive aspects, which must prove most fruitful in the long run, will be neglected. A recent survey of the situation in Liberia by Huss<sup>8</sup> may be cited as an example of the sort of situation which exists in many underdeveloped areas of the world. This country has 1 physician to every 63,000 persons in the population, 1 nurse to each 61,000 persons, 1 hospital bed to every 4,000 persons. Over 30% of the inhabitants are infected with malaria. About half of the workers in one large plantation were found to be infected with *ancylostomiasis*. Yaws, gonorrhoea, and dysentery are common. Although 12% of the total national budget is devoted to the Bureau of Public Health and Sanitation, it is clear that the sum available (about \$0.16 per capita) must be largely devoted to the provision of basic hospital and clinic care, leaving no possibility of a real preventive programme. Huss urges the appointment of an Assistant Director in charge of medical services, including supervision of hospitals, clinics, and leper colonies, to enable the Director of Health "to devote more attention to the development of communicable diseases control and environmental sanitation services", and the provision of "a public-health adviser and a public-health engineer ... from the World Health Organization".

It is particularly in such countries as this that the most thoughtful and courageous type of planning is needed to produce maximum results at minimum cost.

### **Opportunities for Service by WHO in Administrative Planning**

WHO, in its infant years, has already made significant contributions to the cause of world health on a global scale. It has carried on and greatly expanded the central technical services initiated by the League of Nations with regard to the standardization of drugs and biological products, the collection and dissemination of epidemiological intelligence, and the development of international health statistics, by which, in the words of a resolution of the Fourth World Health Assembly,<sup>27</sup> "the policy of the Organization, including the regions, can be guided and its operations and their results measured" (Resolution WHA4.3). It has initiated a programme of assistance in the training of professional personnel (the thousandth fellowship award having been made in the spring of 1950). It has provided aid in the most diverse specialties of public health through the counsel of its experts, in spheres ranging from the control of malaria and tuberculosis to the promotion of nutrition and mental hygiene. It has begun a fruitful service in the setting-up of specific projects in various countries, commonly called "demonstrations" but better described perhaps as "pilot studies" since workers in the public-health field are still in the learning stage. Through the evolution of strong regional organizations the work is being decentralized so as to make it more efficient, more closely adapted to local needs, and more fruitful in developing that vital interest of the peoples concerned which is essential to ultimate success.

It would seem logical at present to superimpose on these notable contributions to the solution of particular problems (malaria, tuberculosis, syphilis, yaws, and the like) an increasing emphasis on the planning and on the administration of a balanced public-health programme as a whole, with due consideration of the costs involved and of the value of the results to be attained. Preceding pages of the present chapter may perhaps have suggested the narrow limits of current knowledge of this problem. Data appear to be needed along at least four major lines :

(1) It would be highly desirable to have fuller data on the general patterns of national health services. No one would dream of anything remotely like standardization. Diversified patterns must fit the economic and social and psychological and political needs of individual peoples. Yet comparative study of the various national patterns, as to their general objectives, their emphasis on prevention and cure, their division of responsibility between national and local jurisdictions, and the extent to

which voluntary agencies of various kinds participate in the common task, should be highly suggestive. Reports recently received by WHO from Ceylon and Uruguay have proved of great interest in this connexion. Nations can learn much from each other in the field of national health.

(2) Even more significant, perhaps, would be an analysis of the data on the administrative organization in the ultimate local areas where the beneficent stream of health knowledge actually irrigates the soil. How is the local health service organized in rural areas (or in one specific area) in a particular country? What are the numbers and qualifications of the members of the staff? What are their activities? What results have been attained? There is no one answer to the problem. Yet the experience of one land may often perhaps be fruitfully applied in another. The study tours planned by WHO to begin in the autumn of 1951, in which health officers from a dozen countries will visit and study the administrative organization in other areas (a technique employed long ago by the Health Organization of the League of Nations), should prove a most useful procedure. The fact that the WHO Executive Board has chosen the methodology of health protection for local areas as determined by the health, social, and economic needs of those areas, as the topic for a technical discussion at the Fifth Health Assembly indicates how general is interest in this question. The demonstration areas in which WHO is now working could be profitably used for special studies of problems relating to organizational efficiency and to success in gaining the necessary degree of spontaneous citizen co-operation. Much has been learned, for example, from observation of the way in which some of the demonstration areas in India have actually functioned.

(3) As the scanty and inadequate figures cited in the present chapter are considered, it becomes increasingly clear that more reliable information as to public-health personnel—present numbers and future needs—in various countries is greatly needed. WHO could, without serious difficulty, collect and maintain data as to the numbers of physicians, engineers, nurses, and specialists in other spheres of public health, and of subprofessional auxiliary personnel, which are at present available in each country, and secure at least approximate estimates of the increases needed to meet the most urgent requirements. WHO is already collecting data as to the existing personnel situation in various countries. Health programmes in a given area cannot be wisely planned, and the WHO fellowship programme cannot be wisely administered, without definite knowledge on these points.

(4) Finally, and most directly germane to the major objective of this report, data on the actual cost of the present public-health programme, and estimates of the cost of a programme as nearly approaching the ideal as the economic resources of a given country may permit, are needed.

In no country at present can one say how much money is actually allotted (for the population as a whole) to prevention and how much to the treatment of disease.

At least approximate data on this point could be obtained by WHO, for the whole of certain small countries and for selected typical local areas in larger countries. Above all, they could be secured for areas in which special projects are being operated by WHO and where the data could be collected at first hand on the spot. Standards of tabulation would be necessary so that functions intermediate between prevention and cure could be uniformly grouped. In the USA, tuberculosis and venereal-disease clinics, and visiting nursing are classed as public-health functions, while tuberculosis sanatoria are grouped with other hospitals as curative agencies; but the line of demarcation is unimportant so long as it is uniformly applied.

It is not intended to minimize the difficulties involved in such a study. It could not be carried out by questionnaires on any wholesale scale, yet if data for a score of typical areas in countries at various stages of development were obtained, the results should be of substantial value in making possible the formulation (for these and comparable areas) of a reasonably adequate health service. With such a goal in mind—and with the knowledge of the present scale of public-health expenditures—policies of development for the future could be wisely planned.

It would, no doubt, be found in certain areas that local health problems were so serious as to require for a time more than \$2.50 per capita per year to secure ideal results; and that the resources of the areas would only permit the expenditure of a fraction of this sum. The recognition of the facts is, however, the basis for sound health planning and for the establishment of a practicable system of priorities. In such an area it would almost certainly be found, on analysis, that preventable diseases were costing far more than \$2.50 per capita and were—in fact—largely responsible for the existing low economic status (as in the instances cited in chapter 2 of the present report). A powerful argument could be made for temporary aid from outside the area to redress this unfavourable balance.

In every area, developed or underdeveloped, an approximate determination of cost of present curative and preventive services, an estimate of the ideal preventive services which would be economically profitable, and a programme for approaching that ideal by stages of relative priority must form the basis of sound health planning. If WHO can help to develop such an approach, it will render a major service to the cause in hand.

The promotion of the health of the peoples of the world is basically a moral—not an economic—issue. The means of approaching that objective are, however, practical ones, which involve financial considerations.



Dr. Hermann M. Biggs, the greatest of American public-health administrators, based his outstanding programme of reform in New York State on the slogan "Public health is purchasable. Within natural limitations, a community can determine its own death rate". To attain the desired goals, the actual cost of preventable disease, and the price at which relief from its burdens can be purchased, must be realized much more clearly than they are today.

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## CHAPTER 4

# INTERRELATIONSHIPS OF POVERTY AND DISEASE

Consideration has been given in earlier chapters to certain of the burdens which disease lays upon mankind in the form of premature death and disability, as well as in the provision of costly facilities for the care of those afflicted with maladies, most of which are largely preventable. The relationship, however, is a mutual one; and it is necessary to take note of the converse process—the role of poverty in the causation of disease.

### Poverty as a Factor in the Causation of Disease

It happens that the relations between economic factors and health have received more attention in Great Britain and the USA than elsewhere; and the results of such studies in relatively prosperous areas are particularly significant. If—in such countries—relatively slight differences in economic status have demonstrable effects, the influence of far greater inequalities in other areas must be even more striking.

It has been noted that the modern public-health movement originated in England with the classic report of Sir Edwin Chadwick on *The sanitary condition of the labouring population of Great Britain*, emphasizing, at that early date, the primary challenge of less privileged groups. Chadwick's successor, Sir John Simon, in his first annual report as Medical Officer of Health for the City of London, wrote:

"I feel the deepest conviction that no sanitary system can be adequate to the requirements of the time, or can cure those radical evils which infest the under-framework of society, unless the importance be distinctly recognized, and the duty manfully undertaken, of improving the social condition of the poor." (quoted by Winslow<sup>28</sup>)

The relation between such diseases as malaria and typhoid fever caused by local substandard conditions is too obvious to need mention. The prevalence of contact-borne diseases is also associated with the overcrowding incident upon poverty. More than 40 years ago, the Health Officer of Glasgow studied the relationship between the size of the dwelling unit and the incidence of measles during an epidemic of that disease. In one-room tenements the case-rate during this epidemic was 125 and the death-rate 27 per 1,000; while in four-room tenements the corresponding rates were 11 and 1 per 1,000. For a disease of entirely different etiology, pellagra, studies in southern mill villages of the USA showed a case-rate

of 41 per 1,000 in families of very low income and a rate of 2 per 1,000 in families of very high income.<sup>28</sup>

One of the most significant analyses of this kind was the US National Health Survey of 80,000 male workers in eight American cities.<sup>26</sup> It was found that families with an income below \$1,000 per year had nearly four times as much disability from tuberculosis, nearly three times as much disability from orthopaedic impairments, and approximately twice as much disability from rheumatism, digestive diseases, and nervous diseases as families with incomes over \$5,000. Considering all causes of disability together, the group with incomes under \$1,000 showed 66% more sickness disability than the families with incomes over \$5,000. The correlation displayed was no doubt due partly to poverty resulting from former disease but mainly to diseases whose evolution was favoured by poverty.

The factors involved in such studies are highly complex. Abriol<sup>1</sup> in the Philippines and Gray<sup>12</sup> in the North-Eastern USA found high mortality-rates in the more prosperous areas. A more exhaustive study of 1,926 counties of the USA<sup>29</sup> again showed a positive first-order correlation between mortality and indices of prosperity. By applying methods of partial correlation, however, it was shown that, when indices of urbanization were held constant, the overall positive correlation of mortality with prosperity disappeared, while indices of rural prosperity showed a negative correlation with morbidity.

Figures published by the Registrar-General for England and Wales<sup>13</sup> are of particular interest. They present the following "standardized mortality" adult-male ratios (for all causes) for 1921-3 and 1930-2 by division of the population into five social classes.

<i>Social class</i>	<i>Standardized mortality ratios</i>	
	1921-3	1930-2
I	82	87
II	93	94
III	94	97
IV	99	101
V	124	112

Thus, in a decade of progressive efforts to better the status of under-privileged groups of the population, an excess mortality of about 50% for the lowest economic group as compared with the highest economic groups was reduced to less than 30%.

On the whole, it seems certain from such studies as the US National Health Survey,<sup>26</sup> when the problem was analysed by direct house-to-house canvass of otherwise comparable populations, that poverty is associated—even in highly prosperous countries—with a considerable excess burden of preventable disease. The British data cited seem to indicate that, in a country where a determined effort has been made to improve the status of

the economically lower population groups, the discrepancy between the extremes of society may be materially diminished.

When the less fortunate regions of the globe, where the total resources are woefully meagre and where, also, the differences between rich and poor are far greater than in Western Europe, are considered, poverty must be a major factor in disease. In comparing three countries near the top and three near the bottom of the economic scale in the period immediately preceding the second World War the following figures<sup>25</sup> may be noted :

	<i>Per capita income (US dollars)</i>	<i>Expectation of life at birth (males) (years)</i>
USA . . . . .	554	62
Germany . . . . .	520	60
United Kingdom . . . . .	468	60
Mexico . . . . .	61	37
Brazil . . . . .	46	39
India . . . . .	34	27

### Problem of Overpopulation

Some investigators have been so deeply impressed with the possible influence of poverty—and, particularly, of inadequate food-supply—upon the human race as to feel that drastic limitations on population offer the only possible solution. It is pointed out that the world population is about 10% larger than before the second World War, while world supplies of food in terms of calories per person were, in 1947-8, still 5%-10% below prewar level and even further below standards with respect to specific nutrients necessary for health.<sup>20</sup> Walker & Bolles<sup>27</sup> have recently reviewed some of the more extreme arguments of this kind by those who see a growth of world population at a rate of 200,000,000 per decade as the greatest threat to the human race. The two world wars are credited to population pressure. Available agricultural land is said to be diminishing as a result of erosion. Even the USA is held by one authority to be overpopulated ! An important study by the Rockefeller Foundation<sup>2</sup> analyses this problem as related to conditions in China, Indonesia, Japan, Korea, the Philippines, and Taiwan. A recent contribution from the Population Reference Bureau<sup>3</sup> lists Ceylon, Egypt, Formosa, Japan, Java, India, Korea, Latin America, the Micronesian Islands, the Philippines, Puerto Rico, and Turkey and the Near East as areas where high birth-rates constitute a serious menace.

The question naturally arises whether public-health workers are doing more harm than good by reducing death-rates while birth-rates maintain—or increase—their present level.

There are a number of valid answers to this challenge.

(a) As pointed out in earlier chapters, the major effect of the modern public-health programme has been to reduce mortality occurring before the productive period of life. It is certainly good economy of such natural resources as exist to use them for the support of those who produce as well as consume, rather than largely for those who are not permitted to reach the age at which they begin to make their contribution to society. The argument—sometimes advanced—that one may “preserve the unfit” is, of course, without any rational basis. “Fitness” to resist the germ of tuberculosis is highly specific and has nothing to do with any other kind of “fitness” for useful and productive living.

(b) The public-health movement prevents disease, as well as death, and thus increases the potential efficiency of the population. This process has been described at work in Italy and Sardinia, in the USA, and in South Africa.

(c) The potential food-supply of the world is not a fixed quantity determined by some mysterious iron law as some population experts appear to believe. Students of agriculture take a different point of view. The process of erosion can be checked, as it has been checked in the Tennessee Valley of the USA. Irrigation in many areas could turn deserts into fertile fields. Improved methods of agriculture could play a major role in bridging the gap between a yield of 10-15 bushels of wheat per acre (7-10 quintals per ha) in India and China and 40 bushels per acre (27 quintals per ha) in Western Europe; as between 26 bushels of rice per acre (13 quintals per ha) in India and 76 bushels per acre (38 quintals per ha) in Japan. The addition of boron and manganese to the soil has increased peanut crops in Gambia fourfold at very small expense. Control of plant diseases has worked wonders with tomato crops in Lebanon and citrus fruits in Brazil. Entirely novel crops can be developed, as in the cultivation of kenaf, a new fibrous plant in Cuba.<sup>25</sup> The introduction of hybrid corn in Italy has increased crop yields by 32%-117%. The sea could provide large food resources, as yet unutilized. It has been estimated that per acre yields (1 ha = 2.47 acres) of grain in India could be increased by 30% in ten years—5% by the use of improved varieties, 20% by manuring, and 5% by protection against pests.<sup>4</sup> The experts of FAO<sup>11</sup> have set target goals which contemplate an increase of 90% in the calorie yield of the less-developed areas by 1960, an increase which could not only provide for probable population growth but also for a material rise in standards of living. The limiting factor in such a programme<sup>10</sup>

“is not the physical capacity to produce enough food but the ability of nations to bring about the complex economic adjustments necessary to make adequate production and distribution possible.” (page 3)

It happens that those areas which offer the greatest promise of increased agricultural development are precisely those areas now handicapped by preventable disease. Approximately one-fourth of the world's cultivable lands lie in the tropics;<sup>9</sup> and Norris E. Dodd, Director-General of FAO, considers that Africa offers major possibilities for future development. Yet 4,500,000 square miles (11,654,900 km<sup>2</sup>) of fertile land lie idle on that continent because of the handicap of sleeping-sickness.

(d) For many areas which cannot provide the necessary food-supply within their own borders there are other practical possibilities. The development of mineral and other natural products, of timber resources, and of local industries, if coupled with free international trade, could so increase income that the purchase of food from primarily agricultural areas would be possible. Harris<sup>14</sup> has estimated that the areas of the world at present underdeveloped, while increasing their population 50%, could more than quadruple their total income, increasing their per capita average earnings of \$50 in 1950 to \$139 by the year 2000. This is a long-range goal! It is, however, best not to be too hasty in the process since over-rapid industrialization may produce more evils than it cures.

(e) A highly important fact, which is too often ignored by the population expert, is that—between countries, and within a given country—increased prosperity is normally associated with lower reproductive rates.

This is not always true. Prosperity and parallel increasing birth-rates were often manifest in the days of the industrial revolution. As a rule, however, the reverse has been the case. United Nations estimates<sup>19</sup> indicate a present excess of birth-rates over death-rates of 10 per 1,000 for the world as a whole; but this figure falls to 4 for North-West Central Europe, 6 for Canada and the USA, and 7 for Southern Europe, while it rises to 14 for Eastern Europe, 15 for the Near East, and 20 for Latin America. Notestein et al.<sup>16</sup> have made a penetrating study of these relationships in Europe, showing the sharp contrast between Western Europe, where underpopulation causes anxiety, and Eastern Europe, where overpopulation is a serious problem. How far certain countries are rich because their population grows slowly, and how far their population grows slowly because they are prosperous, is not easy to assess; but the general relation is clear. In Western Europe and the USA, reduction of reproductive rates has certainly come about without any designed purpose. In Ireland, the great potato famine of a century ago led to emigration on a large scale; but it was also followed by a drop in the birth-rate from 27 per 1,000 in 1870 to 23 per 1,000 in 1900. Late marriage and a high proportion of unmarried persons in the population contributed to this result.<sup>27</sup> In Japan today the active development of marriage-guidance clinics is taking place. Where limitation of population may seem essential, there are more economical and more humane agents of control than malaria and tuberculosis.

On the whole, the fear of overpopulation offers no valid grounds for modifying the responsibility of public-health workers for the control of preventable disease. Here, as in other aspects of human ecology, there are diverse angles of philosophical approach. There are those at one extreme who hold a defeatist "man-under-nature" concept of human destiny. There are those at the other extreme who maintain an equally unfortunate "man-over-nature" philosophy, and may bruise themselves on the jagged surfaces of reality. The position of the true scientist should lie between these two poles. A "man-with-nature" approach, recognizing both the facts of life and the human aspirations, which are equally a part of nature, is a creative force with almost unlimited powers to control and mould the physical universe nearer and nearer to the goals of human health and happiness. As the FAO experts have said :<sup>11</sup>

"Many people who have given serious study to the population problem prophesy doom for much of mankind unless the rate of population growth can be drastically checked. It is worth reiterating that the fundamental solution of the problem lies in increasing the productivity of the individual by putting at his disposal modern scientific knowledge and the tools of modern technology. To the extent that this is done, every individual can become a source of new wealth to his country and to the world. To the extent that it is not done, he is a potential liability, unable to supply his own needs let alone helping to supply those of his fellow human beings." (page 25)

### **Importance of a Broad and Integrated Programme**

The importance of economic and social factors in the health and welfare of our peoples does not weaken—but strengthens—the argument for a comprehensive programme for world health. On the other hand, the interrelationships involved make it abundantly clear that the public-health programme cannot be planned in a vacuum, but only as a vital part of a broader programme of social improvement. In this programme the public-health worker must work in the closest and most intimate contact with the United Nations and its constituent and co-operating bodies (such as the Department of Social Affairs, and the Economic and Social Council), with FAO, ILO, the United Nations Educational, Scientific and Cultural Organization (UNESCO), UNICEF, non-governmental organizations, and other similar groups.

An interesting approach (to which reference has been made in chapter 3) toward co-ordination of health and social and educational programmes was initiated five years ago in Egypt by an agreement between the Ministries of Public Health, Municipal and Rural Affairs, Social Affairs, Agriculture, and Education to establish a joint experimental demonstration in the Manuf district. A system of social centres, health centres, agricultural centres, and rural schools has been projected. Farnsworth,<sup>8</sup> in



a recent report, urges the more complete development of this enterprise, and concludes that :

“ The entire success of any public-health programme is dependent on the concurrent and integrated approach to the social, educational, and economical problems within the area. Improvement in health will automatically follow improvement in the educational, economical, and social status of the people.

Mobilization of all the effective individual agencies and programmes of the area into one local generalized practical programme is the ultimate objective.”

Health aims cannot be attained, in many areas, without control of soil erosion, irrigation of desert areas, improvement in plant breeding and the use of fertilizers, control of animal and plant diseases, and development of fisheries, timber lands, and mineral resources.<sup>18</sup> In many countries their realization will depend on the development of local industries, on increased power resources, on the production of farm machinery and appliances, on competent government services, and on the co-operation of managerial groups. Furthermore, in the course of social evolution care must be taken to avoid the creation of new hazards such as psychosomatic illnesses which appear to have been associated with industrial and urban life. The social anthropologist, as well as the health expert, is needed in solving such problems.

All of the advances which are so essential in health, in agriculture, and in industry are primarily dependent on local, regional, and national leadership. Furthermore, their attainment requires a far-reaching improvement in the educational status of the population as a whole ; so that the promotion of higher and lower levels of instruction, involving the extension of educational services to the mass of the population, must form an essential part of the broad programme.

With special reference to the needs of underdeveloped areas, UNESCO has formulated a constructive philosophy of “ Fundamental education ”, in consonance with the ideal that : <sup>22</sup>

“ The aim of all education is to help men and women to live fuller and happier lives in adjustment with their changing environment, to develop the best elements in their own culture, and to achieve the social and economic progress which will enable them to take their place in the modern world and to live together in peace.” (page 9)

The principles of such a philosophy of fundamental education have been admirably presented in a special series of UNESCO monographs on the subject ; <sup>6, 15, 22, 24</sup> and the progress already made is described in the annual report of the Organization for the period April 1950 to March 1951.<sup>23</sup>

The plan for a particular area should be worked out only after a careful study of local conditions and local psychology. Many of the problems involved were admirably set forth at the eighth session of the Economic

and Social Council in 1949.<sup>21</sup> Park<sup>17</sup> suggests the following considerations :

“Effective projects should be planned on the basis of a people's existing social and economic conditions. Where the economy is still largely at the subsistence level, the emphasis should be placed first on smaller, consumer industries. Production of consumer goods should utilize existing skills, artistic tastes, and familiar materials.

Programs should be planned in terms of the total requirements of a people. Industrial or agricultural projects should include plans for health and educational services, recreational activities, etc.

Existing institutions such as communal work groups, social units such as the extended family, and established lines of authority should be adapted and utilized to the fullest possible extent.

Efforts should be made to work in and with the local community. Underdeveloped areas are predominantly rural with a wide gap between urban and country life. Centering development projects in the cities will accelerate the urban drift, drain off from the rural areas much of the potentially talented human resources, and further accentuate the gap between rural and city life.

Industrial developments should in many cases start with the encouragement and improvement of local handicrafts. This would also help correct some of the unsatisfactory results of the growing urbanization.

Education should be encouraged of a type that would foster interest and pride in a people's own group or country at the same time that it trains in modern science and technology.

Fullest possible utilization of scientific studies of human societies should be used to provide a basis for the most satisfactory adjustment between the old and the new.” (page 71)

In many instances the full success of plans for the development of underdeveloped areas may require the removal of barriers to international trade and the provision of necessary investment capital. Where possible such financing should come from the country itself, but sound investment of the surplus capital of more prosperous countries may often play a useful part. Whether the capital comes from within or from without the national boundaries, its employment should be adequately safeguarded so as to promote the essential social objectives outlined above.

A suggestive example of a carefully planned programme for South-East Asia was drawn up at a meeting of Commonwealth Foreign Ministers at Colombo, Ceylon, in 1950.<sup>5</sup> This programme envisages an expenditure over a six-year period of a sum in excess of \$5,000,000,000, of which about three-quarters would go to India, 15% to Pakistan, and 5% each to Ceylon, the Federation of Malaya, and Borneo. Of the grand total, 34% will be allotted for improving transport and communications, 32% for agricultural and river-valley development, 18% for health, housing, and education, 10% for industry and mining, and 6% for fuel and power projects.

Highly significant results have already been achieved in certain “pilot studies” made in India preparatory to the broader programme. In one

of these demonstrations the yield of wheat per acre (1 ha = 2.47 acres) has been increased by 20% ; in another the yield of rice by 40%.<sup>7</sup>

If we, as public health experts, realize the impact of prosperity on human health, we shall recognize that such projects are direct contributions to our own objectives. In a given area, higher crop yields, increased power developments, or improved transportation may accomplish as much for health as more clinics and hospitals. The results we wish to achieve can be attained only by comprehensive planning.

It is not enough then, for the health administrator to develop the soundest possible programme for his own field of social endeavour (as emphasized in chapter 3). He must also sit down with experts on agriculture, on industry, on economics, and on education and integrate his specific health programme as a part of a larger total programme of social reconstruction.

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## CHAPTER 5

### PROGRAMME OF TECHNICAL ASSISTANCE

The problems of social and economic reconstruction, considered in chapter 4, are far too complex and far too costly to be solved by the under-developed countries—where they are most acute—through their own unaided efforts. That is why a worldwide programme of mutual co-operation in the building up of such areas has been formulated under the title of “Technical Assistance”.

This programme is so significant and, indeed, so essential for the evolution of a peaceful world order, that its formulation may well seem to the historian of the future one of the most brilliant and outstanding contributions of the 20th century to world history. It is of particular importance to the public-health administrator since it bears directly on the tasks he has in hand.

#### Objectives of Technical Assistance

No important idea is wholly new. The Pan American Sanitary Bureau, the earliest international organization in the health field,<sup>22</sup> was created in 1902 primarily to co-ordinate quarantine procedures in the American hemisphere ; but, as its work developed, the temporary loan of personnel by one country to another came to play a useful role in its programme.

In 1913, the Rockefeller Foundation established an International Health Commission (now the International Health Division of the Foundation), whose basic policy was founded on the principle that public health is a function of government and that long-range results can be accomplished only by building up national and local health administrations to carry on in the future. This end has been approached essentially along three lines : (1) by participation in joint demonstrations of suitable practical programmes and the provision on a temporary basis of personnel and funds to establish sound public-health services ; (2) by development of training centres for public-health personnel in various countries and the provision of scholarship aid ; and (3) by support of basic research in both governmental and non-governmental laboratories (as well as in Foundation laboratories established for special temporary purposes) to extend the boundaries of knowledge and develop more effective practical methods of control. This is, in essence, technical assistance, and it has achieved brilliant results particularly in the control of malaria and yellow fever.

The next important step in the development of a programme of world health—and one of primary importance—was taken in 1923 by the establishment of the Health Organization of the League of Nations. This was the first attempt to create strong and effective official machinery for a continuing attack on the problems of disease on a world scale. The Malaria Commission of the League, as a result of repeated and arduous conferences and extended field study, succeeded in harmonizing widely divergent schools of thought in Europe, Asia, and America into a sound and accepted programme for the control of this greatest of all microbic enemies of the human race. Similar constructive approaches yielded important results in the diverse fields of tuberculosis, of syphilis, of rabies, of leprosy, of infant mortality, of cancer, and, in Equatorial Africa, of sleeping-sickness.

The League of Nations studies on rural hygiene, on housing, on the health of the schoolchild, and on physical education, extended its influence into the sphere of health promotion in a more positive sense. In particular, its Housing Commission had a far-reaching influence in developing standards of home design and construction compatible with maximum physiological, psychological, and social health.

As regards direct service to individual nations, the Health Organization of the League of Nations (in co-operation with the Rockefeller Foundation and other bodies) rendered invaluable aid in the control of postwar typhus in Poland and Roumania, in the control of malaria in Albania, Greece, Thailand, and Yugoslavia, in the development of a health programme for China, in the conduct of health demonstrations in Czechoslovakia, in the improvement of sanitary conditions in Bolivia, in syphilis control in Bulgaria, in anticholera measures in Shanghai, and in infant-mortality programmes in Belgium, France, and the Netherlands.

Since 1942, the Institute of Inter-American Affairs has provided similar machinery for technical assistance in the American hemisphere; and for the past five years the Interim Commission of the World Health Organization, and the definitive Organization itself, have carried on services of the same general type in world health.

### **Formal Programme for Technical Assistance**

The principle of mutual aid, covering all aspects of social welfare, and including all the nations of the world, was contemplated in Articles 1, 55, and 56 of the Charter of the United Nations,<sup>7</sup> in which the member countries pledged themselves to co-operate “in solving international problems of an economic, social, cultural, or humanitarian character . . .” (Article 1); in the promotion of “higher standards of living, full employment, and conditions of economic and social progress and development”;

in the "solutions of international economic, social, health, and related problems"; and in "international cultural and educational co-operation" (Article 55).

The Economic and Social Council, in October 1946, recommended the transfer to the United Nations of certain "urgent and important advisory functions in the field of social welfare carried on by UNRRA" (Resolution 11 (III)).<sup>9</sup> Acting on this resolution, the General Assembly, on 14 December 1946, authorized the Secretary-General,<sup>16</sup>

"In consultation with the Economic and Social Council, to make provision, with the co-operation of the specialized agencies where appropriate, for the continuance of the urgent and important advisory functions in the field of social welfare carried on by UNRRA; and . . . to include in the budget of the United Nations for 1947 the funds necessary [for this operation]". (Resolution 58 (I))

At the same session the General Assembly authorized the Secretary-General to take over the non-political functions and activities of the League of Nations and to bring them into relationship with the United Nations, in appropriate ways (Resolution 51 (I)).<sup>16</sup> It also passed a resolution concerning the provision of expert advice by the United Nations to Member States:<sup>16</sup>

*"The General Assembly,*

*Considering* that the Members of the United Nations are not yet all equally developed;

*Considering* that some Member nations may need expert advice in the various fields of economic, social and cultural development;

*Recognizing* the responsibility of the United Nations under the Charter for assisting in such development;

*Recognizing* the importance of such development for the peace and prosperity of the world;

*Recognizing* the responsibility of the specialized agencies in their respective fields;

*Decides* to refer to the Economic and Social Council for study the question of providing effective ways and means for furnishing, in co-operation with the specialized agencies, expert advice in the economic, social and cultural fields to Member nations who desire this assistance." (Resolution 52 (I))

Further resolutions were adopted by the Economic and Social Council in March 1947 (Resolutions 27 (IV) and 51 (IV))<sup>10</sup> and in August 1947 (Resolution 96 (V)),<sup>11</sup> and again in August 1948 (Resolutions 139 (VII) and 149 (VII) C).<sup>12</sup> In December 1948, the third session of the General Assembly laid the actual groundwork for specific action by adoption of Resolution 200 (III),<sup>17</sup> which empowered the Secretary-General, where appropriate, in co-operation with the specialized agencies and upon request from Member Governments, to organize teams of experts to advise on economic development programmes, to arrange facilities for the training of experts abroad and of local technicians within the countries themselves,

and to assist in the provision of technical personnel, equipment, and supplies. This was the real beginning of the Technical Assistance Programme.

In January 1949, the President of the USA, in his Inaugural Address, stated as a basic principle of policy that :

" We must embark on a bold new program for making the benefits of our scientific advances and industrial progress available for the improvement and growth of under-developed areas. ... we should make available to peace-loving peoples the benefits of our store of technical knowledge in order to help them realize their aspirations for a better life. And, in co-operation with other nations, we should foster capital investment in areas needing development.

Our aim should be to help the free peoples of the world, through their own efforts, to produce more food, more clothing, more materials for housing, and more mechanical power to lighten their burdens." (quoted by Fox <sup>1</sup>)

During the early months of 1949 progress was rapid. On 4 March, Resolution 180 (VIII) of the Economic and Social Council <sup>13</sup> called for a report setting forth not only a full plan for a co-operative programme of technical assistance, but also the methods of financing such a programme and co-ordinating its planning and execution. After consultation with the various specialized agencies (FAO, the International Bank for Reconstruction and Development, the International Civil Aviation Organization (ICAO), ILO, the International Monetary Fund, the International Refugee Organization (IRO), the Interim Commission for the International Trade Organization (ICITO), UNESCO, and WHO) the Secretary-General prepared a detailed and inspiring report on an expanded co-operative programme.<sup>8</sup> The ninth session of the Economic and Social Council, in August 1949, outlined this programme fully in its Resolution 222 (IX) A <sup>14</sup> which was approved by the General Assembly of the United Nations at its 242nd plenary meeting in November 1949 (Resolution 304 (IV)).<sup>18</sup>

The overall cost of the desired technical co-operative programme was estimated at \$85,000,000, of which \$28,000,000 would come from the countries served and \$57,000,000 from international agencies and from other countries (through bilateral agreements). At the Technical Assistance Conference, which met in June 1950, over \$20,000,000 was actually pledged by 50 countries for the operation of this programme from 1 July 1950 to the close of 1951. Of the \$10,000,000 to be allocated at once to the United Nations and its specialized agencies, FAO will receive 29%, the United Nations 23%, WHO 22%, UNESCO 14%, ILO 11%, and ICAO 1%.<sup>19, 20</sup>

Details for the application of a programme of this general type to particular areas are being worked out, as in the Colombo plan (see chapter 4), and in a recent report of the Pan American Sanitary Bureau applicable to Latin America.<sup>6</sup> The official "Technical Assistance Programme",



however, is that programme which is conducted under the auspices of the Technical Assistance Board,

“to help [underdeveloped countries] to strengthen their national economies through the development of their industries and agriculture, with a view to promoting their economic and political independence in the spirit of the Charter of the United Nations, and to ensure the attainment of higher levels of economic and social welfare for their entire populations;...” (Resolution 222 (IX) A, Annex I)<sup>14</sup>

The Technical Assistance Board is composed of representatives of the United Nations, FAO, ICAO, ILO, UNESCO, and WHO.<sup>19</sup> The important role of WHO is indicated by a report presented to the eighth session of the WHO Executive Board<sup>20</sup> which summarized the Technical Assistance funds, totalling \$1,660,710, which have been allocated to WHO. The work planned includes the strengthening of national health administrations (in the control of malaria, tuberculosis, and venereal diseases, in environmental sanitation, in maternal and child health, in nursing, and in health education), the provision of fellowships and the strengthening of national training facilities, and the setting-up of special demonstration areas (as requested by eight countries).

The resources of the International Bank for Reconstruction and Development might well be applied, in certain countries, to the financing of the capital cost of essential sanitary works, such as public water-supplies, which have an important influence on national well-being.

### **Administrative Problems Involved in Technical Assistance**

International co-operation is never a simple task, and in the sphere of technical assistance there are many problems to be met.

In the first place, there are two fundamental approaches to the general programme, which involve different relationships though the general objective to be attained is the same. In the USA the programme is often referred to as the “Point Four” programme because the proposal in President Truman’s 1949 address happened to be so numbered.<sup>21</sup> The appropriations called “Point Four” appropriations in the USA are in part made to the general funds of the Technical Assistance Board, and in part are allotted to specific countries, under bilateral agreements between each country and the USA. Under this bilateral plan, assistance is rendered directly by one country to another.

“Under the Expanded Programme, on the other hand, the voluntary contributions of over fifty nations, both developed and under-developed, are pooled in a fund by means of which assistance is rendered by the international organizations to the countries which request it in accordance with principles laid down by the Economic and Social Council. The administrators and experts who operate the Expanded Programme are

international officials, responsible to international organizations, on whose governing bodies the under-developed countries are represented.”<sup>19</sup>

Co-operation with underdeveloped areas is thus provided in many different ways: through multilateral agreements under the auspices of WHO and other organizations associated with the United Nations; through bilateral agreements such as those negotiated by the US Institute of Inter-American Affairs, with Latin American countries; under the auspices of regional programmes such as the Colombo plan; and through the initiative of non-official agencies such as the Rockefeller Foundation. This diversity of approach is inevitable, and desirable, but voluntary and informal co-operation in planning would be highly profitable; and the regional offices of WHO should be able to provide valuable counsel in regard to a co-ordinated programme for health.

Within the scope of any project (whether it be multilateral or bilateral) there are at least six problems which must be considered:

(1) Co-ordination between the major interests involved on an international level (as represented by FAO, ILO, UNESCO, WHO, etc.).

(2) Complete agreement between the fund-granting agency and the national government so that a jointly-prepared plan may have wholehearted support from both sides.

(3) Planning the local programme so that various aims (hygienic, social, educational, and economic) shall be attained without mutual interference. (In Egypt and in Southern Rhodesia, for example, serious increases in bilharziasis have occurred as a result of irrigation projects.)

(4) Within the health field, proper adjustment of balance as to priorities. An admirable approach to the formulation of a sound national health programme was made in India five years ago. The Health Survey and Development Committee (under the Chairmanship of Sir Joseph Bhore)<sup>3</sup> approached its task with full recognition of the two most important issues—the need for emphasis on preventive work, and the need for securing the active co-operation of the populations concerned. Its report presents an ideal long-term programme and a short-term programme covering two five-year periods which are sound and well-balanced. The report deserves careful study in other countries since the philosophy of its general approach is of wide application.

(5) Most important of all, perhaps, development of the programme in accord with the psychological receptiveness of the people who are to be served. The difficulties involved in this connexion should not be minimized. Competent experts in this field<sup>2</sup> have recently pointed out some of the serious problems which arise. Logical priorities in emphasis may conflict with national desires, as in the case of Iran, where an Overseas Consultants

Mission came to an untimely end because the foreign experts failed to adapt their objectives to national psychology.<sup>5</sup> Compromises must be made and, by constant interchange of opinion, a plan devised which will achieve the ends in view without serious conflict with the existing economic, social, and psychological customs of the people. Many valuable lessons as to methodology may be drawn from experience in Haiti, the first country to request and receive technical assistance from the United Nations. Experts from the United Nations and a number of the specialized agencies visited the island in 1948,<sup>15</sup> and the experience of the last two years illustrates many of the difficulties to be faced in such an enterprise.<sup>4</sup>

(6) Finally, the time factor necessarily involved in such a programme must be always kept in mind. Pressure to get dramatic results for political reasons may do great harm. Real progress in changing the habits of a people must come through a slow process of assimilation. Thailand, for example, has now tripled its health budget and, quite rightly, feels that financial grants for further increase, until the present advances have been consolidated, would do more harm than good.

The following admirable statement of the principles involved in health programmes under any form of technical assistance has been made recently by WHO : <sup>24</sup>

(1) Health programmes should have as their ultimate objective the raising of health levels for the total population on a permanent basis.

(2) The initial health projects planned for an underdeveloped area should be directed toward meeting those needs which affect the health of large segments of the population.

(3) Health programmes should be planned in relation to the amount of permanent benefit they will provide to the economy of the country.

(4) Health programmes should be planned in relation to the general economic and social conditions in the country.

(5) Health programmes should be co-ordinated with other social and economic programmes being planned or carried out in the area.

(6) Educational programmes in health fields should be planned as integral parts of the overall health programmes.

(7) Professional and technical experts should be brought in at all stages of the programme.

These same major points were emphasized by a resolution of the Fourth World Health Assembly : <sup>25</sup>

“ The Fourth World Health Assembly,

Noting that assistance in the field of health is furnished in many countries by more than one agency and in some cases by several agencies ;

Recognizing that the highest degree of co-ordination of the various assistance programmes is desirable ;

Recognizing that such co-ordination must be achieved both by consultation between the different agencies at the planning stage and particularly by co-ordination of both plans and operations in the host countries ;

Recognizing that a major function of the World Health Organization is to act as co-ordinating authority on international health work ;

Recognizing that in some host countries a high degree of co-ordination in the field of international health programmes has been achieved through the setting-up of national co-ordinating committees under the minister or director-general of health,

1. URGES upon Members the desirability of promoting such co-ordination :

- (1) by encouraging agencies furnishing technical assistance to co-operate with the World Health Organization when planning their activities,
- (2) by establishing within their own governments single points of contact for outside agencies furnishing assistance in health matters,
- (3) by establishing appropriate arrangements for consultation between their own governments and such outside agencies with respect to such assistance ;

2. EMPHASIZES

- (1) that, if no overall co-ordinating arrangements already exist, a national co-ordinating committee in the field of health may be desirable and this or some similar arrangement should be actively considered and promoted, and
- (2) that, if overall co-ordinating arrangements do exist, any special arrangements in the field of health should be brought within the framework of such overall arrangements ;

3. REQUESTS the Director-General to use appropriate means and occasions to bring to the attention of Members these and other suitable methods of co-ordinating technical assistance programmes." (Resolution WHA4.23)

Technical assistance is not a relief project for feeding starving millions ; nor is it a vision of a new world which would reorganize national economy overnight and impose upon primitive peoples an alien way of life. It is a direct, simple, practical procedure for providing the leadership of trained technical personnel to assist underprivileged peoples in improving their own standard of living in their own way, a programme of pump-priming, of helping people to help themselves, with major possibilities of improvement in total world economy as a result. In such a programme as this is to be found the basis for the future health of the world.

### **Significance of the Technical Assistance Programme for the Health Administrator**

It has been made clear in previous chapters that the economic aspects of public health are many and diverse. Poverty causes disease and disease creates more poverty, in a vicious circle.

Public health is therefore a problem which is intimately related to the economic and social progress which has been made in a given community. As stated in the WHO programme for 1950 : <sup>23</sup>

“Public-health officers have for long affirmed that economic development and public health are inseparable and complementary and that the social, cultural and economic development of a community, and its state of health, are interdependent.”

The Technical Assistance Programme offers at last an opportunity to realize the total objective in view. It may be hoped that health administrators throughout the world will realize the significance of the opportunity now offered to them. In the underdeveloped areas plans for the evolution of health services in the coming years should be fully integrated into this larger programme ; and the leaders of public health in countries where personnel is now adequate should be ready to assign their own experts to assist in the demonstration and training projects designed to aid their less fortunate sister-nations. We are all “members one of another”. The stable world order of which we dream can be built only on the foundation of Member States in every one of which there is at least a reasonable hope of progress toward freedom from disease and want—as well as from fear.

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# INDEX

*The figures in bold type indicate that a complete chapter, or an important section of a chapter, on the subject in question begins on that page.*

- Abriol, R., 76
- Administrators, health, 55, 60
  - significance of Technical Assistance Programme for, **92**
  - See also* Public-health personnel
- Aëdes aegypti*, 20, 21, 24
- Afghanistan, typhus in, 19
- Agricultural development and disease control, 15, 78, 81, 83
- Air conditioning, 36
- Aircraft workers, US study on, 35
- Albania, malaria in, 86
- Alcoholics Anonymous, 42
- Alcoholism, 42
- Algeria, BCG vaccination in, 29
- Alphen de Veer, M. R. van, 40
- Alumni Association of the Menninger Foundation, 40
- American Committee on the Hygiene of Housing, 37
- American Public Health Association, 67
- Anaemia, 35
- Ankylostomiasis
  - in India, 19
  - Liberia, 69
  - Peru, 19
- Annecke, S., 25
- Anopheles*
  - darlingi*, 21
  - funestus*, 24
  - gambiae*, 20
  - labranchiae*, 23
- Argentina
  - nutrition in, 36
  - physicians in, 61
- Asoka, King of India, 65
- Assyria, ancient civilization of, 37
- Athens, ancient civilization of, 37
- Australia, 11
  - tuberculosis in, 27
- Austria
  - BCG vaccination in, 29
  - caloric value of food-supply, 34
  - physicians in, 61
- Autret, M., *see* Brock, J. F.
- Auxiliary personnel, 62, 71
  - for local health services, 56
- Balfour, Sir Andrew, 19, 26
- Bank for Reconstruction and Development, International, 88, 89
- Bataan, rice enrichment in, 35
- BCG vaccination, 29, 30, **44**, 55, 59
- Bechuanaland, 25
- Bejel, 29
- Belgian Congo
  - physicians in, 61
  - public-health programme in, 50
- Belgium
  - caloric value of food-supply, 34
  - health services in —
    - hospital facilities, financing of, 65
    - national organization, 49, 51, 52
  - infant mortality in, 86
  - Ministère de la Santé publique et de la Famille, 49, 52
- Benzene hexachloride, *see* BHC
- Beriberi, 35
- BHC, 25
- Bhore, Sir Joseph, 90
- Bibliographical references, **16**, **45**, **73**, **83**, **93**
- Bierstein, P., 19
- Biggs, H. M., 73
- Bilharziasis
  - in Egypt, 15, 90
  - Middle East, 15
  - Southern Rhodesia, 90
  - Tanganyika, 15
- Biostatistics, 60
- Births and deaths, registration of, 57
- Blair, D. M., 25
- Bolivia
  - environmental sanitation in, 86
  - health services in —
    - national organization, 52
    - physicians, 61
  - malaria in, 21

- Bolles, B., *see* Walker, C. L.
- Borneo, 82
- North, public-health programme in, 50
- Brazil
- agricultural developments in, 78
  - expectation of life in, 77
  - malaria in, 20, 21
  - nutrition in, 36
  - tuberculosis in, 28
  - typhoid in, 18
  - yellow fever in, 20
  - water-supplies in, 18
- British Commonwealth, Foreign Ministers' meeting at Colombo (1950), 82
- British Guiana, malaria in, 21
- British Malaya, hospital facilities in, 63
- British West Indies
- housing in, 51
  - public-health programme in, 50
- Brock, J. F. & Autret, M., 36
- Brunt, D., 37
- Bulgaria
- health services in —
    - financing of, 66
    - national organization, 49, 51, 52
  - syphilis in, 86
- Burgess, R. C., 35
- Burma
- caloric value of food-supply, 34
  - dysentery in, 16
  - health services in —
    - hospital facilities, 63
    - physicians, 61
  - malaria in, 16, 26
  - malnutrition in, 35
  - Medical and Health Service of, 16
  - tuberculosis in, 16
- Calmette, A., 3
- Calorie(s)
- consumption —
    - effect on human productivity, 32
    - standard levels of, 34
  - food, 32
  - supply of, 34, 77
  - increase in, 78
  - heat, 32
- Cambournac, F. J. C., 24
- Canada, 11, 79
- drug addiction in, 43
- Cancer, 86
- Cappelletti, R., 54
- Carter, H. R., 21
- Castro, J. de, 36
- Ceylon, 71, 82
- malaria in, 23
  - malnutrition in, 35
  - overpopulation in, 23, 77
  - physicians in, 61
- Chadwick, Sir Edwin, 9, 75
- Child
- guidance clinics, 41, 59
  - health, *see* Maternal and child health
- Children, mental health of, US study on, 41
- Chile
- caloric value of food-supply, 34
  - malaria in, 21
  - tuberculosis in, 28
- China
- agricultural developments in, 78
  - expectation of life in, 12
  - health services in —
    - hospital facilities, 63
    - physicians, 61
  - malaria in, 27
  - malnutrition in, 35
  - overpopulation in, 77
  - public-health programme in, 86
  - syphilis in, 30
  - tuberculosis in, 28
- Cholera, 18
- in Egypt, 58
  - in Shanghai, 86
- Civilizations, ancient, 37
- Clinics, 63
- child-guidance, 41, 59
  - marriage-guidance, 59, 79
- Cohn, A. E. & Lingg, C., 10
- Coleman, J. V., 40
- Colombo plan, 82, 88, 90
- Commonwealth, British, Foreign Ministers' meeting at Colombo (1950), 82
- Contact-borne diseases, 27
- and poverty, 75
- Cost of
- planning a national health programme, 49
  - preventive and curative health services, 67, 71
  - sickness, 9
- See also* Disease(s); Illness; Poverty
- Cuba, agricultural developments in, 78
- Czechoslovakia, 86
- BCG vaccination in, 29
  - caloric value of food-supply, 34
  - health services, financing of, 66
  - syphilis in, 30



- DDT, 19, 21, 22, 23, 25, 26, 44
- Death(s)  
     premature, economic burden of, 10, 44  
     registration of, 57
- Deficiency diseases, 35  
     *See also* names of diseases
- Degenerative diseases, 54
- Demerol, 43
- Denmark  
     health services in —  
         cost of, 69  
         cost per person, 67  
         physicians, 61  
         syphilis in, 30  
         tuberculosis in, 28
- Dental caries, 36
- Dentistry, public-health, 57
- Dichloro-diphenyl-trichlorethane, *see* DDT
- Diet, effect on human productivity, 33
- Diphtheria, 54  
     in Egypt, 58  
     in USA, 14
- Disablement, economic burden of, 13
- Disease(s)  
     *See also* Illness; Sickness  
     and poverty, interrelationships of, 9, 75  
     notification of, 57  
     reducing economic burden of, 18  
     transmitted by —  
         animals, 57  
         lice, 19  
         man, 27  
         mosquitos, 20
- Dodd, N. E., 79
- Dolophine, 43
- Drug addiction, 42
- Dublin, L. I., Lotka, A. J. & Spiegelman, M., 11, 39
- Dysentery, 18  
     in Burma, 16  
     in Liberia, 69
- ECA Mission to Greece, 22
- Economic and Social Council, *see* United Nations ...
- Economic burden of  
     disease, reduction of, 18  
     physical and mental disability, 13  
     premature death, 10, 44
- Economic Co-operation Administration,  
     *see* ECA
- Economic improvement and public health,  
     23, 80, 91, 93  
     *See also* Poverty
- Ecuador, economic burden of illness and  
     disablement in, 13
- Education, health, 41, 54, 57, 68, 89
- Educators, health, 54, 57  
     *See also* Public-health personnel
- Egypt  
     ancient civilization of, 37  
     bilharziasis in, 15, 90  
     caloric value of food-supply, 34  
     expectation of life in, 12  
     infant mortality in, 31  
     malaria in, 20  
     national health service in, 50  
     overpopulation in, 77  
     public-health programme, 58  
         integrated planning of, 60, 80
- Eire, *see* Ireland
- El Salvador, physicians in, 61
- Engineers  
     public-health, 56, 61, 69  
     sanitary, 62  
     *See also* Public-health personnel
- England, 9, 36  
     *See also* England and Wales; Great  
         Britain; United Kingdom  
     hospital facilities, cost of, 64  
     poverty and disease in, 9, 75
- England and Wales  
     *See also* England; Great Britain;  
         United Kingdom  
     poverty and disease in, 76  
     Registrar-General for, 76  
     syphilis in, 30
- English Poor Laws, 66
- Environmental sanitation, 50, 51, 53, 68,  
     89  
     achievements in, 18  
     in Bolivia, 86  
     in Egypt, 58
- Equatorial Africa  
     Malaria Conference in, 25  
     sleeping-sickness in, 86
- Ethiopia, 34  
     course for auxiliary personnel in, 62
- Evolution of mortality, 10
- Ewing, O. R., 14
- Exchange rates, 13
- Expanded Programme (United Nations),  
     *see* Technical Assistance Programme
- Expectation of life  
     economic aspects of, 11, 13, 14  
     in Brazil, 77  
     China, 12  
     Egypt, 12

Expectation of life (*continued*)

- in Germany, 77
  - India, 12, 77
  - Mexico, 77
  - Sweden, 10
  - United Kingdom, 77
  - USA, 10, 77
- FAO, 78, 80, 88, 90
  - allocation of Technical Assistance funds to, 88
  - Committee on Calorie Requirements, 34
  - Director-General of, 79
  - representation at Technical Assistance Board, 89
- Farnsworth, S. F., 80
- Federated Malay States, malaria in, 26, 44
- Federation of Malaya, *see* Malaya, Federation of
- Fernandez, F., 21
- Financing of medical care, 65
- Finland
  - BCG vaccination in, 29
  - tuberculosis in, 28
- Fluorine, 36
- Food and Agriculture Organization, *see* FAO
- Food calories, 32
  - supply of, 34, 77
    - increase in, 78
- Formosa, overpopulation in, 77
- Fox, A. B., 88
- France, 36
  - caloric value of food-supply, 34
  - health services in —
    - cost per person, 67
    - financing of, 66
    - national organization, 50
  - infant mortality in, 86
  - Ministère de la Santé publique et de la Population, 50
  - tuberculosis in, 28
- Frank, J. P., 9
- Fraser, R., 28, 40
- French Overseas Territories in Africa,
  - public-health programme in, 50
- French West Africa
  - health services in —
    - nurses, 61
    - physicians, 61
- Frimodt-Møller, J., 15
- Gambia, 24
  - agricultural developments in, 78

## Geriatrics, 54

- Germany
  - caloric value of food-supply, 34
  - expectation of life in, 77
  - health services, financing of, 66
  - Ruhr miners, studies on, 32, 44
- Giglioli, G., 21
- Gold Coast, 24
  - public-health programme in, 50
- Gonorrhoea in Liberia, 69
- Gramiccia, G., 23
- Gray, C. E., 76
- Great Britain
  - See also* England; England and Wales; United Kingdom
  - health services, cost of, 69
  - National Health Service, 69
  - 19th century industrialization in, 39
  - poverty and disease in, 75
- Greece
  - BCG vaccination in, 29
  - caloric value of food-supply, 34
  - ECA Mission to, 22
  - malaria in, 22, 26, 86
  - national health service in, 50, 51, 52
- Guatemala, physicians in, 61
- Guiana, British, malaria in, 21
- Guthe, T. & Reynolds, F., 29
- Haiti
  - physicians in, 61
  - United Nations Mission to, 91
  - yaws in, 30
- Hall, Sir John Hathorn, 25
- Hanlon, J. J., 14
- Harris, S. E., 79
- Health
  - centres, rural, in Egypt, 59
  - education, 41, 54, 57, 68, 89
  - educators, 54, 57
    - See also* Public-health personnel
  - insurance, 65, 66, 69
  - positive, promotion of, 31
  - programmes, national, *see* National health programmes
  - protection for local areas, methodology of, 7, 71
  - public, *see* Public health
  - services —
    - financing, 65
      - by individuals, 65
      - insurance schemes, 65, 66, 69
      - religious philanthropy, 65
      - the State, 66

- Health (*continued*)  
 services —  
   local, *see* Local health services  
   national, *see* National health services  
   personnel for, *see* Public-health personnel  
   physical facilities for, 62  
   preventive and curative, cost of, 67, 71  
   statistics, 43, 68, 70  
   visitor, *see* Nursing, public-health
- Heat calories, 32
- Hedley, O., 22
- Hiscock, I. V., 68
- Holland, *see* Netherlands
- Home care, 63
- Honduras, physicians in, 61
- Hookworm disease, *see* Ankylostomiasis
- Hospital(s), 63, 65, 66  
   construction in non-self-governing territories, 50  
   function of, 64
- Housing, 51, 86  
   Commission, *see* League of Nations Health Organization  
   hygiene of, 37  
   in Egypt, 59, 60
- Human life, effect of temperature on, 36
- Human productivity, factors affecting, 32, 33, 39
- Hungary  
   BCG vaccination in, 29  
   health services, financing of, 66
- Huss, R., 69
- Hygiene  
   industrial, 36, 38, 54, 57  
   institutes of, 60  
   mental, 39, 54, 57  
   in Egypt, 59, 60  
   of housing, 37
- ICAO, 88  
   allocation of Technical Assistance funds to, 88  
   representation at Technical Assistance Board, 89
- Iceland, infant mortality in, 31
- ICITO, 88
- Illness, economic burden of, 13  
   *See also* Disease(s); Sickness
- ILO, 36, 66, 80, 88, 90  
   allocation of Technical Assistance funds to, 88  
   Asian Advisory Committee, 38  
   representation at Technical Assistance Board, 89
- Immunization against tuberculosis, 28, 53, 59
- India, 82  
   agricultural developments in, 78, 83  
   ankylostomiasis in, 19  
   BCG vaccination in, 29  
   caloric value of food-supply, 34  
   expectation of life in, 12, 77  
   health services in —  
     hospital facilities, 63  
     national organization, 50  
     nurses, 61, 62  
     physicians, 61
- Health Survey and Development Committee, 90
- housing conditions in, 38
- malaria in, 15, 19, 23, 27
- malnutrition in, 35
- overpopulation in, 77
- plague in, 19
- public-health programme in, 90
- tuberculosis in, 15, 28
- WHO demonstration areas in, 71
- Indonesia  
   health services in —  
     hospital facilities, 63  
     nurses, 61  
     physicians, 61  
   housing conditions in, 38  
   overpopulation in, 77  
   yaws in, 30, 31
- Industrial hygiene, 36, 38, 54, 57
- Infant mortality, *see* Mortality, infant
- Insecticides, 20  
   BHC, 25  
   DDT, 19, 21, 22, 23, 25, 26, 44  
   shortage of, 27
- Institute of Inter-American Affairs, 18, 86
- Institutes of hygiene, 60
- International Bank for Reconstruction and Development, 88, 89
- International Civil Aviation Organization, *see* ICAO
- International Labour Organization, *see* ILO
- International Monetary Fund, 88
- International Refugee Organization, *see* IRO
- International Trade Organization, Interim Commission for the, *see* ICITO
- Intestinal diseases, 18  
   *See also* names of diseases
- Iran  
   *See also* Persia  
   Overseas Consultants Mission to, 90

Iran (*continued*)

water-supplies in, 19

Ireland, 19th century potato famine in, 79  
IRO, 88

## Italy

agricultural developments in, 78

caloric value of food-supply, 34

health services in —

cost per person, 67

financing of, 66

malaria in, 22, 23, 26, 78

typhus epidemic (1944), 19

Jamaica, public-health programme in, 50

## Japan

agricultural developments in, 78

overpopulation in, 77

tuberculosis in, 28

## Java

overpopulation in, 77

yaws in, 31

Kala-azar in Pakistan, 23

## Kenya

health services in —

nurses, 61

physicians, 61

public-health programme in, 50

Korea, overpopulation in, 77

Kwashiorkor, 36

Lane, C., 19

## League of Nations

functions taken over by United Nations,  
87

Health Organization, 37, 71, 86

functions taken over by WHO, 70

Housing Commission, 37, 86

Malaria Commission, 86

report on physiological bases of nutri-  
tion (1936), 34

Lebanon, agricultural developments in, 78

Leprosy, 86

## Liberia

ankylostomiasis in, 69

dysentery in, 69

gonorrhoea in, 69

health services in —

hospital facilities, 69

nurses, 69

physicians, 69

yaws in, 69

Liberson, 36

## Life

expectation of, *see* Expectation of life  
human, effect of temperature on, 36,  
39Lingg, C. & Cohn, A. E., *see* Cohn, A. E.

Local health services, 7, 55

administrative organization of, 71

functions and standards, 68

relation with national health ser-  
vices, 51Lotka, A. J., *see* Dublin, L. I.

Lynn Smith, T., 24

Macchiavello, A., 13

Macdonald, G., 24

Macdonald, T., 33

MacEachern, M. T., 64

Mackintosh, J. M., 64

## Madagascar

physicians in, 61

public-health programme in, 50

Malaria, 15, 31, 40, 41, 44, 53, 79, 85,  
86, 89

and poverty, 75

Commission, *see* League of Nations

Health Organization

Conference in Equatorial Africa, 25

hyperendemic areas, 24, 25

in Albania, 86

Bolivia, 21

Brazil, 20, 21

British Guiana, 21

Burma, 16, 26

Ceylon, 23

Chile, 21

China, 27

Egypt, 20

Federated Malay States, 26, 44

Greece, 22, 26, 86

India, 15, 19, 23, 27

Italy, 22, 23, 26, 78

Mauritius, 24

Natal, 24

Northern Rhodesia, 25

Pakistan, 23

Peru, 21

Philippines, 16, 22

Southern Rhodesia, 15, 25

Thailand, 24, 86

Transvaal, 24

USA, 21, 22, 78

Venezuela, 21

Yugoslavia, 86

vectors, 20, 21, 23, 24

- Malaya  
 British, hospital facilities in, 63  
 Federation of, 82  
*See also* Federated Malay States  
 housing conditions in, 38  
 malnutrition in, 35
- Malnutrition, 35  
*See also* Deficiency diseases; Nutrition
- Malzberg, B., 39
- Manchuria  
 health services in —  
 hospital facilities, 63  
 physicians, 61
- Mantoux test, 59  
*See also* BCG vaccination
- Marriage-guidance clinics  
 in Egypt, 59  
 in Japan, 79
- Maternal and child health, 31, 53, 56, 57, 68, 89  
 in Egypt, 59  
 mental health aspects of, 41
- Mauritius, malaria in, 24
- Measles and poverty, 75
- Medical care, financing of, 65  
*See also* Health services
- Medical Research Council, British, study on mental health of factory workers, 40
- Menninger Foundation, Alumni Association of the, 40
- Mental disability, economic burden of, 13
- Mental health  
 and industrial efficiency, 40  
 of children, US study on, 41  
 promotion of, 39
- Mental hygiene, 39, 54, 57  
 in Egypt, 59, 60
- Metropolitan Life Insurance Company, USA, 14
- Mexico  
 expectation of life in, 77  
 infant mortality in, 32  
 water-supplies in, 18
- Micronesian islands, overpopulation in, 77
- Mistresses, 32, 56, 59  
*See also* Nursing
- Miners, Ruhr, studies on, 32, 44
- Monetary Fund, International, 88
- Montefiore Hospital, New York City, 63
- Morocco, BCG vaccination in, 29
- Morris, R. M., 15, 30
- Mortality, 14, 15, 18, 23, 24, 35, 54, 58, 73, 76, 78  
 beriberi, 35
- Mortality (*continued*)  
 cholera, 58  
 diphtheria, 14, 54, 58  
 dysentery, 16  
 evolution of, 10  
 infant, 16, 18, 23, 31, 35, 54, 59, 86  
 malaria, 15, 16, 22, 23, 26, 27  
 measles, 75  
 plague, 58  
 relapsing fever, 58  
 smallpox, 58  
 tuberculosis, 13, 15, 16, 27, 28, 35, 59  
 typhoid, 58  
 typhus, 58
- Mosquito-borne diseases, 20  
*See also* names of diseases
- Mott, F. D. & Roemer, M. I., 63
- Nasr Bey, M. A., 58, 59
- Natal, malaria in, 24
- National health programmes  
 administrative planning, opportunities for WHO service, 70  
 cost of planning, 49  
 integration of planning, 60, 80, 91, 93
- National Health Service, Great Britain, 69
- National health services  
 universal functions of, 53  
 variations in pattern, 49  
 comparative study on, 70  
 degree of autonomy, 49  
 relation to local health services, 51  
 services covered, 50
- Nelbach, J. H., 7
- Netherlands, 9  
 health services in —  
 cost per person, 67  
 hospital facilities, financing of, 65  
 national organization, 50, 51  
 nurses, 62  
 infant mortality in, 86  
 syphilis in, 30
- New Zealand, 11  
 health services in —  
 cost of, 66  
 hospital facilities, 63  
 physicians, 61
- Newfoundland, flour enrichment in, 35
- Nigeria, 24  
 public-health programme in, 50  
 ten-year plan for development and welfare in, 51
- Non-governmental organizations, 80
- Non-self-governing territories  
*See also* names of individual territories

- Non-self-governing territories (*continued*)  
 average income in, 12  
 public health in, United Nations report on, 50  
 North Borneo, public-health programme in, 50  
 Northern Rhodesia, malaria in, 25  
 Norway  
   health services in —  
     financing of, 66  
     national organization, 51  
     syphilis in, 30  
 Notestein, F. W., 79  
 Notification of diseases, 57  
 Nursing, 32, 61, 89  
   public-health, 53, 56, 59, 61, 65, 68  
   *See also* Public-health personnel  
 Nutrition, 32, 41, 51, 57  
   in Egypt, 59, 60  
   physiological bases of, League of Nations report on, 34  
 Nyasaland, public-health programme in, 50  
 Overpopulation, 23, 54, 77  
 Overseas Consultants Mission to Iran, 90  
 Padua, R. G., 15  
 Pakistan, 82  
   caloric value of food-supply, 34  
   housing conditions in, 38  
   kala-azar in, 23  
   malaria in, 23  
 Palestine  
   ancient civilization of, 37  
   physicians in, 61  
 Pampana, E. J., 21  
 Pan American Sanitary Bureau, 85, 88  
 Pan-American highway, construction of, 33, 44  
 Paraguay, nutrition in, 36  
 Paresis, 13  
 Park, W. Z., 82  
 Pascua, M., 11  
 Pellagra, 35  
   and poverty, 75  
   in Egypt, 58  
 Penicillin treatment of treponematoses, 29, 44, 55  
 Persia, ancient civilization of, 37  
   *See also* Iran  
 Peru  
   ankylostomiasis in, 19  
   caloric value of food-supply, 34  
   malaria in, 21  
 Philippines  
   housing conditions in, 38  
   malaria in, 16, 22  
   overpopulation in, 77  
   poverty and disease in, 76  
   tuberculosis in, 16, 28  
 Physicians, 61  
 Pinta, 29  
 Plague  
   in Egypt, 58  
   in India, 19  
 Point Four programme, 89  
   *See also* Technical Assistance Programme  
 Poland  
   BCG vaccination in, 29  
   caloric value of food-supply, 34  
   health services, financing of, 66  
   syphilis in, 30  
   tuberculosis in, 28  
   typhus in, 86  
 Population growth, *see* Overpopulation  
 Population Reference Bureau, USA, 77  
 Portugal, national health service in, 50  
 Positive health, promotion of, 31  
 Poverty  
   and disease, interrelationships of, 9, 75  
   as cause of disease, 75  
 Premature death, economic burden of, 10, 44  
 Preventive medicine, economic value of, 7  
 Productivity, human, factors affecting, 32, 33, 39  
 Proteins, 35  
 Psychiatry, *see* Mental health; Mental hygiene  
 Public health  
   definition of, 28  
   engineers, 56, 61, 69  
   laboratory service, 57, 60, 68  
   personnel, 55, 60, 71  
   *See also* Administrators, health; Educators, health; Nursing; Sanitary auxiliaries, 56, 62, 71  
   recruitment of, 60  
   shortage of, 60  
   training facilities for, 7, 60, 85  
   programmes, *see* National health programmes  
   research on, 43  
   schools of, 60  
 Puerto Rico  
   overpopulation in, 77  
   public-health programme in, 50

- Quinine, 23  
 Rabies, 86  
 Radiography, 28  
 Red Cross, 52  
 Registration of births and deaths, 57  
 Relapsing fever in Egypt, 58  
 Reynolds, F., *see* Guthe, T.  
 Rheumatism and poverty, 76  
 Rhodesia  
   Northern, malaria in, 25  
   Southern —  
     bilharziasis in, 90  
     malaria in, 15, 25  
     venereal diseases in, 15, 30  
 Rickets, 35  
 Rockefeller Foundation, 19, 20, 21, 23,  
   77, 86, 90  
   International Health Division of the,  
   85  
 Roemer, M. I., *see* Mott, F. D.  
 Rome, ancient civilization of, 37  
 Roumania  
   health services, financing of, 66  
   typhus in, 86  
 Ruhr miners, studies on, 32, 44  
 Rural health centres in Egypt, 59  
 Russell, P., 21  
  
 St. Lucia, public-health programme in, 50  
 Sanitarians, 61, 62  
 Sanitary  
   engineers, 62  
   *See also* Engineers, public-health  
   inspectors, 56, 59, 61, 62  
 Sanitation, *see* Environmental sanitation  
 Sardinia, *see* Italy  
 Scheele, L. A., 26  
 Schistosomiasis, *see* Bilharziasis  
 Schools of public health, 60  
 Scotland  
   *See also* Great Britain ; United Kingdom  
   measles epidemic, Glasgow, 75  
 Scurvy, 35  
 Sherman, H. C., 32  
 Shousha, Pasha, Sir Aly T., 59  
 Sickness, cost of, 9  
   *See also* Disease(s) ; Illness ; Poverty  
 Sierra Leone, public-health programme  
   in, 50  
 Simon, Sir John, 75  
 Singapore, housing conditions in, 38  
 Sinton, J. A., 15  
 Sleeping-sickness in Africa, 79, 86  
 Smallpox in Egypt, 58  
 Social improvement and public health, 23,  
   80, 91, 93  
   *See also* Poverty  
 Soper, F. L. & Wilson, D. B., 20  
 Southern Rhodesia  
   bilharziasis in, 90  
   malaria in, 15, 25  
   venereal diseases in, 15, 30  
 Spain  
   caloric value of food-supply, 34  
   health services, financing of, 66  
 Spiegelman, M., *see* Dublin, L. I.  
 Straits Settlements, syphilis in, 30  
   *See also* Malaya  
 Sumeria, ancient civilization of, 37  
 Sweden, 11  
   economic burden of illness in, 14  
   expectation of life in, 10  
   health services in —  
     cost of, 69  
     cost per person, 67  
     financing of, 66  
     syphilis in, 30  
 Switzerland, national health service in, 51  
 Syphilis, 27, 29, 31, 55, 57, 86  
   in Bulgaria, 86  
   China, 30  
   Czechoslovakia, 30  
   Denmark, 30  
   England and Wales, 30  
   Netherlands, 30  
   Norway, 30  
   Poland, 30  
   Straits Settlements, 30  
   Sweden, 30  
   Yugoslavia, 30  
  
 Tacitus (quoted), 64  
 Taiwan, overpopulation in, 77  
 Tanganyika, bilharziasis in, 15  
 Technical assistance  
   formal programme for, 86  
   objectives of, 85  
   principles involved in health pro-  
   grammes, 91  
   problems —  
     administrative, 89  
     general, 90  
 Technical Assistance Board, 89  
 Technical Assistance Conference (1950), 88  
 Technical Assistance Programme, 85  
   *See also* Point Four programme  
   cost of, 88

- Technical Assistance Programme  
(*continued*)
- financing of, 88
  - formulation of, 86
  - objective of, 89
  - significance for health administrators of, 92
- Temperature, effect on human life, 36, 39
- Thailand, 93
- housing conditions in, 38
  - malaria in, 24, 86
  - yaws in, 30
- The money value of a man*, 11
- The sanitary condition of the labouring population of Great Britain*, 9, 75
- Transvaal, malaria in, 24
- Treponema*
- carateum*, 29
  - pallidum*, 29
  - pertenue*, 29
- Treponematoses, 29
- See also* Syphilis; Yaws
  - penicillin treatment of, 29, 44, 55
- Trinidad and Tobago, public-health programme in, 50
- Truman, H., 88, 89
- Trypanosomiasis, *see* Sleeping-sickness
- Tubercle bacilli, 29
- Tuberculin-testing, 28, 29
- See also* BCG vaccination
- Tuberculosis, 15, 27, 31, 40, 41, 55, 56, 57, 79, 86, 89
- and poverty, 76
  - immunization against, 28, 53, 59
  - in Australia, 27
  - Brazil, 28
  - Burma, 16
  - Chile, 28
  - China, 28
  - Denmark, 28
  - Egypt, 59
  - Finland, 28
  - France, 28
  - India, 15, 28
  - Japan, 28
  - Philippines, 16, 28
  - Poland, 28
  - USA, 13, 14, 27, 28
  - Venezuela, 28
- Research Office (WHO), Copenhagen, 29
- Turkey, 34
- caloric value of food-supply, 34
  - overpopulation in, 77
- Turner, T. B., 29
- Typhoid, 18
- and poverty, 75
  - in Brazil, 18
  - in Egypt, 58
- Typhus
- in Afghanistan, 19
  - Egypt, 58
  - Italy, 19
  - Poland, 86
  - Roumania, 86
- Uganda, 24, 25, 62
- physicians in, 61
  - public-health programme in, 50
- Underdeveloped areas
- fundamental education needs of, 81
  - housing policy in, 38
  - mental health in, 41
  - technical assistance for economic development of, *see* Technical Assistance Programme
- UNESCO, 80, 88, 90
- allocation of Technical Assistance funds to, 88
  - definition of fundamental education, 81
  - representation at Technical Assistance Board, 89
- UNICEF, 80
- disease-control projects (UNICEF/WHO), 24, 30, 31
- Union of South Africa, 25
- caloric value of food-supply, 34
  - research on housing conditions in, 37
- Union of Soviet Socialist Republics, *see* USSR
- United Kingdom, 9
- expectation of life in, 77
  - cost of, 66, 67
  - cost per person, 67
  - financing of, 66
  - hospital facilities, 65
  - national organization, 50
  - nurses, 54, 61
  - physicians, 61
  - research on housing conditions in, 37
- United Nations, 12, 90
- allocation of Technical Assistance funds to, 88
  - Charter, 86, 89
  - Children's Emergency Fund, *see* UNICEF
  - Department of Social Affairs, 37, 80



United Nations (*continued*)

- Economic and Social Council, 80, 89
- Commission on Narcotic Drugs, 43
- sessions of —
  - third, 87
  - fourth, 87
  - fifth, 87
  - seventh, 87
  - eighth, 81, 88
  - ninth, 88
- Educational, Scientific and Cultural Organization, *see* UNESCO
- General Assembly, sessions of —
  - first, 87
  - third, 87
  - fourth, 88
- Mission to Haiti, 91
- population estimates of, 79
- provision of expert advice to Member States by, 87
- Relief and Rehabilitation Administration, *see* UNRRA
- report on public health in non-self-governing territories, 50
- representation at Technical Assistance Board, 89
- Secretary-General, 27, 87, 88
- specialized agencies of the, *see* names of specialized agencies
- taking-over of —
  - League of Nations' functions by, 87
  - UNRRA functions by, 87
  - tropical housing mission, 37
- United States of America, *see* USA
- UNRRA, 22, 87
- Uruguay, 71
  - caloric value of food-supply, 34
  - nutrition in, 36
  - public-health programme in, 54
- US Children's Bureau, 32
- US Committee on the Costs of Medical Care, 13
- US Department of State, 11
- US Institute of Inter-American Affairs, 90
- US National Health Survey, 13, 76
- US National Research Council, 34
- US Public Health Service, 13, 22, 49
- US Works Projects Administration, 13
- USA, 9, 36, 72, 79, 89
  - agricultural hazards in, 38
  - aircraft workers in, 35
  - alcoholism in, 42
  - diphtheria in, 14

USA (*continued*)

- drug addiction in, 43
- economic burden of illness and disablement in, 13, 14
- expectation of life, 10, 77
  - economic aspects of, 11, 14
- health services in —
  - auxiliary personnel, 62
  - cost per person, 67, 68, 69
  - dentistry, 57
  - hospital facilities, 63
    - financing of, 66
  - national organization, 49, 51, 54
  - nurses, 56, 61
  - physicians, 61
  - public-health engineers, 61
  - recruitment for, 61
- infant mortality in, 31
- malaria in, 21, 22, 78
- mental health of children in, 41
- mental hospital patients, New York State, 39
- overpopulation in, 77
- paresis in, 13
- pellagra in, 13
- poverty and disease in, 75, 76
- President of, 88, 89
- public-health programme in, 54
- research on housing conditions in, 37
- soil erosion in, 78
- tuberculosis in, 13, 14, 27, 28
- USSR, health services, financing of, 66
- Vejjakar, P. B., 24
- Venereal diseases, 53, 56, 89
  - See also* names of diseases; Treponematoses
  - in Egypt, 59
  - in Southern Rhodesia, 15, 30
- Venezuela
  - malaria in, 21
  - tuberculosis in, 28
- Vernon, H. M., 36
- Veterinarians, public-health, 57
- Vitamins, 35
- Walker, C. L. & Bolles, B., 77
- Water-supplies
  - See also* Environmental sanitation
  - fluorine treatment of, 36
  - in Brazil, 18
  - Iran, 19
  - Mexico, 18
  - Uruguay, 54

- West Indies, British
  - housing in, 51
  - public-health programme in, 50
- WHO, 9, 10, 31, 38, 42, 62, 69, 86, 88, 90, 91
  - allocation of Technical Assistance funds to, 88, 89
  - Constitution, 10, 27
  - disease-control projects, 19, 22, 23, 24, 30, 31, 71
  - Executive Board, 71
    - sessions of —
      - sixth, 7
      - eighth, 89
  - Expert Committee on Mental Health —
    - Alcoholism Subcommittee, first session, 42
    - second session, 41
  - Interim Commission, 86
  - opportunities for research on —
    - administrative planning of national health programmes, 70
    - reducing the burden of disease, 43
  - regional nursing advisers, 57
  - offices, 90
  - representation at Technical Assistance Board, 89
  - study tours, 71
  - Tuberculosis Research Office, Copenhagen, 29
- Wilson, C. M., 21
- Wilson, D. B., *see* Soper, F. L.
- Winslow, C.-E. A., 75
- World Federation for Mental Health, 40
- World Health Assembly, Fourth
  - discussions at, 15
  - technical, 7
  - presidential address at, 26
  - resolutions of, 38, 44, 64, 70, 91
- World Health Assembly, Fifth, technical discussions at, 7, 71
- World Health Organization, *see* WHO
- Wright, W. H., 15
- Yaws, 29, 55, 56
  - in Haiti, 30
  - Indonesia, 30, 31
  - Liberia, 69
  - Thailand, 30
- Yellow fever, 85
  - in Brazil, 20
  - vectors, 20, 21, 24
- Yugoslavia
  - BCG vaccination in, 29
  - malaria in, 86
  - syphilis in, 30
- Zanzibar, public-health programme in, 50