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NON-COMMUNICABLE DISEASES:  
Towards a better and a longer life

by Evguenie N. Chigan

Since health conditions depend upon many socio-economic, demographic, behavioural, environmental and other factors, it follows that changes in these factors lead to changes in the health status of populations. In spite of differences existing between developed and developing countries, it is possible to select certain common trends which have an influence on public health strategy, on the setting of priority health problems and on the allocation of resources.

The gradual decline of the birth rate in many countries has resulted step by step in an increased proportion of old persons in any given population. The process of urbanisation, boosted by the migration of able-bodied youngsters from the countryside to the cities, has also led to an increase in the proportion of old people left behind in village communities. All too often, what for generations have been large self-contained and self-supporting families have disintegrated. More and more we find old and sometimes ailing persons living alone in their own homes.

Meanwhile, progress in preventive and curative medicine in the national health care systems, as well as international activity in health promotion and disease prevention, have led to a decrease in mortality among younger age groups and to an increase in longevity. All these processes have led to substantial changes in the structure of causes of death and illness in all countries. In a predictable pattern, the mortality and morbidity rates caused by infectious diseases have declined while the rates related to non-infectious pathology have increased.

Dr Evguenie N. Chigan is Director of WHO's Division of Non-communicable Diseases.

At present, non-communicable diseases are the cause of 70 to 80 per cent of deaths in developed countries and of 40 to 50 per cent of deaths in developing countries. There is no doubt that, if the trend remains the same, non-communicable diseases will play a much more important role in both societies. Cardiovascular diseases, cancer and chronic respiratory diseases take a leading role among causes of death. Cardiovascular diseases, chronic respiratory diseases, endocrinological and gastro-intestinal complaints, osteoporosis and others are important causes of disability and invalidity.

Many countries are therefore developing a system of activities aimed at checking this negative process; by creating and applying national disease prevention and control programmes they are achieving positive results in cutting back the mortality and morbidity caused by non-communicable diseases. They are helped in this by many international but non-governmental organizations, such as the International Diabetes Federation, the International League Against Rheumatism, the International Union Against Cancer, the International Union Against Tuberculosis and Lung Diseases, the World Hypertension League and so forth. The International Epidemiological Association promotes the exchange of information about risk factors and their influence on death and sickness caused by non-communicable diseases.
How to change unhealthy lifestyles presents a longstanding challenge to the health services.

WHO/Zafar. Cartoon by Regula Hartmann

WHO itself plays a methodological, catalytic and coordinative role in uniting the activities of national and international bodies and directing them towards disease prevention and control. Its credo is that “each health programme should have its specific objectives and targets, whenever possible quantified, that are consistent with those of the national health strategy. The programme should set out clearly the requirements in health workers, physical facilities, technology, equipment and supplies, information and intercommunication, the methods of monitoring and evaluation, the timetable of activities, and ways of ensuring correlation between its various elements and related programmes”.

For the present the methodological tool of health programme development consists of epidemiological, economic, mathematical, expert and other methods which are used at different stages of the programming procedure.

Meanwhile epidemiological, social, psychological and other studies have uncovered the complex nature of many non-communicable diseases, their trends, distribution and frequency in different regions, countries, social and other groups of population. In spite of differences among them, all these diseases have a multifactorial structure, and it is apparent that, in order to decrease the harm they do, the influence of the main socioeconomic, behavioural, environmental and medico-biological risk factors should be eliminated or at least decreased.

Some factors, such as age, sex, genetics and climate, cannot be controlled, but there are controllable factors too which depend on individual, family and community lifestyles, health care and other fields of activity. So any general programme aimed at solving the problem should have a three-fold aim: changes in behaviour and lifestyle, health care activity per se, and the reorientation or reorganization of related sectors of activity. The role of these three intervention programmes will differ according to the socio-economic situation, the cultural level and the basic principles of health care in each country. But under changes in lifestyle will fall smoking, alcohol consumption, dietary habits, physical inactivity and psychosocial behaviour. Under reorganization and reorientation of health care come development of primary health care, community and district services; creating new types of medical services for target groups or risk groups; team work and training. And reorganization or reorientation of other health-related sectors will involve creating a social environment; integrating new sectors, groups and movements into health problem solving; and dealing with air and water pollution.

There are many studies proving that, in about 70 per cent of cases, the appearance of such non-communicable diseases as heart diseases, hypertension, diabetes, chronic bronchitis, and lung cancer
depends upon individual behaviour and lifestyle. That is why WHO pays special attention to what we call **factor-oriented programmes** such as those directed against smoking and alcohol or in favour of better nutrition, which are already proving highly effective.

**Disease-oriented programmes** include those against cancer (including cancer pain relief), hypertension, ischaemic heart disease and diabetes. They include preventive and curative measures, recommendations about rehabilitation and so on.

Several years ago WHO started a new programme, the **Integrated Programme for Community Health in Non-communicable diseases**. This combines resources and approaches currently being devoted to preventing and controlling selected diseases and related conditions; and it puts a set of preventive and other control activities under unified management in order to promote better health in whole communities. Its prime aims are:

- to reduce common risk factors in the field of smoking, alcohol consumption, bad nutritional habits, physical inactivity, high blood pressure and so on;
- to involve the entire community;
- to integrate various health promotion strategies—those aimed at high-risk groups (the elderly, children, workers, pregnant women) or at screening for early detection, for instance;
- to integrate different types of intervention—change of lifestyle, or improved health care or intersectoral action;
- and to carry out prevention and control activities through existing primary health care systems and other health and community structures.

The methodology of the Integrated Programme is flexible and can be adapted to suit any environment, lifestyle or culture. It is being tested on demonstration projects within 15 countries, and eventually could be extended to entire countries.

This issue of *World Health* magazine examines some of the progress being made in tackling non-communicable diseases throughout the world.
Nothing would have a greater impact on cancer throughout the world than being able to put into effect the enormous knowledge we have already gained in cancer control. This is the fundamental basis for WHO's cancer control programme. About one-third of all cancers are potentiallypreventable today. At least one-third of cancer patients can be cured provided the diagnosis is made early enough and provided adequate routine therapies can be offered. For the great majority of the world's cancer patients the diagnosis comes too late, and for most patients with incurable cancer, unnecessary pain could be avoided by appropriate medicine and the quality of life could be improved by adequate palliative care.

Cancer is a Third World problem too. One out of every ten deaths throughout the world is due to cancer. Every year, some six million new cases of cancer are diagnosed and of these more than half are in developing countries. Each year 4.3 million people die of cancer. In developing countries most patients are incurable at the time of diagnosis, and only a fraction—less than ten per cent—are seen at specialised centres. In black Africa there are fewer than 75 full-time cancer specialists of any kind to serve over 285 million people. More than three and a half million patients suffer from cancer pain every day worldwide, and only a fraction of that number receive adequate treatment for it.

The mortality pattern of developing countries is progressively approaching that occurring in industrialised countries. If existing trends continue, cancer mortality is expected to rise in the future in nearly all regions of the world. The major reasons are the increasing age of the world population and the still increasing use of tobacco.

The most frequent forms of cancer are those of the stomach, lung, breast, colon/rectum, cervix, mouth/pharynx, oesophagus and liver, in that order. About three-quarters of the cervical cancers occur in developing countries, where it is the most common tumour. Incidence rates for cancer of the mouth, oesophagus, stomach, liver and cervix are higher in developing countries than in developed ones.

Dr Jan Stjernswärd is Chief of WHO's Cancer Unit.

In most countries, cancer control activities lack overall coordination. Usually most of the resources are used for therapy, often at relatively high costs yet with limited effect, as the great majority of patients are incurable at time of diagnosis. Particular emphasis should be given to the careful setting of priorities, since cost-effectiveness considerations play the greatest role when resources are severely limited. Launching a cancer control activity can be expensive and can take many years to complete. The use of a formal procedure for evaluating potential activities and setting priorities can usually be accomplished in a few days at a tiny fraction of the cost of launching a programme, and may protect against the waste of large amounts of money and resources.

Of the eight most frequent tumours, five are more common in developing countries, three are preventable, screening or early diagnosis is effective in three, therapy is curative in three (but only if diagnosed at an early stage), and finally, pain relief and palliative care are needed for most. Worldwide, at least two-thirds of all cancer patients will die of their tumours. Active palliative care including pain relief should therefore be a high priority instead of a low one; there is a need for re-thinking. Quality of life and comfort before death could be considerably improved by a relatively small reshuffling of resources. At present—in nearly all countries—most of the available resources for cancer control go to therapy. But other approaches, such as primary prevention and early diagnosis, would have great effect and deserve more resources.

So unless the right priorities and strategies are determined in a systematic way to gain maximum benefit from available resources, preferably through well-conceived national cancer control programmes, there is unlikely to be much impact on cancer, especially in the less developed countries.

Tomorrow's cancers are preventable today

Based on current estimates, about one-third of cancers are potentially preventable today. We know enough about the cause-relationship in the development of common tumours such as lung, oral, liver and skin cancers to take
Cancer Control
Priorities and strategies

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1 Listed in order of the eight most common tumours globally
2 ++ = effective, + = partly effective, - = not effective
3 Curative for majority of cases with a realistic opportunity of finding them early

active measures to prevent them. WHO has produced specific policy documents explaining how to control them. National tobacco control programmes are being put into effect in several Member States.

WHO has planned and initiated field intervention trials (with hepatitis B vaccines) to prevent hepatitis B and liver cancer in China and Gambia, where the prevalence of infection with hepatitis B virus and liver cancer are known to be high. Production of a national vaccine has begun in China, where the aim is to cover most new-born children.

At least a third of cancer patients can be cured provided the diagnosis is made early enough and adequate therapies can be offered. For certain tumour sites such as the cervix, skin, mouth and breast, many years may elapse between the cellular inception and the established tumour, thus permitting early detection while the cancer is still amenable to cure.

WHO actively encourages cost-effective methods for the early detection of cancer. It promotes studies to find the right kind of diagnostic intervention technologies suited to local facilities and conditions. It is important to have strict policies that are scientifically valid and realistic for each country's health care system, otherwise screening will not be beneficial and can be harmful to healthy people.

In developing countries, for years to come, nationally efficient screening policies for specific carcinomas will be unrealistic. Their main problem is to get the patients referred for treatment early enough for curative therapy. At present the great majority are incurable, and adequate manpower is lacking. In such circumstances it is vital that the giving of therapy should be linked with the search for earlier diagnosis. All too often, limited resources are spent on expensive curative therapies which have a marginal effect when applied to an ocean of incurable (and penniless) patients.

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It is equally essential to be able to offer efficient therapies for the cases found by earlier diagnosis. In most developing countries, the lack of resources and manpower (nurses, trained surgeons, radiotherapists, medical oncologists and other specialists) makes it unrealistic to apply such approaches as routine procedure. So research has to be encouraged on therapeutic procedures that are appropriate in situations where there is a minimal health care infrastructure.

Following its review of essential chemotherapeutic drugs for cancer, WHO recommended that only 14 drugs were required for treating curable cancers, and those cancers where the cost-benefit ratio clearly favours drug treatment. WHO is encouraging local health administrators to develop lists of basic or essential drugs as part of a process of efficient resource allocation.

The Organization also promotes the development of efficient baseline outreach therapies for cancer that could be applied on a global scale, for instance, the anti-oestrogen tamoxifen for breast cancer patients. The primary responsibility for conducting the necessary controlled studies is delegated to WHO Collaborating Centres. National and regional training facilities for a suitably adapted curriculum in radiotherapy and oncology are being set up (in Sri Lanka and Zimbabwe), and an international curriculum to train individuals for leadership in national cancer control programmes is being developed by WHO in close collaboration with the Soviet Union.

Freedom from cancer pain

Freedom from cancer pain is possible with available technology.
Betel-chewing, a common habit in South-East Asia, is a suspected cause of mouth cancer.

Photo WHO/E. Schwab

Relatively simple, inexpensive methods exist that can control the majority of cancer pains and thereby solve this neglected public health problem. Two-thirds of all cancer patients today will die of their disease. Both in developed and developing countries, cancer pain is undertreated. Most patients in developing countries are incurable at the time of diagnosis; so before primary prevention will show its effect, before early referral and diagnosis will be implemented, and before adequate manpower for curative therapies have been trained, pain relief is the only realistic and humane alternative for years to come. Yet few countries have any cancer pain relief policies or programmes.

A relatively simple and inexpensive method to ease cancer pain has been developed and field tested by WHO and has received international consensus. This method provides for drugs to be administered immediately by mouth if there is pain, to be increased from non-opioids (aspirin or paracetamol) to mild opioids (codeine), and then to strong opioids (morphine) until the patient is free from pain. Hence the concept of the three-step ladder for cancer pain relief. Drugs are to be given "by the clock," that is, from every three to every six hours, rather than "on demand" only at time of pain. Tests have shown that the right drug in the right dose, given at the right time, relieves 80 to 90 per cent of pain, thus leading to freedom from cancer pain.

WHO's programme calls for: a global network to disseminate knowledge of what can be done to relieve pain; an increase in awareness among patients and their families that pain is almost always controllable; the incorporation of cancer pain therapy into the training of doctors and nurses at the undergraduate and graduate levels; the full development of cancer pain relief in standard cancer textbooks; the treatment of cancer pain in general hospitals, health centres and even at home rather than only in specialised cancer centres; the re-framing of national drug legislation in ways that do not hinder pain-relieving medication from reaching patients; and the raising of extra-budgetary funds, from public and private sources, to support local and national programmes of pain therapy.

WHO is encouraging countries to develop their own national cancer control policies and programmes and to integrate them into the existing health care system. Such programmes are being evaluated in selected countries such as Chile, India and Sri Lanka, and in parts of the American, European, Eastern Mediterranean and South-East Asian Regions. Model systems for the care of selected cancer types are operating in the European Region. In the Western Pacific Region, ministries of health and national committees are setting up cancer control units.

A method devised by WHO for setting priorities compares the effectiveness and costs of various cancer control activities by providing a structure and language so that each element can be addressed separately.

The International Agency for Research on Cancer (IARC), based in Lyon, France, adds its own activities to those of WHO. IARC represents a major international investment in cancer research by 14 WHO Member States. A clear division of work between WHO and IARC has been established. While WHO's Geneva headquarters and the six Regional Offices concentrate on cancer control, including prevention, early diagnosis, therapy, cancer pain relief, operational research and international dissemination of policies and strategies, IARC's efforts are mainly directed, through a combination of laboratory and field research, towards identifying risk factors for cancer in the environment, defining high risk groups in different populations, describing the world epidemiological situation and disseminating worldwide the acquired information.
The tobacco epidemic spreads

by Judith Mackay

Tobacco kills approximately two and a half million people each year throughout the world. It is the largest single, preventable cause of death in the world today, responsible for many cancers, coronary heart disease, peripheral vascular disease, chronic bronchitis and emphysema. Taken in whatever form, it is a dangerous, expensive and addictive habit.

Contrary to popular opinion, the greatest excess mortality from tobacco is not in old age, but in productive middle life. One quarter of smokers die prematurely from the habit. This appalling statistic places tobacco in a unique risk category, far ahead of the risks of other consumer goods such as alcohol, sugar, cars or motor bikes. Another distinction is that many of these other consumer goods are dangerous when abused or misused, such as drinking and driving together, or driving too fast, whereas tobacco is simply dangerous when used as intended by the manufacturer.

Dr Judith Mackay is Executive Director of the Hong Kong Council on Smoking and Health and a Member of WHO's Expert Advisory Panel on Tobacco or Health.

The dangers of tobacco have long been accepted by all competent scientists, and today the only challenge to this medical consensus comes from the tobacco industry. Indeed, this refusal to admit candidly that health dangers result from smoking may be cited as proof of the tobacco industry's lack of credibility on all topics.

The major concern about tobacco use in the world today is the increase in developing countries. While tobacco markets are decreasing in the west at the rate of one per cent per annum, smoking is increasing in developing countries at an average of two per cent per annum.
annum. In other words, for every smoker who quits in the United States or Europe, two people start smoking in a developing country. WHO’s World Health Statistics Annual, 1986, commented that the number of cigarettes smoked outstripped population growth in all developing regions. A WHO group of experts commented: “Whereas in most industrialised countries the smoking habit is decreasing and becoming socially less acceptable, in developing countries it is on the increase, fuelled mainly by intensive and ruthless promotional campaigns on the part of the transnational tobacco companies. Unfortunately, in most developing countries the legislative controls and other measures—which in industrialised countries succeed in limiting the use of tobacco—do not exist or are at best inadequate.”

The experts predicted that smoking diseases “will appear in developing countries before communicable diseases and malnutrition have been controlled, and thus the gap between rich and poor countries will widen further.” WHO has estimated that more than 50 per cent of men but only five per cent of women smoke in developing countries compared to about 30 per cent of both sexes in the industrialised world. So the challenge in the Third World is to maintain these low smoking rates among women while reducing the high smoking rates among men.
Developing countries can ill afford the costs of smoking. Tobacco consumption is costly to the individual smoker whatever the total family income, especially in developing countries. Money that could be used to buy food for the whole family is diverted to a product with no nutritional value whatsoever. Disability or death of a productive breadwinner will have serious results for the rest of the family in a poor country.

But tobacco is also costly to governments. In the view of the Food and Agriculture Organization (FAO): “Tobacco growing is likely to be deleterious in terms of both public health and long-term national economic interest.”

Dr Roberto Masironi, the coordinator of the WHO Programme on Tobacco or Health, says bluntly: “Tobacco economics is sham economics.” This is because the price
that countries have to pay for tobacco use usually far outweighs the “benefits” of tax collected. The costs include medical and health costs; the expense of lost productivity; social welfare costs resulting from premature death and disability; fire losses; the lost use of land that could have been used to grow nutritious food.

In Asia particularly, most of the profits from the sale of tobacco by the transnational tobacco companies benefits neither the countries nor the people. Instead, the profits from the sale of tobacco by shareholders of the companies benefits neither the countries nor the people. Instead, the profits from the sale of tobacco by shareholders of the Western world. In Beijing recently, a senior health official likened this to “a new opium war.” Certainly for both health and economic reasons, reducing tobacco use is crucial for developing countries.

Nowhere is the tobacco battle being fought more vigorously than in Asia. One only has to read the recent headlines in World Tobacco, the industry’s journal—“Bright future predicted for Asia Pacific” with the sub-headings “Growth potential” and “More smokers,” with emphasis on the potential Chinese market—to view with alarm the penetration of the foreign tobacco companies into Asia. In the same edition, the tobacco industry confidently predicted: “The most conservative estimation is that sales in Asia will increase by 18 per cent by the year 2000.”

The “Western” tobacco industry operates with a different standard in developing countries. For example, cigarettes are sold in many countries in Asia without health warnings that would be compulsory in their country of origin. In addition, the tar content of cigarettes sold in Asia is higher than in industrialised countries. A recent analysis conducted by the American Health Foundation reported that American cigarettes sold in the Philippines yielded significantly higher values of tar, nicotine and carbon monoxide than exactly the same brands sold in the United States. And promotional campaigns have especially targeted women.

The tobacco companies wield considerable political influence. Trade sanctions or the threat of such sanctions have been made against Hong Kong, Taiwan, Japan and Korea unless they open their markets to the sale and advertising of American tobacco products. For an industry that speaks so frequently of freedom, the use of this kind of political coercion is noteworthy.

Is it already too late to heed the warning? The epidemic of tobacco-related diseases, deaths and disability does not lie in the future in Asia; it has already begun. No longer are the communicable diseases the major cause of death. At a
"I was a chain smoker"
by Syed Bux

Who says you can’t give up smoking? It’s supposed to be easier to overcome alcoholism and even narcotic drugs addiction than to give up confirmed smoking. But nobody can tell me this—because I did give up smoking, 18 years back, after being a chain smoker for almost 40 years. Tobacco should rightly be classed with dangerous drugs. It contains nicotine, a lethal drug. A pin dipped in pure nicotine can kill a dog within seconds. It keeps stealing on you unawares. Yet smoking has been viewed for over a century as something of a status symbol. Offering a cigarette was seen as instrumental in breaking the ice or as a prelude to pleasant talk.

I was introduced to smoking in my early teens by a childhood friend as a mark of freedom and self-assertion. After the first two or three disastrous experiences, I was on the road to becoming a regular smoker. Until I had graduated from high school, I was compelled to smoke surreptitiously in respect for social taboos. But once I joined the University college in a distant city and lived in a boys’ hostel, there was no restraint on smoking. I could smoke boldly and openly to my heart’s content.

Soon I became a heavy and regular and at last a chain smoker, puffing away and burning ever-increasing amounts of money, heedless of the anger and remonstrance of my parents. In all this time, I never for a moment thought of giving up smoking. Why give up? It looked so natural, like breathing. I had seen many of my friends giving up smoking dozens of times. Some took to sucking peppermint lozenges when they felt an urge to smoke; some used to chew cardamom and aniseed while others resorted to chewing ‘pan.’ All of them returned soon enough to that tawny weed, tobacco.

However, in my case, there were two short breaks of a few days each time: once in 1932, when I had fallen head-over-heels in love with a girl just out of high school. She very strongly insisted that I cut down on my smoking. “Not another puff if you really love me; and you shall not buy or smoke another cigarette after now.” I had to throw away the cigarette I was smoking.

True to my word, I stopped smoking; but I felt completely lost and depressed. I seemed to have lost all interest in life. Within a couple of days, my love must have regretted what she had done to me. With a smile, one evening, she suddenly produced a packet of very costly scented cigarettes and said, “I can’t bear to see you quietly withering away and looking so crestfallen and woebegone.” In no time at all, I was my old jolly self again, puffing away like a chimney.

The second interruption came five years later. I had found a very special friend in Naseer, the son of a rich landlord and silk merchant of my home town. He made me give up smoking. But he too relented in two or three days time and released me from my promise. This time my chain smoking continued up to the end of 1969.

I strongly believe in the marvellous powers of the human brain and the human will. During the 1960s, I used to hold heated discussions on this and related topics with a friend in Karachi. One evening we discussed ingrained habits and particularly smoking. As usual, our discussion soon drifted to other matters. But a germ of an idea had started to tickle my brain and fire up my feelings. I decided to give up smoking once and for all, more as a test of will power than the desire to get rid of a bad habit. This time there was no outside influence; no compulsion other than my own determination to do it.

A few days later, when the craving got too strong, I bought a packet of good cigarettes and caught hold of a friend who was only a casual smoker. I made him sit before me and smoke as many cigarettes as he could at a time. He agreed only when he was assured that it was merely as a test of my endurance and will power. Having mustered the strength to watch him smoke, and having enjoyed the familiar aroma in the atmosphere, I felt a sudden easing of the urge to smoke myself.

From then on, the urge gradually died down until at last, I began to dislike tobacco smoke. So, you see, I gave up smoking JUST LIKE THAT, after being a chain smoker for so long. Every one of you can do it if only you can summon the will to do so. As Socrates said: “Nothing is stranger than human determination.”

Mr Syed Bux is a retired professional journalist living in Karachi, Pakistan.

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Cartoon from The Chinese Health newspaper, June 1988.

WORLD HEALTH, October 1988
Epidemiology is the study of the causes and distribution of disease in populations. In turn, it is fundamental to the study of public health. Research in many countries has proved its relevance to promoting better health in given populations and to selecting appropriate methods for care, cure and prevention.

In the past, the overwhelming emphasis in epidemiology has been on the conquest of infectious or communicable diseases and on improving such basic environmental factors as sanitation, housing and working conditions.

In developed countries, this is now giving way to interest in the major chronic diseases, man-made environmental hazards such as pollution, and the planning and delivery of health services in hospitals and in the community. Most of the major causes of illness and death in developed countries such as cancer, bronchitis and heart disease remain incurable despite much clinical research effort. These diseases are also increasing in importance in developing countries. And they are very often preventable.

The epidemiologist uses five main research methods, each with its merits and disadvantages. The most appropriate method will depend on the matter under investigation.

Descriptive studies. Here the usual sources of information are mortality and morbidity statistics that are routinely collected in some form and with varying reliability in most countries. They can provide a broad picture of the magnitude of a disease problem and can help to identify high risk groups. They can also be used to examine whether factors associated with a disease are predominantly occupational or environmental.

Mortality data are normally available for all causes of death together and for selective causes by age, sex and occupation. Morbidity or illness information can usually be obtained on hospital admissions and discharges, on sickness absence for those in employment and sometimes on attendances at general practice surgeries and primary care facilities. But the findings can only act as general guides, and are usually not sufficiently refined to take account of many factors which may influence the development of a disease.

Case control studies. This is possibly the simplest technique available for the study of individual subjects. Here, a number of patients with a disease under investigation are matched with an equal number of individuals without the disease, but broadly comparable with regard to other characteristics such as age and sex. Comparison of the relative frequency of various personal, social or environmental factors in the two groups may then suggest a cause or association. This kind of study is useful, not only in investigating disease aetiology, but also in assessing the outcome of different forms of methods of management or prevention.

Cross-sectional studies. The aim of cross-sectional or prevalence
studies is to determine either the proportion of people with a specific condition or the frequency distribution of some attribute such as weight or blood pressure in a defined population at a particular point in time. Cross-sectional studies often test a hypothesis suggested by a descriptive or case control study.

**Longitudinal studies.** These attempt to identify much more closely the factors concerned with the development of a disease by following the study population over a period of years. The principle value is that any one factor can be considered in detail and the level of risk involved can be estimated.

**Experimental studies.** These constitute the best tool available to the epidemiologist. The classic form is the controlled clinical trial in which the study population is divided randomly into two equal groups. The method of treatment or prevention under investigation is provided to one, and the control or placebo treatment to the other. Researchers can be reasonably certain that differences in outcome are due to the treatment provided. This technique can be used to evaluate a new drug or a preventive measure, or to compare the outcomes of different methods of health care procedure. It is a complex technique partly because of the length of time needed to obtain results and partly because only one parameter can be varied at any one time.

**Prevention concerns us all**

Prevention of illness is very much the province of epidemiology today. To develop a coherent programme for prevention it is necessary not only to consider the important causes of illness, disability and death in a population, but also the place and status of prevention in the general, medical, social and economic framework of a country.

We must accept that prevention is the responsibility of us all. Perhaps the most profound change required is that of individual behaviour and this is extremely difficult to achieve. The activities of government, professional people and individuals are all inter-related and can influence behaviour in a positive or negative way. For example, if
Prevent ill health: promote good health

A demonstration of oral rehydration to treat acute diarrhoea in Bangladesh.

Photo WHO/A. Khan

health professionals smoke in front of their patients it is more likely that these patients will start or continue to smoke.

Although no single genetic disease is common, these conditions taken as a group represent an increasing problem. Some progress has been made in the early detection of individuals who might be affected or at high risk. For example, it is now possible to identify women who are likely to have children with Downs’ syndrome and to use gene probes to identify carriers of Duchenne muscular dystrophy, or Huntington’s chorea. Methods for the prevention of conditions such as thalassaemia have been developed in some countries, for example in Cyprus. This has largely come about through appropriate epidemiological investigations.

Environmental factors can be divided into those that represent the unwanted presence of harmful elements and those that represent the absence of elements needed for health. The single most important influence on health is food. Food imports and the technology of food preparation require close investigation since the influence of health considerations on agricultural policy and the food industry generally is still very small.

Priorities in this area are to produce reliable scientific evidence on the relationship between diet and disease, and to find ways of countering advertising interests. Another important environmental influence has been the waste created by human society, not least water pollution resulting from the generation of energy, especially domestic heating, industrial activity and transport.

Accidents are a major and increasing health hazard everywhere in the world. Road traffic accidents and accidents in homes should be among the prime targets of any preventive programme.

Control of the non-communicable diseases clearly calls for study both to identify their aetiology and to determine appropriate methods of health promotion and prevention. They include coronary heart disease, hypertension, various forms of cancer, chronic bronchitis and other acute respiratory infections.

In most Western countries, the use of heroin and other opiates is illegal and enforcement of existing legislation is the most important preventive measure. However, misuse of drugs extends to such substances as amphetamines, barbiturates, tranquilisers, sleeping pills and even analgesics. There is scope for health education in both educational institutions and through the media.

Finally, dental care is often forgotten among preventive measures. Fluoridation of the water supplies and good dental hygiene can contribute to reducing the suffering and cost of treatment of dental caries.

Much can be done to prevent disease through changing individual lifestyles and modifying behaviour. A satisfactory philosophy of health promotion cannot depend on self responsibility or on social manipulation alone, however important these aspects may be. The role of the primary care practitioner in preventive activities is crucial. The most important opportunities for prevention are in family planning, ante-natal care, immunization, fostering the bonds between mother and child, discouragement of smoking, detection and management of raised blood pressure, and—in the final analysis—helping the bereaved.

WORLD HEALTH, October 1988
Until about two generations ago, cystic fibrosis (CF) was virtually unknown. Yet, it is the most common serious genetic disorder in people of European descent, whether they live in Europe, North or South America, Australasia or elsewhere. It may affect other Caucasians (from the Middle East and the Indian sub-continent) almost as frequently, but because of its many different manifestations it is often mis-diagnosed—even in countries where it is relatively well recognised.

Inheritance follows what is called the “autosomal recessive pattern”. This means that parents of affected children—carriers of the CF gene—have no features of CF themselves, but they are nevertheless able to pass the genetic abnormality on to their offspring. A baby will only be born with CF if he has inherited the faulty gene from both parents.

The proportion of carriers in affected populations is mostly in the range of 1 in 20 to 1 in 30, corresponding to an incidence of CF among newborn babies ranging from more than 1 in 2,000 in some communities, such as Brittany (France) and the white population of Namibia, to less than 1 in 4,000 in Finland. The incidence is likely to be greater in areas where there is a high rate of consanguinity (cousin marriage), because close relatives are likely to inherit the same faulty genes from a common ancestor.

The precise biochemical abnormality causing CF is still unknown, but there is a well-documented defect in the transport of chloride ions across the walls of certain body cells. This leads to an increase in the salt content of the sweat, and changes in the secretions produced by the pancreas and the air passages of the lungs. The major clinical problems suffered by CF patients result from these changes, the most serious being the repeated respiratory infections which follow stagnation of mucus in the lungs. Such infections can be fatal in young infants, who die before the true diagnosis has been established. It was the observation that children with CF were often affected by heat stroke which led to the development of the diagnostic sweat test.

Cystic fibrosis is so-called because of the involvement of the pancreas, which even at birth often shows extensive damage and is eventually replaced by cysts interspersed with fibrous tissue (scars). This destruction deprives the patient of enzymes essential for the proper digestion of food, and failure to thrive is a prominent symptom. In some cases, CF shows up in the newborn period as a form of bowel obstruction called meconium ileus. This must be treated at once, either by surgery or by bowel washouts with an appropriate agent, or the infant will die.

Severely affected children still show the characteristic clinical picture of poor growth, underdeveloped muscles, abdominal distension, chest deformity and the finger clubbing which accompanies chronic lung infections. With early and effective care, these infections can be minimised and, by paying special attention to the child's nutrition, growth can be maintained within the normal range.

Some older children and adults develop cirrhosis of the liver. Other complications seen in older patients include joint pains and swelling, pneumothorax, severe haemorrhage from the lungs, and male infertility. All the same, the outlook for CF patients is steadily improving in centres where they can receive intensive treatment.

Because the basic defect is unknown, treatment must be directed towards the secondary, clinical manifestations of CF. The salty sweat rarely gives rise to problems in temperate climates, but additional salt in the diet may be necessary for children in warmer countries. They also need supplements of pancreatic enzymes, derived from animal pancreas, and taken in varying doses as required with every meal. A high calorie diet is essential and, with modern pancreatic preparations, there is no need to reduce the fat intake. For normal growth and development, we advise a dietary intake of 120-150 per cent of the recommended daily allowance.
Cystic fibrosis

Preventing lung infections involves a programme of regular exercise and physiotherapy designed to help the patient bring up the sticky bronchial mucus. Additional treatment with broncho-dilator drugs similar to those used in asthma is often helpful. Antibiotics covering a broad spectrum of bacteria must be used early in the course of infection and in generous dosage, as the metabolism of many drugs seems to be enhanced in CF. Some patients need to be kept on continuous maintenance antibiotics which can be given by mouth or inhaled as an aerosol.

One organism which causes a great deal of trouble is *Pseudomonas aeruginosa*, and unfortunately the antibiotics most effective in this type of infection have to be given by injection. Chronically infected children therefore require frequent admission to hospital, both for courses of antibiotics and for intensive physiotherapy; but in some centres, programmes of home treatment have been very successful. Such an intensive treatment regime places considerable strain on the child and his family, and attention needs to be given to their psychological needs.

Managing the CF patient involves a team of care-givers, including doctors, physiotherapists, nurses, dietitians, social workers and counsellors, but the composition of the team varies from one clinic to another. Genetic counselling for the parents is essential, because of the risk of CF recurring in subsequent children. At present we have no reliable way of identifying carriers in the general community, although in affected families where there is already at least one living CF patient it is now possible, using advanced genetic technology, to determine which of the healthy siblings are carriers.

It has been found that, where lungs have been transplanted, the transplanted lung does not acquire
the characteristics of CF, confirming that the lung disease is caused by an intra-cellular defect and not a chemical "factor" carried in the bloodstream. Much research is directed towards understanding the precise nature of this intra-cellular metabolic abnormality. By the year 2000 we should have both the means to diagnose carriers and an effective drug treatment to counter the intra-cellular defect. In this way damage to the lungs and the liver which is not present at birth might be prevented.

Cystic fibrosis research was given an enormous impetus in 1985 with the discovery that the responsible gene is located on chromosome number 7, and scientists are already very close to pinpointing the specific alteration in gene structure which determines the functional abnormality.

With hope of alleviation of cystic fibrosis, if not its actual cure, on the horizon, it becomes increasingly important to identify those populations where the CF gene occurs, so that children yet to be born will benefit from new therapeutic approaches, who is working together with the International Cystic Fibrosis (Mucoviscidosis) Association to increase awareness of CF among medical and para-medical staff as well as the general population in countries where it often goes unrecognized.

In families who have already had a CF child it is now possible to identify affected fetuses early in the pregnancy and to offer termination. When a carrier detection test becomes available, such prenatal diagnosis could be made available to the entire population in communities where it is sufficiently common. One way or another, the prospects for control of the suffering caused by this gene are very encouraging.

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**ICF(M)A**

The International Cystic Fibrosis (Mucoviscidosis) Association, a non-governmental organization in collaboration with WHO, exists to promote and assist scientific research, study, and the dissemination of information about cystic fibrosis (CF). The membership is made up of affiliated National Associations devoted to the problem of CF. Since its foundation with four members in 1965, the membership has grown to 39. Every fourth year, the ICF(M)A organizes the International Cystic Fibrosis Congress.

The role of the international body and of each national association is to consult with community leaders in the member countries, spread knowledge about CF directly to communities (for the benefit of both patients and parents), inform risk groups about family planning, see that scientific information reaches schools, universities and medical personnel (paediatricians), and relay public information about CF through the media and in booklets and posters. As a non-profit organization, the ICF(M)A depends upon financial donations and on voluntary support to run various fundraising activities of a sporting and cultural nature.

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Exercises on a therapy ball — part of the intensive physiotherapy to prevent lung infections.

Photo WHO J. Dodge
Hereditary diseases are preventable
by Victor Bulyzhenkov and Bernadette Modell

Hereditary disorders are common, interact with infectious and nutritional diseases, can often be managed or prevented by relatively simple approaches, and deserve inclusion in family planning and maternal and child health programmes. Common disorders of later life such as coronary heart disease, diabetes mellitus, cancer and mental illness also have important genetic components. The WHO Hereditary Diseases Programme is concerned with developing community approaches and appropriate technology to prevent and control the most common of them.

More than two per cent of all infants are born with severe hereditary disorders. But in many developing countries, the figure reaches six per cent because of the greater frequency of disorders related to maternal age (such as mental retardation due to Down's Syndrome), and of inherited disorders of the red blood cell (sickle cell disease, the thalassaemias and G6PD deficiency).

Infants with genetic diseases are particularly vulnerable to infectious and nutritional diseases. So when the infant mortality is high, most die undiagnosed in early childhood, creating the impression that hereditary disorders are not a significant health problem. For instance, in Sub-Saharan Africa, between one and two per cent of all infants are born with sickle cell disease, and the vast majority die in their first two years from anaemia or infections. In addition, about 20 per cent of male infants have glucose-6-phosphate dehydrogenase (G6PD) deficiency, and probably one-tenth of them die or are disabled as a result of severe neonatal jaundice. The result is that these two inherited diseases kill between two and three per cent of African infants, and contribute up to 20 per cent of the infant mortality, without attracting particular attention.

Infant mortality is falling wherever programmes of immunization, diarrhoea management and malaria control are making progress. As a direct result, more infants with hereditary disabilities are surviving and being diagnosed, and will then require management, as far as it is available. The proportion of infants born with hereditary disease who survive to older age-groups can be regarded as a built-in "thermometer" to measure the progress of primary health care measures.

Though the numbers of children affected are relatively small compared with infectious or nutritional conditions, hereditary diseases cause life-long problems, and present a disproportionate burden for the patients, their families, and the health care system, whatever its stage of development may be. An inherited disease can even emerge rather suddenly in a progressive country as a priority health problem. This happened with thalassaemia in Cyprus, Greece and Italy in the 1960s and the same is now happening in Bahrain, the Republic of Maldives and Thailand. These facts require new perceptions on the part of health planners.

It is too easy to suppose that, because hereditary diseases are inborn, very little can be done about them, but this is not the case. Neonatal jaundice due to G6PD deficiency can be prevented by educating mothers and health workers to avoid factors that can precipitate it (such as herbal medicines or keeping infant clothes in mothballs) and, providing health workers are trained to recognise it, it can usually be successfully treated simply by exposing the infants to sunlight. Children with sickle cell disease can be protected by teaching the parents to avoid extremes of temperature and dehydration, and to seek rapid treatment for infections.

Of course, many hereditary diseases are more intractable. Some treatments are complex and expensive; thalassaemia major for instance requires monthly blood transfusions and a daily infusion of an iron-chelating drug (one which promotes a suspension of iron substances in the blood). Others, like mental retardation due to Down's Syndrome, cannot be treated at all. But in some cases even these problems can be overcome. For exam-
ple, thalassaemia and sickle cell disease can be prevented through education and carrier testing and information, when prenatal diagnosis is available.

Such diseases as thalassaemia, sickle cell disease, cystic fibrosis and phenylketonuria are transmitted by symptomless carriers, who inherited the “trait” from their parents. In Africa and Asia, from between one and 25 per cent of most populations are carriers of one of these disorders which, rather surprisingly, serves as a constitutional protection against malaria. If a carrier and non-carrier marry, some of their children are carriers and some are not, but none have the major disease. However, if two carriers marry, on average one in four of their children will inherit the disorder from both parents, and will have sickle cell disease or thalassaemia major.

Very simple blood tests are sufficient to identify carriers, so couples who are carriers can be detected and advised of their risk before they start a family. We now know that most people wish to know these facts. Information on genetic risk and ways of avoiding it must be given according to the basic ethical principles of medical genetics. These are: that the autonomy of the individual or the couple must be respected; that they have the right to full information given in a way they can understand; and that confidentiality must be preserved.

When carriers are detected and informed according to these principles, they do not usually let the information influence their choice of marriage partner, but it does influence their reproductive behaviour. So the important message to give to such couples is that to be a carrier is harmless to themselves, that they have a high chance of having healthy children, and that the birth of sick children can be avoided through prenatal diagnosis with selective abortion of affected fetuses.

The techniques for prenatal diagnosis are steadily becoming more simple—for instance, it can now be done around nine weeks into the pregnancy by chorionic villus sampling (CVS), allowing early termination of pregnancy when this is requested. Gene-mapping methods for prenatal diagnosis are also becoming simpler, and will soon be suitable for use in developing countries.

The strategy for community control of hereditary diseases combines treatment and prevention in a unified approach. The objectives are to develop community education and involvement, appropriate management, and prevention through population screening and counselling, preferably with access to prenatal diagnosis. The primary aim of the prevention component is to provide information and offer parents a choice, but it is already clear that making these facilities available often leads to a major reduction in new births of affected infants.

In the Mediterranean area, for example, large-scale WHO thalassaemia control programmes have started over the last decade in Greece, Italy and Cyprus, and as a result the birth rate of affected infants has fallen by about 70 per cent in Greece and 50 per cent in Italy, and is still falling fast in both countries. In Cyprus, progress has been even more rapid: in 1986 no new affected infants were born, as a result of the informed choice of couples at risk. Simultaneously, an improved service has been built up for the affected patients. This approach is now beginning to find support in parts of Asia.

The strategy of hereditary disease control is in the mainstream of WHO's approach to health promotion, since it depends on community education and participation, and on the development of appropriate technology. Genetic technology is developing very rapidly; in the near future it will become possible to detect carriers for other inherited diseases such as cystic fibrosis. The programmes for the haemoglobinopathies provide a model on how to apply this knowledge—by putting information into the hands of people themselves, so that they can protect the health of their families.
Contrary to popular belief, diabetes mellitus is not a disease that affects only the affluent. It strikes the poor and under-nourished as well. A greater awareness of this fact, as a result of a large mass of epidemiological data, has resulted in the new international classification of diabetes. Malnutrition-related diabetes mellitus (MRDM) was recognised by a recent WHO study group as a clinical class distinct from non-insulin (NIDDM) and insulin dependent diabetes mellitus (IDDM). In several developing countries it may constitute 30 to 70 per cent of all cases of youth-onset diabetes. Indeed, epidemiological data do indicate a low incidence of IDDM and a high prevalence of MRDM in most of the developing world. Clinical features include characteristic leanness with sub-normal body mass, moderate to severe increase in blood glucose, the requirement of large doses of insulin to achieve normalcy in blood glucose, and a frequent history of malnutrition in early childhood.

The clinical spectrum of MRDM in most parts of the world lends itself to a further classification into two sub-types, namely fibro-calculous pancreatic diabetes (FCPD) and protein deficient diabetes mellitus (PDDM). This classification is based on simple clinical observations together with basic laboratory data, readily obtainable in the setting of primary health care in developing countries.

The previous terminology of tropical diabetes served its purpose in the past, when it was essential to accord recognition to the fact that most young people with diabetes mellitus in tropical developing countries exhibited features distinct from those observed in youth-onset diabetes in the industrialised societies. With the increase in knowledge of causes and mechanisms, as well as of metabolic changes that occur in this type of diabetes, it was considered essential to propose a clinical, rather than geographical, descriptive classification.

A worldwide disorder, diabetes mellitus is recognised as a growing problem in developing countries. In the island of Nauru, in the Western Pacific Region, one-quarter of the adult population are known to suffer from the non-insulin-dependent form of diabetes. In migrant communities of Asian Indians now living in Fiji, Mauritius, Singapore and South Africa, some ten per cent of adults suffer from the disease. Whilst prevalence may be low in populations which maintain a traditional lifestyle, no country is free of the disease.


In July this year, WHO co-sponsored a meeting organised by the Wellcome Tropical Institute in London which, for the first time, brought together experts from around the world to consider the problem of malnutrition-related diabetes and its potential prevention.

The FCPD syndrome has been described from several countries, including Bangladesh, Ghana, India, Indonesia, Jamaica, Madagascar, Nigeria, Sri Lanka, Thailand, Uganda, Zaire and Zambia. The prevalence is especially high in South India (Kerala), Indonesia, Nigeria and Zaire. In these countries, 30 to 35 per cent of young diabetics with age of onset of disease below 30 years have this type of diabetes. The key feature is widespread formation of calculi (stones) in the main pancreatic duct and its branches, without any calcification in the pancreas itself. The calcification is easily shown by radiological examination, or by newer techniques such as ultrasonography and computerised tomography. The natural history of the disease is characterised by attacks of abdominal pain at a young age—usually below ten years, diagnosis of diabetes during the following five to ten years, leading on to diabetes-related complications by the age of 30 years.

Although the precise cause and mechanism of FCPD is not known, there is evidence to suggest association with protein malnutrition in early childhood and with excessive intake of cassava, also known as tapioca. Cassava is one of the major tuber crops, grown in more than 80 countries located on both sides of the equator. While it has achieved considerable agricultural importance as a major source of cattle feed in the countries of the European Economic Community, it also provides an important source of calories for around 500 million people living in tropical developing countries.

The tubers may be peeled, boiled in water, and mashed. Slices of fresh tubers are fried in oil and form a common snack in Kerala. In Brazil, the tubers are often cooked in sugar syrup and eaten as a sweet meal. Gari, a food consumed in...
Nigeria and Ghana, is prepared by roasting the fermented pulp of cassava in hot pans. In the Philippines, the juice is squeezed out of the pulp which is then made into pellets and dried, and these are used as a substitute for rice and maize.

Kerala State, in the south of India, has the monopoly of its cultivation, with 83 per cent of the total area and 88 per cent of total production. And the largest prevalence of FCPD in India is reported from Kerala.

Cyanoglucosides are important chemical constituents of cassava. And it seems that excessive cassava intake combined with a low intake of proteins, deficient in certain amino acids, provides the essential milieu for the accumulation of cyanide in the body, with possible resultant toxicological effects.

Alternative sources of dietary cyanide include sorghum, yam, millet, maize, lima beans and linseed. Could there possibly be other toxic factors, especially food toxins, which may interact with malnutrition to produce similar clinical and morphological changes? We need much more information about other factors which, either singly or in concert with protein-energy malnutrition, may lead to FCPD syndrome.

As cyanoglucosides in cassava have also been implicated in the etiology of tropical ataxic neuropathy and of endemic goitre in several regions of Africa, the methods of reducing their content to within safe limits for human consumption constitute an important intervention strategy. The suggested safe limit is 50 milligrams per kilogram of freshly grated cassava; any amount between 50 and 80 mg is probably toxic, 80 to 100 mg is definitely toxic, and above 100 mg may prove to be fatal. A large amount of cyanoglucosides can be eliminated by peeling and washing the tuber before eating. Sun drying the tapioca slices may destroy about 75 per cent, and cooking in water about 80 per cent.

To improve the protein content of foods prepared from cassava, efforts have been made to supplement such foods with groundnut and soyabeans. It is also possible to mix cassava flour with wheat flour. Tapioca macaroni prepared by blending tapioca and groundnut flour with wheat semolina in the ratio of 60:15:25 has a final protein content of about 12 per cent.

Research is being carried out to develop varieties of cassava that are low in cyanogenic glucosides but high in protein content. This has resulted in increases in the protein content as high as 42 per cent.

Protein-deficient diabetes mellitus (PDDM) has been described as J-type, K-type or M-type of diabetes. Essentially an absence of bouts of abdominal pain, a lack of demonstrable pancreatic calcification and an absence of pancreatic exocrine dysfunction differentiate FCPD from this sub-type. In contrast to FCPD, where an interaction of malnutrition and environmental factors such as dietary toxins constitutes the key to the understanding of pathogenesis, there is now considerable evidence that protein malnutrition in early childhood initiated functional impairment of pancreatic beta-cells in the case of PDDM. Earlier observations which indicated alterations in carbohydrate metabolism in cases of kwashiorkor (a severe protein deficiency disease) provided a significant clue to the role of protein deficiency as a possible causative factor in PDDM. It seems that nutritional injury, in the form of protein malnutrition in early infancy and childhood, results in partial failure of beta-cell function. A continuing low level of protein intake may make this process progressive and irreversible, resulting in the clinical onset of diabetes mellitus at a young age.
There has been an increase in public awareness of osteoporosis in recent years, particularly in the Western World. This comes at a time when our scientific and clinical knowledge of bone metabolism and disorders of the skeleton is increasing rapidly, but is not matched by a comparable increase in facilities for its prevention and treatment. The widespread prevalence, morbidity and cost of osteoporosis have many implications for public health, and place particular responsibility on investigators and health care agencies. It has been the subject of several recent international meetings at which consensus development has been a major aim.

Osteoporosis is a syndrome characterised by a decrease in bone mass, thereby giving rise to fractures. It has many causes, but qualitatively the most important is the bone loss that occurs in the elderly, particularly in women after the menopause. There is a compelling relationship between the amount of calcium or bone matrix in the skeleton and the risk of fracture. The lower the bone density, the lower its ability to withstand compressive and torsional forces and the greater the risk from fracture.

Thus, in the post-menopausal woman, the risk of fracture is largely determined by the peak bone density attained during skeletal maturation and by the amount of bone lost after the onset of the menopause. Little is known of the factors which determine peak bone mass, but several risk factors have been identified which contribute to bone loss. Of these, oestrogen deficiency at the time of the menopause is the most important, and the administration of oestrogens can prevent this loss. Of course, there are other factors that cause bones to break, among them trauma (accidents), liability to fall, the metabolic activity of bone itself and its micro-anatomy.

The fractures which are associated with osteoporosis include Colles fracture of the distal radius, vertebral compression fractures and fracture of the neck of femur. The incidence of other fractures is also increased. In the Western World, surveys indicate that by the age of 70 more than one quarter of women will have sustained one or more osteoporotic fracture. The estimat-
ed life-time risk for Colles fracture and for fractured neck of femur have been estimated to be in the order of 15 per cent for each of these fractures, and is probably similar for vertebral fracture. These figures compare with a life-time risk of breast cancer of nine per cent. Indeed, the total risk from osteoporotic fracture may approach that of ischaemic heart disease.

It is hard to assess the true size of the problem, largely because of incomplete epidemiological data. Relatively complete information is available for hip fracture, since all patients sustaining such fractures in the industrialised countries are admitted to hospital. In the UK, hip fractures account for 20 per cent of all orthopaedic beds, and about 80 per cent of these occur in elderly women. There is an exponential increase in its incidence with age.

The incidence of hip fracture is rising for two independent reasons. The first relates to increasing longevity. It is estimated that, between 1980 and the year 2000, the world population aged 60 or greater will increase by 57 per cent, and that aged 80 or greater will increase by 68 per cent. So a progressively greater number of patients are at risk, and this trend seems likely to continue. But even allowing for aging, there is still a remarkable difference in the incidence of hip fracture around the world. In developing countries the incidence is lower and the female/male ratio is nearly equal. In the industrialised world, the age-specific incidence is up to four-fold higher and twice as common in women as in men. It thus appears that the high incidence of osteoporosis is not solely a function of age, but is also related to factors surrounding the improvement in living standards in the Western World.

Even within developed countries the age-adjusted incidence appears to be increasing. One study compared the incidence of fractured neck of femur in Oxford, United Kingdom, in 1954-1958 and in 1983. They found that over this period the age-specific incidence had doubled in both men and women aged 65 or more. Data from several European countries show an increase in age specific incidence, both of hip fracture and of Colles fracture similar in magnitude to that seen in Oxford. Whereas 46,000 hip fractures occurred in England and Wales in 1985, 60,000 are expected in 2016, assuming that 1985 age and sex specific incidence rates continue unchanged. But this figure will nearly double to 117,000 if the present increasing trend continues. Osteoporosis may therefore be considered as an epidemic of the Western World.

The impact of this condition on health care resources has been poorly assessed except in the case of hip fracture. In England and Wales, the average length of stay following a hip fracture is 20 days in hospital, taking up 3,500 beds per day. Mortality is high, both around the time of a remedial operation and subsequently, and only a minority of patients regain their former mobility. The public health problem arises more from the morbidity and high cost of medical care than from mortality. In the USA with a population of about 250 million, the estimated health care cost of hip fracture alone is about US $5,000 million per year.

Despite the importance of bone disease, and despite increases in our knowledge of its cause, treatment and prevention, awareness and attitudes to bone disease vary widely from country to country. In many countries only a small minority receive any medical treatment or advice. Of particular concern and practical importance in the future is that increased public awareness will uncover inadequate training and facilities of the health caring professions to cope with the real demand.

Despite the presence of a number of national organizations with interest in bone disease, there is clearly a need to serve an international interest. The European Foundation for Osteoporosis and Bone Disease was born from these considerations, and one of its major aims is to promote knowledge and understanding relating to the cause, diagnosis, treatment and prevention of osteoporosis. To this end it supports research, particularly of a multi-national nature, and fosters the education and awareness of bone disease, especially among physicians and the allied health care professions. The resources of the Foundation come from corporate sponsorship, and through the collaboration of national societies throughout Europe. A recent Consensus Development Conference on the prophylaxis and treatment of osteoporosis was one of the activities of the Foundation.

International research projects are already underway in collaboration with WHO, with whom the Foundation has a working relationship. This relationship has permitted a multinational epidemiological investigation to identify not only the variations in incidence of hip fracture between countries, but also the risk factors which may give clues to the cause for this epidemic and whether it could be prevented. The Foundation and WHO held a formal joint consultation from 13-15 July 1988 to identify further areas where international collaboration will help to determine mutual priorities for what is largely a preventable disorder.
Heart Attacks: Developing in Developing Countries

by Peter Ozorio

Developing countries are developing cardiovascular diseases—the ills commonly attributed to the industrialised world—at such a pace that by the Year 2000 the diseases will be either “actively emerging or established” in virtually every nation of the Third World, accounting for between 15 to 25 per cent of all deaths.

Unless public health officials “arouse political and public awareness of the problem,” and step-up programmes to prevent the disease spread, then, according to a WHO report, “history will repeat itself.”

In a reference to the industrialised world where heart attacks are the number one killers, the report warns that as traditional patterns of life give way to modernisation “developing countries too will soon confront the problems of mass premature cardiovascular diseases.”

Says Dr Siegfried Bothig, Chief of WHO’s cardiovascular diseases programme:

“The diseases result from too much and too little. On the one hand, too much fatty food, salt, alcohol; and on the other, too little fresh fruit, vegetables, and exercise. Add tobacco to this deadly combination, and the sum total is disaster—heart attacks and premature death.”

The report was among documents presented at a recent meeting to recommend ways and means of preventing and controlling hypertension, the leading cardiovascular disease, in developing countries.

Hypertension, or high blood pressure, accelerates atherosclerosis which narrows the arteries and impedes the flow of blood to the heart or brain, causing heart attacks or strokes.

“The grim prospects are that many of these countries will face the emerging problems of cardiovascular and other chronic, non-communicable diseases at a time when infectious diseases are not wholly under control,” the report states.

In the early stages of high blood pressure, there are no symptoms. Many who are afflicted feel no discomfort until a medical crisis—a heart attack or stroke—occurs. As a consequence, high blood pressure is often referred to as the “silent killer”.

Says Professor Kihumbu Thairu, chairman of the meeting, by way of example: “There is hardly anyone in Africa who does not know, or has not heard of someone with a stroke.”

As part of a new impetus aimed at increasing awareness to the growing risk of cardiovascular diseases in the Third World, WHO launched a programme of information and education, in its 40th anniversary year, under the theme: “Heart Attacks Are Developing in Developing Countries: Prevent Them Now.”

A major aim is to urge public health officials to act against the so-called “modern ills.” Another aim is to recommend ways of controlling hypertension through prevention, which is affordable to developing countries, rather than through drug treatment, which is not.

According to studies of populations in 43 nations, when mortality from infectious diseases declines, when death rates fall below 15 per 1,000 population, and particularly when life expectancy increases to between ages 55 and 60, then diseases of the heart and arteries become major problems.

From 1920 to 1930, for instance, as life expectancy rose to between 55 and 60, cardiovascular diseases began to take more lives than infectious diseases in the United States. Mortality from the cardiovascular diseases, which in 1900 had been only 8 per cent of total deaths, climbed to about 20 per cent.

Some developing countries—notably Singapore—have already shown these characteristics over a span of barely one generation. As life expectancy increased in the island-country from age 40 in 1948 to age 70 in 1979, infectious diseases declined from 40 to 12 per cent of total deaths, while cardiovascular diseases climbed from 5 to 32 per cent.

“Similar trends have been observed in several countries in South-East Asia, in Latin America and the Caribbean,” the report says.

According to projections by the United Nations, life expectancy will reach at least age 60 by the Year 2000 in virtually all countries of the Third World. This underscores the need for programmes of prevention, “to inhibit the en-
trenchment and spread of unhealthy lifestyles,” in communities of developing countries.

Hypertension is at an “epidemic” stage in more and more countries of the Third World, another who report states.

The prevalence in some groups “is now of about the same magnitude as in Finland,” a country with “one of the highest mortality rates for heart disease among the middle-aged population.” Hypertension in those groups has reached levels equaling those of developed countries.

The report bases its conclusions on data from 25 surveys on blood pressure levels carried out over a decade in developing countries and in Finland, which was selected as representative of an industrialised country.

A survey among some 360 Finnish males in the age group 45 to 59 in 1982 showed a 28 per cent prevalence of hypertension. High as that is, the prevalence is even higher among city workers in São Paulo, Brazil, and among urban-dwelling Bantu in Zaire.

The Brazilian survey showed a prevalence of high blood pressure ranging from 30 to 34 per cent among 1,200 men aged 35 to 45, and the Zairean survey, found a 33 per cent prevalence among males aged 40 to 49.

The percentage of hypertensive women in the population sampled was higher than the men by 1 per cent in Finland; but lower both in São Paulo—the range was 18 to 24 per cent lower for women—and in Zaire, where 15 per cent of the women were found to be hypertensive.

Surveys carried out in China and Chile “typically indicate a prevalence of hypertension of between 10 and 20 per cent,” the report says, “with the epidemic becoming apparent over the last two decades or so.”

In China, hypertension doubled in certain areas between the late 1950s and the late 1970s, nationwide screening showed. It increased from 7.4 to 14.7 per cent in Beijing; from 4.2 to 10.7 per cent in Tianjin; and from 3.9 to 10.8 per cent in Lianoning.

In Chile in the early 1980s, as much as 20 per cent of the urban and rural populations checked were found to be hypertensive. The report adds that rural populations are showing a “steeper upward trend than urban.”

Among the populations surveyed, blood pressure is highest among Indian males, aged 50 to 59, working in the petrochemical industry, among Bantu men aged 40 to 49, living in Zairean urban areas, and among Malawian men, aged 45 to 54, who live in the countryside.

“These blood pressure levels are approximately the same among populations in developed countries,” the report states, similar to readings found in the late 1970s in rural populations in Japan, and in the early 1980s in Finland.

This is also the case for Bantu and Zulu women surveyed, aged 40 to 49. While their blood pressure is comparable to those for Finnish women in 1982, it is “somewhat higher than the blood pressure values in rural Japan in 1983,” the report points out.

According to estimates cited in the report, about 12 million suffer from hypertension in Brazil, whose population totals 138.5 million; 1.8 million in Bangladesh, population 103.8 million; 860,000 in Thailand, population 52.2 million; 560,000 in Sri Lanka, population 16.4 million; in comparison with 680,000 in Finland, population 4.9 million.

As developing countries cannot afford treatment equal to that of the industrialised world, they should prevent hypertension through “nonepharmacological therapy.” This means exercising and watching weights and diets—avoiding food high in animal fat, as well as excesses in salt and alcohol. It also means no tobacco use. That is a regimen applicable to both developing and developed worlds, the report says.

A major problem faced by public health officials is a lack of funds; most countries do not have budgets for cardiovascular diseases programmes. Another is a lack of equipment, the basic sphygmonometers to check blood pressure, and stethoscopes for the heart. And yet another is a lack of personnel training to perform such simple tasks as identifying hypertension.

While rheumatic heart diseases, which stem from poor living conditions, have long been problems in developing countries, heart attacks, which are associated with industrialised lifestyles, have not—at least not until now.
Integrating dental care with general health care

by Aubrey Sheiham

Professor Aubrey Sheiham is with the Department of Community Dental Health and Dental Practice, University College, London, U.K.

Oral diseases affect a very high proportion of people and, although the consequences are not fatal, they are serious. Among the consequences are toothache, anxiety about dental treatment, limitations of the foods that are chosen, embarrassment about appearance. Children with teeth that hurt when they eat will restrict their diet, and so will old people with no teeth. People with decayed or missing front teeth may avoid social contact.

In addition to these social and psychological consequences the costs in financial terms are considerable. In the United Kingdom oral diseases are the third most expensive of all diseases to treat; the cost of dental treatment runs to about one thousand million pounds a year. Because oral diseases are chronic and require regular treatment and re-treatment under the current systems of dental care, the lifetime costs are high. However the challenging and exciting fact is that the two main oral diseases, dental caries and periodontal disease (gum infection), are entirely preventable by currently available measures.

The dramatic potential of prevention has been clearly demonstrated by the marked improvement in oral health in the past 15 years. Most industrial countries have recorded improvements in dental caries of between 30 and 40 per cent in ten years. In some countries the annual decrease in caries among 12-year-olds was 10 per cent per year. This has led to the closure of some dental schools in Holland, Sweden, and the United States, and to a marked reduction in dental students. WHO predicts that there will have to be a decrease in the numbers of full-time dental personnel from about 650,000, at present, in industrialised countries to 150,000 within the next 40 years—a 75 per cent reduction.

If planners adopt a public health approach stressing the use of fluorides, reducing sugar consumption and improving oral cleanliness, further improvements in oral health should occur. And in developing countries such a step should halt the rapid worsening of oral health.

There are good reasons for planners to adopt a radical public health approach. WHO's Health for all strategy calls for the health sector to move increasingly towards positive health promotion, instead of being mainly concerned with providing conventional health services. Traditional dental care is based mainly on curative services and individual responsibility. A collaborative study undertaken by WHO and the US Public Health Service showed conclusively that such an approach has not achieved the desired improvements in oral health. And since it is also very expensive, it is beyond the financial capacity of most countries.

On the other hand, adopting a public health approach will improve oral health efficiently and cheaply, and at the same time enhance general health. Indeed a health promotion approach to improving oral health could provide decision-makers with interesting guidelines on how to tackle other health problems.

The first of several ways in which oral health may illustrate how to approach health promotion is by tackling causes that are common to a number of chronic diseases. Several non-communicable diseases such as coronary heart disease, diabetes, cancer, bowel diseases, gall stones, and oral disease have diet as a common risk factor: a diet high in fat, sugar and salt, and low in fibre. An integrated programme is preferable to one directed at specific diseases. Reducing sugar consumption for certain populations by a wide-ranging food and health policy which includes all levels of the food chain from food production to consumption so as to reduce a range of conditions should
replace the present non-integrated programmes to reduce dental caries, heart disease, diabetes and obesity. WHO's Countrywide Integrated Non-Communicable Disease Intervention Programme (CINDI) addresses the problem of an unhealthy diet as part of a broader strategy which includes a national health policy, district health projects and the "healthy cities" campaigns. Such a multiple response on a broad front is more likely to make healthy choices the easier choices.

**Alternative approach**

Another way is to incorporate oral health into general health programmes. The control of the other major oral conditions—periodontal disease, oral cancer, traumatised teeth and temporo-mandibular joint dysfunction—should all benefit from an integrated approach. For example, periodontal disease is mainly a dirt disease, caused by poor oral cleanliness. Oral cleanliness is related to body cleanliness. A logical approach to controlling periodontal disease is to include oral hygiene in the teaching of general hygiene in the teaching of general hygiene carried out by parents, teachers and primary health workers. Such an approach encourages self-care.

Yet another way is to adopt a population-directed strategy other than one aimed at the individual. Oral diseases are public problems and are essentially socio-political in character. To concentrate on individual behaviour is not only oversimplification but even an evasion of public health responsibility. Individually-oriented programmes can and should be encouraged, but more attention must be given to an environmental approach directed at the whole population. The latter makes individual choice and options easier and therefore increases freedom of choice.

A cornerstone of the Health for all approach is the focus on prevention. Treatment of dental diseases is both relatively ineffective and beyond the financial resources of much of the world. The effectiveness of prevention has been convincingly demonstrated: it should be allocated the highest priority. Treatment of disease to alleviate pain and discomfort is the next priority. Here WHO's Three-Level Strategy for planning oral health has already had some effect. The strategy emphasises firstly the use of appropriate technology, that is, simple and inexpensive materials; then, simple clinical measures carried out by non-dental personnel or dental auxiliary personnel working in primary health care facilities; finally, specialist personnel to do the more complicated work at the third referral level.

The strategies available to prevent dental caries and periodontal disease can virtually eradicate them in the near future, and therefore can and should be incorporated into a primary health approach. They include a multisectoral food policy to increase the availability of fluoride, where less than optimal levels exist, either as fluoridated water or salt, or in toothpaste, and to develop guidelines for tolerable and adequate levels of refined sugar. A meeting will take place in Geneva early in 1989 with the object of tackling this subject. A population approach to improving general hygiene should serve to increase oral cleanliness and thereby reduce periodontal disease.

Dental disease is increasing at a frightening rate in many developing countries, and in some the level is higher than in industrialised countries. An integrated preventive approach offers the only realistic solution to the increasing problem of oral disease in developing countries. For the treatment-oriented dentists in industrialised countries, it may however raise a quite different problem—that of over-manning.
Scarcity and Surplus in Pain-Killers

Millions of cancer patients suffer needlessly for want of pain-relieving drugs. Yet there are surpluses of the raw material derived from the poppy plant from which pain killers are manufactured.

These surpluses are stocked mainly in India and in Turkey, the world's traditional suppliers of opium for therapeutic purposes, and are intended for use in the manufacture of codeine and morphine. They have accumulated since the mid-1950s because of a lack of demand.

A major reason for excess stocks, according to Dr Jan Stjernsward, chief of WHO's cancer control programme, is the legislation in many countries that limit the availability of pain killers.

"When there is scarcity on the one hand, and surplus on the other, the result is suffering," he told participants at the recent 2nd International Congress on Cancer Pain, held in Rye, New York.

According to a recent report he cites from the International Narcotics Control Board, Vienna: "The stock of India and Turkey alone would meet the global needs for nearly two years." Figures show 135 tons in morphine equivalent stock stored in Turkey and 227 tons in India at the end of 1986.

"With the drugs, we can prevent pain, provide relief to cancer patients, and allow incurable patients to die with dignity," the WHO official said.

"Yet over 3.5 million patients suffer pain daily throughout the world—needlessly."

Admitting that much needs to be done, Stjernsward none-theless cited these examples of progress:

- In Argentina, Brazil, China, Denmark, Egypt, Japan, Mexico, Norway, Spain, Sweden and Zimbabwe: A growing awareness that pain can be treated.

- In Canada and France: The publication by the governments of guidelines for cancer pain relief.

- In India: The states of Karnataka and Kerala setting pain relief as a priority in cancer control programmes, and Karnataka making oral morphine available in routine cancer care for the first time.

- In Italy: The recent decision to make available pain killers that were difficult to get before.

- In the United States: Wisconsin's initiative in cancer-pain relief that resulted in the state being named a "WHO demonstration" project is now being followed by Arizona and Texas.

PolioPlus Goes Over the Top With $220 Million

PolioPlus, a fund-raising campaign by Rotary International, ended last June with some US $220 million in contributions either received or pledged—about $100 million more than the $120 million goal set in 1986.

The contributions were made to help finance WHO's programme of immunization launched in 1974, and—following a decision last May by the World Health Assembly to rid the world of this crippling disease—the eradication of polio by 1990.

(In a joint statement from the Moscow summit last June U.S. President Ronald Reagan and the Soviet Union's General Secretary Mikhail Gorbatchev "reaffirmed their support for the WHO's target of eradicating poliomyelitis by 1990.)

Polio is the second disease targeted to be wiped out from the face of the earth. The first was smallpox, certified eradicated in May 1980 after a 13 year battle spearheaded by WHO.

To date, PolioPlus contributions have made possible the immunization of more than 400 million children in 67 countries. About 70 per cent of funds were raised by Rotarians them-
selves through their million strong membership in business and the professions, organized by some 23,000 clubs in 162 countries.

Virtually all organizations exceeded their goals: For instance, Rotarians in Australia and Papua New Guinea raised $5.3 million (against a pledge of $4.5 million); in Nigeria $1 million (pledge $220,000); in France, Andorra and Monaco $4.5 million (pledge $2.7 million); in Bolivia and Peru $730,000 (pledge $400,000).

Rotarians in Canada pledged $4.2 million and raised $7.3 million; those in Bahamas, Bermuda, Puerto Rico and the United States pledged $78.5 million and raised $119 million.

Other contributions to PolioPlus came from commercial enterprises, among them Coca-Cola, Baxter International, Bell South, and Hershey Foods.

Ten governments contributed about $10 million, the largest being from the US Agency for International Development, with $8 million bid to matching donations from US Rotarians.

Reducing the Number of Animal Tests

A Swiss foundation for animal protection in the eastern canton of Graubunden has presented wide with a pledge equivalent to about US $30,000 in recognition of studies that should lead to a reduction in the number of animals used in testing the efficacy and safety of contraceptive drugs.

One result of the studies, carried out by WHO’s programme of research in human reproduction, is that the US Food and Drug Administration now requires that such drugs be tested on rats for two years, beagles for three years and mice for 18 months.

Previously, tests were needed on beagles for seven years, on monkeys for ten, as well as on rats for two. The tests are carried out to determine if drugs are carcinogenic (cancer-causing).

The presentation was made by Professor Gerhard Zbinden, of Switzerland’s Federal Institute of Technology and University of Zurich. He is also vice-president of the foundation, which is named after himself and a German colleague, Hildegard Doerenkamp, its President.

Newsbriefs

- **Aging**: A Report Card. These recent examples, from East and West, underscore a slow but growing awareness of the needs of the elderly, whose numbers are increasing throughout the world.
  - The designation of the Red Cross General Hospital in Pyongyang (Democratic People’s Republic of Korea) as a WHO collaborating centre in gerontology and geriatrics on the basis of its espousal of traditional medicine in preventing and treating age-related ailments;
  - The appointment of George Hees as first Minister of State for Seniors for Canada, a country with 2.7 million citizens over the age of 65;
  - The study by the American Association of Retired Persons, Washington, D.C., partly funded by WHO’s regional office of the Americas—on older women in the Caribbean and Latin America.

  “It is clear that death will be progressively delayed”, says Dr Hans Herrmann, in charge of WHO’s programme of health for the elderly. “It is less certain that disabling morbidity will be delayed correspondingly.”

- **Dumping on Africa**. Parliamentarians in Africa have appealed for the assistance of their counterparts throughout the world to prevent their continent from “becoming a dumping ground for radioactive and toxic wastes from industrialised countries.”

  Meeting recently in Brazzaville under the theme “Health, A Basis for Development in Africa,” some 50 parliamentarians from 22 African countries also asked that the issue of dumping—a growing practice—be placed on the agenda of the next session of the U.N. General Assembly.

  They met under the auspices of the Inter-Parliamentary Union, Geneva, the International Postal Union, and WHO.

- **People**. Appointed as Deputy Director-General—WHO’s second top post—Dr Mohamed Abdelmoumene (Algeria), a staff member since 1983, who served as chief of the office of research promotion and development until his new appointment in July.

  His was the first appointment made by Dr Hiroshi Nakajima (Japan) on taking office, 21 July, as WHO’s fourth Director-General.

  Named Director-General Emeritus, Dr Halfdan Mahler (Denmark), WHO’s third Director-General, who served for three five-year terms, during which WHO and its member states chose as their common goal Health for All by the Year 2000.

- **Saving Medicinal Plants**. Experts who met recently in Chiang Mai, Thailand, under the aegis of WHO, the International Union for the Conservation of Nature, and the World Wildlife Fund have called for an international programme to be set up for the conservation of medicinal plants “to ensure that adequate quantities are available for future generations.”

  Because of “habitat destruction and unsustainable harvesting practices,” they say, by the year 2000 there is the danger of some 20,000 plants becoming extinct.

  “Tell the world what you’re doing about AIDS.” That’s the slogan for World AIDS Day to be observed on Thursday, 1 December. As there is neither vaccine nor medicine against the dreaded Acquired Immuno-deficiency Syndrome, the only defences to date against the disease are health education and public information.

In the next issue

In most parts of the world, there are simply not enough health resources—staff, equipment and money—to meet all the needs. The more ordinary people can do to look after their own personal health, the less will they need to have recourse to limited health services. The November issue of World Health suggests what all of us can do to be healthy and stay healthy.

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A young cystic fibrosis patient inhaling antibiotics. (See page 17.)  Photo: WHO/J. Dodge