Chapter 3
Charting the future

**Disease trends**

Of every 100 babies born alive during 1955, more than 75 survived 20 years to enter the economically productive workforce in 1975; life expectancy at birth was 48 years in 1955. Of every 100 babies born alive in 1975, more than 85 survived to join such a workforce in 1995; life expectancy at birth was 59 years in 1975 and 65 years in 1995. This substantial improvement was the result of many factors, including progress in public health, enhanced application of scientific knowledge already available and marked improvements in infectious disease prevention and control, particularly in the domain of environmental sanitation and immunization. During the period 1975-1995 there were overall improvements in the living standards of most populations worldwide: smallpox was eradicated, the proportion of children immunized against the six major childhood diseases increased from less than 5% in 1974 to over 80% in 1995. The percentage of the population in rural areas with access to safe water increased from 13% in 1970 to 61% in 1990, and with access to adequate sanitation from 11% to 36%. Because of the experience gained in the process it has been possible to target many other infectious diseases for eradication, elimination and control, and there has been perceptible progress in achieving these targets.

The continued emergence of infectious diseases is, however, a worrying trend but, as shown in *The World Health Report 1996 – Fighting disease, fostering development*, workable solutions exist for dealing with many of these diseases. With renewed commitment at global and national levels to combat them, the challenges that they pose can be overcome (Box 26). HIV/AIDS is, however, an exception because of its ever-changing character and the increasingly complex role of the factors that influence the progression from HIV infection to full-blown AIDS. Though the overall prevalence of the disease is low, it has spread to every inhabited continent, and kills and incapacitates young and middle-aged adults, disproportionately affecting skilled and managerial workers (Box 27, Map 5). Even so, there is heartening evidence that some preventive campaigns are slowly but definitely influencing its spread. Increasing emphasis is being given to AIDS research, to the development of vaccines and topical microbicides, and to finding treatment regimens that are simpler, more economical and accessible for most of those infected or vulnerable to HIV, due consideration being given to long-term survival possibilities and ethical issues.

Rising life expectancy, resulting primarily from declines in child mortality and in fertility, and from the prevention of deaths from fatal infectious diseases, is increasing the risks of developing chronic and debilitating diseases such as heart disease, cancer, diabetes and mental disorders. It is estimated that the elderly population (aged 65 and above) will increase globally by more than 80% during the next 25 years; in 10 countries at least, one out of every five persons will be “elderly” by the year 2020 (Map 6). Most deaths among the elderly will be due to cancer, lung and heart diseases. Meanwhile, because of profound changes in working methods and environments, and lifestyles associated with modernization, conditions such as diabetes and premature disability related to ergonomic factors are increasing among young adults and in the working population. In addition, an increasing
Box 26. Progress in infectious disease control

Among the main issues examined in The World Health Report 1996 were the control of "old" and "new" infectious diseases, and the spread of antimicrobial resistance. On both these fronts there were significant advances in 1996.

The campaign for the global eradication of poliomyelitis has progressed with continued vigour; 116 countries have already conducted national immunization days (NIDs) and the number of reported cases in 1996 was down by over 90% since the eradication effort was launched in 1988. In India about 120 million children under 5 were immunized against polio in a single day during each round of NIDs held in December 1996 and January 1997.

The leprosy elimination campaign also progressed. The global prevalence of registered cases fell from 2.3 to 1.7 per 10,000 population during 1995-1996. Over the past 17 years, the leprosy problem has been reduced by 82% worldwide. With a donation of $10 million received from the Nippon Foundation, WHO supplied drugs for multidrug therapy (MDT) free of cost to a large number of countries; in 1996, over 90% of all registered cases in the world were receiving MDT.

The Onchocerciasis Control Programme which began in West Africa in 1974 has since protected an estimated 36 million people from the disease, which has been eliminated as a public health problem from Benin, Burkina Faso, Ghana, Niger and Togo and large areas of south-eastern Mali and northern Côte d'Ivoire. An area of 25 million hectares of previously-infected mobile land has been made available for cultivation — enough to support 17 million people. The African Programme for Onchocerciasis Control began in January 1996 and covers 19 additional countries. The Onchocerciasis Elimination Programme in the Americas was started in 1991 in six Latin American countries and aims to eliminate severe pathological manifestations of the disease and to reduce morbidity in the Americas through the distribution of ivermectin.

Dracunculiasis (guinea-worm disease) is a debilitating parasitic disease that appears likely to be eradicated in the near future. Between 1992 and 1996, the number of endemic villages around the world was reduced from 23,000 to 9,500 and global incidence declined from 3.5 million cases in 1986 to 130,000 cases in 1996. Already, the International Commission for the Certification of Dracunculiasis Eradication has certified 21 endemic countries as "being free of dracunculiasis transmission".

Within the framework of the Initiative of the Southern Cone Countries, the elimination of transmission of Chagas disease — a chronic and incurable disease which can cause disability and death — was achieved during 1996 in Brazil, which accounts for over 40% of prevalence of the disease in Latin America.

Trachoma is an infectious disease that has caused irreversible blindness in about 6 million people; another estimated 147 million people suffer from the active disease and are in need of treatment, if blindness is to be prevented. WHO has launched an alliance consisting of a number of international nongovernmental development organizations, the Edna McConnell Clark Foundation and the philanthropic section of Pfizer International Inc. — the company that has developed azithromycin, a new long-acting antibiotic that may be used to fight trachoma. The target is the elimination of the disease by the year 2020.

In 1957, when the world’s population was 2.9 billion, malaria incidence was estimated at 200 million, with 2 million deaths annually. Forty years later the world population has more than doubled to over 5.8 billion people, and malaria cases increased to 300-500 million, with 1.5 to 2.7 million deaths annually. In 1992, the Ministerial Conference in Amsterdam adopted the Global Malaria Control Strategy, which aims to reduce malaria mortality by at least 20% in at least 75% of affected countries by the year 2000, compared to the 1995 data. At present, the great majority of endemic countries have completed malaria control plans in accordance with the Global Strategy, and 93 countries are implementing the plans. A new initiative for research and development of antimalarial drugs — Tropical Diseases R&D Alliance (TDRA), has been launched to forge new partnerships with the private sector. Field trials in Africa suggest that insecticide-treated bednets can, in certain epidemiological conditions, reduce overall childhood mortality by 15-35%. Research and field trials of several possible malaria vaccines are progressing.

There were at least 42 million cases of measles and 1 million deaths due to the disease in 1995 worldwide. As of March 1997, the total number of confirmed cases of measles in Latin America and the Caribbean was 1464, and there is hope of certifying the Region of the Americas free of measles in the year 2000.

Epidemic meningitis is a recurrent problem in the "meningitis belt" of Africa stretching from Senegal to Ethiopia and including all or part of at least 15 countries with an estimated population of 300 million people. In 1996, more than 150,000 cases and 16,000 deaths, mostly children, were reported, and WHO launched an initiative that resulted in an international coordination group of various United Nations agencies, nongovernmental organizations and other technical partners meeting with manufacturers of vaccines and injection material and seeking their commitment to reserve for WHO 14 million doses of vaccine for epidemic control in 1997.

The largest outbreak of foodborne infection ever recorded involving the E. coli pathogen occurred in Japan, affecting more than 6300 schoolchildren and causing two deaths. In Scotland, an outbreak of
Box 26. Progress in infectious disease control (continued)

Food poisoning due to *E. coli* killed almost 20 people and affected several hundred others; the source was cooked and processed meat products. Both outbreaks were the subject of major public health investigations which resulted in the strengthening of international and national capability for early detection and rapid response.

To test the hypothesis that the cluster of cases of the new variant form of Creutzfeldt-Jakob disease (CJD) identified in the United Kingdom in 1996 may be a consequence of exposure of humans to the bovine spongiform encephalopathy (BSE) agent, international experts reviewed scientific evidence concerning possible transmission of BSE to humans and are carrying out studies in laboratory animal models; methods to characterize human agents including the agent of the new variant form of CJD and to compare them to animal agents especially the BSE agent have been developed. WHO is organizing a consultation on medicinal products and other products in relation to human and animal transmissible spongiform encephalopathy (TSE) in March 1997.

To combat newly emerging infectious diseases and the spread of pathogens that are resistant to antibiotics, WHO is electronically linking more than 200 collaborating centres, 190 health ministries, 142 WHO country offices and six WHO regional offices, together with almost 150 national laboratories, for the rapid international exchange of information on disease outbreaks.

In November 1996, WHO and the pharmaceutical industry, represented by the International Federation of Pharmaceutical Manufacturers Associations, agreed on a framework for future collaborative efforts to contain the spread of antibiotic-resistant bacteria. This is expected to improve opportunities for successful, cost-effective treatment of infections, and to encourage research and development of new antibiotics.

The number of persons are likely to suffer from psychiatric and neurological conditions. Possible trends in respect of some of the major chronic diseases are given below.

The burden of cancer is predicted to increase over the next decades both in absolute numbers of cases and deaths, and as a proportion of the overall burden of disease. This increase is ascribed to population growth and ageing, and more particularly to an increasing incidence rate of cancer, especially due to smoking, which already accounts for one in seven cases worldwide. Though the risk of developing a cancer is increasing for individuals of a given age, the increase is not uniform for all types of cancer; for instance, the risk of developing stomach cancer appears to be falling almost everywhere, while there are rising trends for many of the more common cancers such as lung cancer linked to tobacco smoking, and colorectal, breast and prostate cancer linked to the so-called “Western lifestyle” (a relatively sedentary way of life with a diet low in fibre and fresh fruit and vegetables but rich in calories, meat, fat, salt, additives and alcohol). Increasing incidence of these cancers has been observed, although the death rate has not increased to the same extent, because of improvements in therapy.

It is projected that, even if incidence rates remain the same as in 1995, the annual number of new cases of cancer will increase by more than 30% to 13.6 million by the year 2010, and by 45% to 14.7 million by the year 2020. Based on present knowledge, it is anticipated that for the countries of the European Union the increase during 1995-2005 may range from 11% for colorectal cancer in women to 40% for prostate cancer in men; there is likely to be 33% more lung cancer in women, two-thirds of which will be the result of their increased risk of developing the disease.

Increases in the annual number of new cases of cancer in the developing world will probably be higher because of the rapidly increasing incidence of cancers such as those of the lung, breast, colon, prostate and ovary; for example, in the last two decades the incidence rates of the last four have approximately doubled in Singapore. Based on available information, the total number of new cases of cancer is expected to double by the year 2020 in the developing world, compared to an increase of about 40% in the developed world.

In most countries for which time-trend data are available, mortality rates from circulatory diseases have been declining in recent decades in people aged over 65 as well as in younger age groups.

Box 27. The HIV/AIDS situation, 1996

The latest estimates show that there were more than 3.1 million new HIV infections in 1996, and that about 1.5 million people, including 350,000 children, died of HIV/AIDS-associated illnesses. Some 22.8 million people are now living with HIV infection or AIDS, including 21.8 million adults and 830,000 children. Since the start of the epidemic, an estimated 5.5 million adults and 1.4 million children have died.

Worldwide, 75-85% of HIV infections in adults have been transmitted through unprotected sexual intercourse, with heterosexual intercourse accounting for more than 70%. Mother-to-child transmission accounts for more than 90% of global infections in infants and children. Sharing HIV-infected injection equipment by drug users accounts for 5-10% of all adult infections, and transfusion of HIV-infected blood or blood products represents 3-5%.

Currently, 14 million people are living with HIV/AIDS in sub-Saharan Africa — about 63% of the world’s total of infected persons. Surveys in seven African countries show that more than 10% of women attending antenatal clinics in urban areas are HIV-infected. Rates have been as high as 40% in some surveillance sites.

In Asia, HIV infection is spreading explosively in some parts of India, particularly to rural areas through migrant workers and truck drivers.

Rates are climbing rapidly among sex workers in Malaysia, Myanmar and Viet Nam. There has been an estimated fivefold growth in the number of people with HIV infection in China between 1993 and 1995, from 10,000 to 100,000. In Thailand, HIV infection rates in men have been declining, but prevalence continues to rise among women attending antenatal clinics.

In central and eastern Europe, spread is occurring, sometimes quite rapidly, to communities and countries that were hardly affected by the epidemic only a few years ago. Ukraine reported a dramatic increase in newly infected drug users in cities bordering the Black Sea. In the Russian Federation, 190 out of 46,000 drug injectors tested were HIV-positive, compared to none among more than 84,000 tested in 1994.

In the United States, although the overall number of new HIV infections has decreased over the past few years, studies suggest that a new generation of homosexual and bisexual men are becoming infected in some cities. In the United Kingdom, male-to-male transmission, which was declining in the late 1980s, seems to have been increasing again since 1990.

In Latin America and the Caribbean, epidemics are increasing among women and adolescents. Recent studies in Haiti have shown high HIV infection rates among pregnant women aged 14-24.

In the area of prevention, a study in one region of the United Republic of Tanzania has strengthened evidence that treating STDs diminishes HIV transmission. Prevalence among women attending antenatal clinics in Uganda has declined. Condom use in commercial sex transactions is now the norm in Thailand. A recent international study has shown that HIV infection among drug injectors is preventable through the early and vigorous implementation of prevention activities such as community outreach and needle exchange programmes.

Since 1 January 1996, when a new joint United Nations Programme on HIV/AIDS (UNAIDS) was launched, WHO’s main focus has been to ensure a coordinated global, regional and country-level response to STDs and HIV/AIDS including in areas such as surveillance, blood safety, STD treatment and HIV/AIDS care.
Map 6. An ageing population
A. Population aged 65 and above, 1996
B. Population aged 65 and above, 2020
Many questions remain unanswered about the exact causes of these large reductions in mortality, which have occurred in countries with very different baseline levels of the diseases, different patterns of the well-established risk factors, and diverse medical care systems. The decline in mortality may be due to a reduction in incidence (fewer new events) or to a reduction in case-fatality rates (i.e. a higher survival rate) either because of reduced severity of the disease or because of better management in the acute phase, such as with angioplasty and bypass surgery. There is some evidence that the decline in mortality from coronary heart disease in elderly people has been associated both with a decline in the incidence rates of the condition and with a more substantial decline in hospital case-fatality rates for acute myocardial infarction primarily due to significant reductions in the time-lag between the onset of a heart attack and admission to hospital. It is likely that favourable trends in some risk factors, for example reduced smoking and improved diet, are involved in the decline in incidence of coronary heart disease.

However, the rapid mechanization of everyday life (when due consideration is not given to its health impact) brings with it hazards related to changing behaviour (sedentary living; excessive or ill-balanced diets rich in calories, cholesterol and salt; smoking) and to a deteriorating environment (air pollution, exposure to chemicals, contamination of soil and water, hazards to food safety and exposure to biological agents). As a consequence, global ill-health attributable to diseases such as coronary heart disease, stroke and hypertension has been increasing. Since the launching of a global initiative on promotion of health at the International Conference on Health Promotion in 1986 in Ottawa, only a few countries in the developing world have introduced measures that encourage healthy public policies, promote healthy lifestyles and improve the human environment.

It is estimated that diabetes will affect more than 150 million people in the year 2000 and 300 million in the year 2025, compared to about 135 million in 1995. Increases in the numbers of cases will not be uniform between 1995 and 2025. Prevalence is expected to triple in Africa, the Eastern Mediterranean and South-East Asia; to double in the Americas and the Western Pacific; and to rise by less than 50% in Europe. The major factor contributing to these trends is increased longevity associated with rapid modernization, particularly in the newly industrialized and developing countries. Rapidly increasing incidence of new cases, and growing disability due to diabetes mellitus, may result in premature mortality and substantial economic cost if appropriate preventive action is not taken.

In many parts of the world economic progress and gains in overall longevity have been accompanied by an increase in mental, behavioural and social health problems. According to recent studies, mental health problems (including self-inflicted injuries) are one of the most frequent causes of lost years of good-quality life. Hundreds of millions of women, men and children suffer from mental illnesses; other behavioural
problems affect the lives of countless adolescents, young adults and the elderly.

Greater longevity and economic progress have been accompanied by an increasing burden of chronic disease and associated social and behavioural health problems. More people live to a later age, when heart disease, cancer, arthritis, stroke and dementia are more common. The result has been personal suffering and impairment in role functioning and social relations, leading to diminished quality of life, and substantial monetary costs to the individual and to society.

Of course, these problems are not new. But some are more common than they were a century ago, and some have become especially important in recent years. The number of persons with major mental illnesses is likely to increase substantially in the decades to come, for two reasons. First, the numbers of men and women living on to the ages of higher risk for some of these illnesses are increasing because of demographic changes. Thus, the number of persons with schizophrenia will rise by 30% between 1985 and the year 2000 because of a 30% increase in the global population between the ages of 15 and 45. There will be a substantial rise in the senile dementias, including Alzheimer disease, again by virtue of the increase in the number of people living to the age of 65 and beyond. Second, rates of depression have risen in recent years due to high unemployment, stressful work conditions, gender discrimination, etc. Depression is now being seen at younger ages and more frequently in several countries, both developed and developing. The relative risk of depression has increased from one ten-year birth cohort to the next in some countries.

**Health prognosis**

Health conditions are likely to continue to change in the future with the rapid ageing of the global population and modifications in working methods and conditions, and leisure activities.

The demographic changes now taking place are creating an unprecedented imbalance between the young and the old. In the next 25 years, the population aged 65 and above is likely to grow by 82% compared to an increase of 46% in the working-age population (20-64 years) and of only 3% in newborns. For every child born today in an industrialized country, there are 10 people aged 65 years or over. By the year 2020 there will be 15 such elderly persons for every baby. Meanwhile, in developing countries, for every baby born today there are two people over 65. By the year 2020 there will be four people over 65 for every newborn.

One result of this situation with socioeconomic implications for many countries will be the imbalance between the elderly and the working populations. Increasingly, relatively fewer people of productive age will have to provide for an expanding number of dependants, not merely in the form of direct support to elderly relatives, but also through taxation, the provision of health and social services, social security, etc.

It follows that the longer the elderly population can be helped to remain in good health, disability-free and productive, the smaller the social cost to the younger generation in particular and to society in general. It is equally clear that the longer the health of the working population can be sustained without disability, the more productive it will be and the more able to support the elderly dependants of society.

It is also obvious that with increased life expectancy, together with the ability of medical technologies to postpone death without always restoring health, individuals are saved from death due to certain diseases, but are subsequently exposed to other risks of death, that is, a decrease in mortality from one cause leading to an increase in mortality from another – “substitute mortality”. While later death is in itself a benefit, the question of quality of life during the additional years needs to be considered.

The independent life expectancy reflecting the quality of life for various
Table 5. Independent life expectancy at age 65, in years

<table>
<thead>
<tr>
<th>Selected countries</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Life expectancy</td>
<td>Disability-free life expectancy</td>
</tr>
<tr>
<td>Canada, 1986</td>
<td>14.9</td>
<td>8.1</td>
</tr>
<tr>
<td>Finland, 1986</td>
<td>13.4</td>
<td>2.5</td>
</tr>
<tr>
<td>Indonesia, 1989</td>
<td>11.5</td>
<td>11.4</td>
</tr>
<tr>
<td>Myanmar, 1989</td>
<td>12.0</td>
<td>11.1</td>
</tr>
<tr>
<td>Netherlands, 1989</td>
<td>14.4</td>
<td>9.3</td>
</tr>
<tr>
<td>Thailand, 1989</td>
<td>12.6</td>
<td>12.4</td>
</tr>
<tr>
<td>United Kingdom, 1991</td>
<td>14.3</td>
<td>13.6</td>
</tr>
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*Life expectancy in good perceived health.
Source: Network on Health Expectancy and the Disability Process (REVES).

Box 28. Prevention of blindness and deafness

Much disability is age-related, reflecting a situation either of a cumulative risk for disease leading to impairments, such as for the increase of cataract by age, or of the evolution of disease and resulting complications over time, as in the case of diabetes complications or eyelid scarring from trachoma. Disability from trauma is also generally age-related, with a cumulative risk throughout life, even if there are particularly vulnerable and/or exposed population groups.

Sensory impairments, for example vision and hearing problems, are very often age-related and the resulting disability is of great importance in terms of social dependency, ill-health and quality of life of the elderly. This is a matter of considerable concern, given the demographic trends, with a rapidly increasing proportion of elderly worldwide. It is thus possible to project the expected increase of impairments and resulting disability for the coming generations for those disorders which are particularly related to ageing. Fig. 9 shows that the number of elderly blind will double over the 25-year period up to the year 2020.

There are several similar examples of age-related, usually noncommunicable, disorders leading to disability in the elderly; this is likely to become a major global issue of health and social care for coming generations.

Fig. 9. Eye and ear problems in the elderly population, worldwide, 1995–2020

...countries is given in Table 5. Increasingly, a substantial share of the number of unhealthy years of life is attributable to debilitating conditions associated with chronic diseases and disorders as they replace acute illnesses in the same population. Several of these conditions, such as arthritis, osteoporosis, dementia and reduced vision and hearing, are manifestations of the natural ageing processes in that they can occur in every member of the population, are progressive and generally irreversible; they cause pain, suffering and disability and with an ageing population the worldwide burden of ill-health will increase (Box 28, Fig. 9). However, many other conditions, such as cancer, heart and...
lung diseases, diabetes and mental and neurological disorders, are age-associated in that their incidence increases with age, and ageing aggravates the progression of the disease or condition.

With rapid industrialization, mechanization and modernization associated with global mass media communication, individuals in many developing countries are exposed to numerous risk factors such as pollution and food contamination, limited physical activity, increased intake of dietary fat, smoking, excessive alcohol consumption, drug abuse and unsafe sex, which singly and in combination lead to many health problems and diseases. It is increasingly observed that adolescents and young adults are also victims of premature morbidity and mortality due to many of these diseases.

** Priorities for action **

Increasing life expectancy provides the potential for better health expectancy, but steps towards fulfilling that potential can only be taken if the pathways are clearly marked. In terms of controlling chronic noncommunicable diseases, this means defining realistic priorities for international action.

It is not a simple task. A wide variety of diseases affect both physical and mental health. The impaired individual well-being and socioeconomic burdens that they impose vary greatly. There is a diversity of health infrastructures (and resources) to deal with them in Member States. There are differing perceptions and degrees of political will to respond to them.

Currently, in the majority of countries the problem of ill-health is addressed primarily by medical services through traditional disease-specific vertical programmes, in most cases aimed at diagnosis and treatment of the established disease or condition. This approach may be quite successful under certain circumstances, given the sophisticated technology now available. However, almost inevitably its high cost creates a barrier and precludes its availability to the whole population even in developed countries, to say nothing about those in greater need.

On the other hand, it is clear from the analysis made in this report that major chronic diseases share a relatively small number of common and crucial risk factors which enable the development of an integrated strategic approach to the prevention of a number of these diseases.

Although the major thrust must be towards the prevention of noncommunicable diseases – a hitherto almost neglected area in their control – assessing and applying cost-effective methods in disease detection and case management should remain an important component of the control process. The time has now come to develop integrated packages for controlling these diseases based on best experiences and good practices; these can serve as a framework for intervention at different levels of public health services (as applicable in different local contexts), including primary health care and referral institutions.

In addition, there is an urgent need to develop and incorporate activities that raise awareness of, and motivation for, healthy lifestyles and the environments to support them. A major, intensified and sustained global campaign to encourage healthy lifestyles is vital. To succeed, such a campaign requires high-level international collaboration and multisectoral cooperation.

This demands a new relationship in which specialists, experts and leaders in various fields look beyond their own professional boundaries. They need to recognize that many diseases have common risk factors, and to share their skills and experience so as to tackle them together. This risk factor recognition must be communicated clearly to the public at large.

Greater attention should be paid to the integration of primarily clinical and public health functions to enable better development and utilization of human resources, and to ensure effective cooperation of the family and community at local levels.

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** Major chronic diseases share a relatively small number of common and crucial risk factors which enable the development of an integrated strategic approach to the prevention of a number of these diseases. **
The relationship between core physical and mental health services has been complex, and sometimes counterproductive. The separation of the two fields has also often produced fragmentation in the delivery of health services, to the detriment of the clients. Each field has developed valuable scientific knowledge and expertise which, if exploited properly, would be mutually beneficial. As it currently exists, the interface between core public health disease prevention and health promotion, and similar efforts in mental health services, is inadequate for either to function properly. A new alliance between the exponents of physical and mental health is required.

**Prevention**

**Behaviour change.** The Western lifestyle, in particular a diet rich in calories and animal fat, and poor in fresh fruit, vegetables and fibre, is associated with cancers of the breast, colon-rectum and prostate, as well as with circulatory diseases and diabetes. It is a matter of great concern that the global spread of this lifestyle will lead to an increase in associated disease burdens in many newly industrialized countries.

A cultural change leading to a more sensible, life-enhancing regimen, adequate physical activity and a proper diet (Box 29), and environmental management aimed not only at safeguarding human health from the potential adverse effects of biological, chemical and physical factors but also at improving the quality of life of people, can modify the evolving global disease patterns which are currently characterized by increasing ill-health due to chronic conditions.

The most effective way to reduce mortality and morbidity from these diseases is the vigorous promotion from a young age onwards of healthy lifestyles in the general population as well as in particular high-risk groups. Most important are changing to a healthy diet (more fruits and vegetables), more physical exercise and smoking avoidance or cessation.

The challenge is to heighten public awareness of risk factors to such a level that individuals themselves take an integrated, coordinated approach to protecting their own health and that of their families. They will need to be encouraged to take personal responsibility for preventing or avoiding disease by opting for healthier lifestyles. Four aspects of health promotion – developing personal skills, creating supportive environments, strengthening community action, and building healthy public policy – should be incorporated into strategies aimed at behaviour change.

**Developing personal skills.** Health promotion supports personal and social development through providing information and education for health and enhancing life skills. It thereby increases

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**Box 29. Diet as preventive medicine**

Affluent populations today habitually consume a diet that was unknown to the human species a mere ten generations ago. Compared with the diet that fuelled human evolution, the so-called "affluent diet" of today has twice the amount of fat, a much higher ratio of saturated to unsaturated fatty acids, a third of the former daily fibre intake, much more sugar and sodium, fewer complex carbohydrates and a reduced intake of micronutrients.

Worldwide, the adoption of this diet has been accompanied by a major increase in coronary heart disease, stroke, various cancers, diabetes mellitus and other chronic diseases. While dietary factors are only partly responsible, it is evident that changes in dietary practices can do much to prevent premature death and disability caused by these diseases.

Research indicates that frequent consumption of vegetables, fruits, cereals and legumes as part of a diet that is low in fat, and especially low in saturated fat, contributes to the prevention of several major chronic diseases.

Because many of the risks of developing chronic diseases, including the atherosclerotic process leading to heart disease, are now known to begin to operate in childhood, "health diets" need to begin early in life and continue thereafter. Populations need to be advised to remember the principle of the balanced diet, with its emphasis on a diversity of foods, and the links between high consumption of fat, especially from foods of animal origin, and low consumption of complex carbohydrates, and the risks of developing chronic disease.

In many areas of chronic disease control, an abundance of cost-effective technologies and intervention strategies already exists. Others are being developed. Listed according to their priority for action, they can be grouped as follows: prevention (which includes behaviour change and immunization); medical intervention (which includes screening and early detection, treatment and palliative care); policies (including legislation and regulation); and research.
the options available to people to exercise more control over their own health and their environments, and to make choices conducive to health. Enabling people to learn throughout life, to prepare themselves for all of its stages and to cope with chronic illness and injuries is essential. This has to be facilitated in school, home, work and community settings. Action is required through educational, professional, commercial and voluntary bodies, and within the institutions themselves.

Creating supportive environments. Health cannot be separated from other goals. The overall guiding principle is the need to encourage reciprocal maintenance – to take care of each other, our communities and our natural environment. Changing patterns of life, work and leisure have a significant impact on health. Systematic assessment of the health impact of a rapidly changing environment – particularly in the areas of technology, work, energy production and urbanization – is essential and must be followed by action to ensure positive benefit to the health of the public.

Strengthening community action. Health promotion works through concrete and effective community action in setting priorities, planning strategies and implementing them to achieve better health. This requires full and continuous access to information, learning opportunities for health, and funding support.

Building healthy public policy. Health promotion policy combines diverse but complementary approaches including legislation, fiscal measures, taxation and organizational change. It requires the identification of obstacles to the adoption of healthy public policies in other sectors than health, and ways of removing them. The aim must be to make the healthier choice the easier choice for policy-makers also.

Immunization. At least 15% of all cancers worldwide are a consequence of chronic infectious disease, the most important being associated with viruses, especially hepatitis B and C (HBV, HCV) and human papilloma virus (HPV), bacteria (Helicobacter pylori) and some parasites. Infections account for as many as 20% of new cancer cases in developing countries.

Many of these underlying infectious diseases can be prevented entirely by immunization (HBV, and possibly in the near future, HPV). For others, even at present it is possible to reduce the transmission of infection (HCV and H. pylori). The coming decade is likely to bring rapid advances in the development of prophylactic vaccines to prevent infection with these organisms, and also of vaccines designed to reduce or eliminate established infection, as part of therapy.

Medical intervention

Screening and other early detection

Screening is the organized attempt to detect, among apparently healthy people in the community, disorders or risk factors of which they are unaware. Prevention of the adverse consequences of many cancers is possible through early detection and treatment. Screening for cervical cancer by cytology (the Pap smear) is the longest established, and has contributed to the decline in incidence of invasive cancer observed in many countries.

In countries with a high incidence of breast cancer, mammography is now generally proposed for women over 50 years of age. The procedure has been shown to contribute to significant reductions in mortality in this age group. Simpler methods such as self-examination and examination by trained non-medical personnel, are proposed as possible alternatives, which may be more cost-effective in less affluent countries. The process of technical innovation continues to produce increasingly sophisticated early detection methods such as screening for the susceptibility genes related to cancers of the breast and large bowel. These need to be evaluated for their relative benefits and costs before they can be integrated into national screening programmes.

The screening and early detection of circulatory diseases rests largely on
identifying and controlling hypertension, and to a lesser extent, raised blood cholesterol levels. Hypertension is the most important risk factor for stroke, and one of the most important in heart disease. Even modest blood pressure reduction in hypertensive people could reduce half of the stroke events worldwide. Well-established methods exist for controlling or lowering high blood pressure and elevated blood cholesterol levels.

Primary prevention strategies can be supplemented by a strategy for dealing with high-risk groups in the population, by identifying and helping individuals in need of special protection. This will include treatment with or without drugs to control hypertension and reduce serum cholesterol levels.

In preventing rheumatic heart disease, early detection and correct treatment of streptococcal sore throat or pharyngitis are necessary to avoid the first attack of acute rheumatic fever.

Prevention and control of diabetes must be integrated into broader programmes for the prevention of major noncommunicable diseases at the community level. A diabetes strategy should focus on the early identification and management of the disease, based on an active partnership between health professionals and diabetic individuals. Early detection of hypertension, high cholesterol and vision-threatening retinopathy are crucially important. Retinopathy screening should be routine in people with diabetes. Evaluation of different options for primary, secondary and tertiary prevention of diabetes is necessary.

A number of hereditary disorders can be detected by genetic screening, which needs to be supported by appropriate counselling services for individuals and families at risk. Genetic studies are becoming increasingly important in the understanding of many major noncommunicable diseases, including some mental disorders. Genomics services are cost-effective in view of the great social and financial burden of the chronic disease avoided. About 50% of congenital abnormalities, around 10% of inherited diseases and about 2% of chromosomal disorders can be successfully treated or corrected. Within the next five years, genetic counselling based on a family-oriented approach will be further developed. The genetic influences on health-related behaviour deserve further, preferably interdisciplinary, research.

**Treatment**

In cancer therapy, advances have been made for cancers at some specific organ sites, which can now be successfully treated in more than 60% of cases (e.g. some malignant lymphomas, including Hodgkin disease), childhood leukaemia and more than 90% in testicular cancer. Similarly, though less dramatically, improvements have been made in the treatment of breast cancer (the use of tamoxifen) and in therapy of childhood tumours (including those of the nervous system). In the case of cancers for which available evidence indicates that radiotherapy is an essential component of treatment, the acquisition of appropriate equipment and the training of personnel in their use, are recommended.

For patients suffering from circulatory diseases, the priority should be to avoid the recurrence and progression of the disease. Improved methods for the management of acute stroke are available and have contributed to the decline in mortality from cerebrovascular disease in industrialized countries. For the treatment of coronary heart disease, low-cost and effective medical interventions have been identified (the use of aspirin, streptokinase), which are simple to administer. Surgical and nonsurgical invasive technologies are widely practised in industrialized countries and are increasingly used in developing ones. Simple, low-cost measures for the rehabilitation of patients with a wide range of circulatory diseases are available for use in even severely disabled, medically complex cases in all age groups, and could be integrated into existing health care delivery systems in all countries.

For the control of hypertension, effective and low-cost pharmacological and nonpharmacological methods have been developed. There are cost-effective
drugs (e.g. penicillin) and surgical methods available for the management of patients with rheumatic heart disease, which lends itself to prevention through the treatment of underlying infections.

In the case of diabetes, effective treatment can considerably improve the outcome, by reducing the incidence or progression of long-term complications. However, insulin, which is considered as an essential drug, is still unavailable in many parts of the world. In the case of people with non-insulin-dependent diabetes, the condition may be adequately controlled by diet, physical exercise or oral hypoglycaemic agents. Noninvasive laser therapy is now available for the early stages of diabetic retinopathy. Treatment of hypertension may reduce the incidence of diabetic kidney disease. Education of the person with diabetes in the self-management of the condition is also a cornerstone of modern treatment of the disease.

Many mental disorders can be treated easily and cheaply, but it is vital to ensure that essential medications are available at affordable cost at the point of contact of the patient with the health care system. Help is needed to ensure that treatment for such disorders is integrated within the first health contact level.

Palliative care

Individual suffering from cancer is a burden that goes far beyond the statistics on incidence and mortality, and is borne by the patient’s entire family and friends. Relief from unnecessary pain should be higher on the public health agenda in both developing and developed countries. WHO has in the past advocated the use of suitable measures to palliate pain in terminal illness, but has often found itself in conflict with laws primarily designed to control the use of illicit drugs. There are those with some mental disorders for whom humane and loving care is all that can be offered, preferably by families supported by the health sector. Good models of care need to be designed and descriptions of existing good practice disseminated to countries.

Policies

Health promotion

Health promotion calls for countrywide community-based programmes supported by national or federal and local economic and social policy. The active participation of the community and the involvement of the mass media are essential. Several countries have adopted comprehensive approaches and their experience should be built upon.

Legislative action and financial measures should be considered in support of disease prevention programmes, such as reducing the availability of tobacco to children; labelling all packages with a health warning; controlling the advertising of tobacco products and restricting smoking in public places, schools and workplaces; taxing products known to increase risk; subsidizing healthy nutritional items; and providing facilities for recreational physical exercise.

Changes in the structure and practices of the health sector are necessary, involving a reallocation of resources, stronger emphasis on prevention, and new approaches to training primary health care workers.

Modern medicine is confronted with vast opportunities provided by a proliferation of diagnostic and therapeutic technology. Their application, however, leads to spiralling health care costs, while their net benefits are unclear. It is thus imperative that all dimensions of their benefits should be evaluated objectively in order to guide the decisions of health personnel. Methods for the evaluation of quality of care should be developed for use in both the public and private health care sector.

Healthy environment

Socioeconomic development should be carried out in such a way as to protect, and where possible enhance, human health and well-being. There is a need for improvements in the existing human environment, including the upgrading of housing, the reduction of long-standing pollution, and the provision of better working conditions.
Such measures involve many aspects of government at central, regional and local levels, and require well-integrated, multisectoral planning and management. Because many of the problems, such as air and water pollution and the transportation of potentially harmful materials, may affect more than one country, there is a need for international collaboration on surveillance and control measures.

The development of new technologies, for instance in the areas of energy production and chemical manufacture, must be such as to minimize the potential adverse effects on human health, and this requires the establishment of systematic mechanisms for risk assessment and the study of alternatives.

**Caring society**

Too often the high-technology care used in an effort to prolong life in fact reduces the quality of life. It may prevent patients from dying with dignity in a situation of their choice. There is a need to develop well-integrated community-based programmes that are sufficiently tailored to the circumstances of individuals with special needs. The time has come for a caring society to do what cannot be done by a curing profession. This is illustrated by data available for both industrialized and developing countries which show few differences between life expectancy at birth and average age at death due to some cancers (Table 6).

### Research

Research is continuing to develop new therapeutic drugs and treatments for a number of noncommunicable diseases. Some have recently been marketed, others are at an advanced stage of development (Box 30).

Within the next five years, genetic therapy for common disorders including cancer, coronary heart disease, diabetes and autoimmune disorders will become available.

Research will not only help further to refine knowledge of the environmental and lifestyle factors which increase the risk of cancer in a population. It will permit identification of the specific individuals at highest personal risk from exposure to these factors, probably in terms of genetic endowment which renders them more susceptible. The search continues for chemopreventive agents which can reduce cancer risk. Although the initial enthusiasm for micronutrients (e.g. vitamins) has waned, other approaches (the use of nonsteroidal anti-inflammatory drugs, tamoxifen-like anti-oestrogens and calcium-fibre preparations) are being investigated for possible benefits, inconvenience or side effects.

Research into the genetic basis of circulatory diseases, especially hypertension, should be encouraged. The use of molecular genetics may in the near future make it possible to identify and pay more specific attention to susceptible individuals. Hypertension in pregnancy is a major cause of premature birth and perinatal death; more research efforts should therefore concentrate on studying its mechanisms in order to facilitate...
prevention and develop suitable treatment. The problem of coronary heart disease in women is causing increasing concern. Knowledge of the natural history of this disease before, during and after the menopause is inadequate and more research is needed on menopause-related pathobiological and metabolic changes.

More detailed information is required on the genetics of diabetes as a means of identifying persons at risk. Studies on asthma prevalence in different areas and population groups are needed to identify environmental risk factors, as are studies on cost-effectiveness in asthma management and prevention programmes.

Research aimed at uncovering the determinants of nonfatal disability, and designing interventions to avoid their consequences, should be given high priority.

**Emerging ethical issues**

Identifying priorities in the prevention of disease, the relief of pain and suffering, caring and curing, and the avoidance of premature death, cannot be achieved without recognizing the many ethical and human rights issues associated with them. The goals of health care are being reoriented towards quality of life and health expectancy as well as life expectancy. Equity and ethics are becoming of ever-greater importance at a time when societies are witnessing both the ageing of their populations and increasing strains on their resources. Longer life has often come at the price of greater suffering, disability and higher costs.

Balancing the advantages against the disadvantages of advanced medical technology is an increasingly important priority for policy-makers. People want the benefits of science and technology. But they also want to be consulted about them and reassured that these advances are properly harnessed to protect rather than endanger human dignity, health, well-being and diversity.

Advances in the fields of genetics, screening and organ transplantation are only a few examples of the many complex ethical challenges facing all concerned - scientists, physicians, health workers, economists and politicians - on behalf of the wider public.

The danger that some of the advances in biomedical sciences have potentially adverse consequences for the integrity, dignity and human rights of

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**Box 30. New drugs and treatments for chronic diseases**

Promising research initiatives are under way in the development of new and innovative products for the prevention and cure of noncommunicable diseases; extensive comparative clinical trials of a variety of treatments are also taking place, in order to show which are the most beneficial and cost effective. Some of them are listed below.

Prophylactic vaccines to prevent infection and also vaccines to reduce or eliminate established infection leading to specific cancers are being developed, most notably a vaccine against the human papilloma virus which is a causative agent in the majority of cases of cervical cancer. Monoclonal antibodies, armed with toxins or radioisotopes and genetically-manipulated components of the immune system, have also reached early stages of clinical trials (see also Box 7).

In the area of circulatory diseases, a range of drugs is available for effective treatment of conditions such as hypertension, hypercholesterolaemia, cardiac arrhythmias, myocardial infarction and chronic angina. Thrombin inhibitors and fibrinogen receptor antagonists are found to improve considerably the efficacy and safety of antithrombotic therapy.

New human insulin analogs, new routes of insulin delivery, organ transplantation and gene therapy are improving the effectiveness of diabetes treatment. Evidence is also accumulating on their preventive effect.

In osteoporosis, for example, the experience of hormone replacement therapy has been encouraging. So too have the first results of studies on the use of enthesal agents including a nasal spray form of calcitonin. Transforming growth factor β and insulin-like growth factor are promising candidates for increasing bone formation in older people.

With new agents such as cytokine inhibitors, improvements are also indicated in the treatment of arthritis. The genetically-engineered human interleukin-1 receptor antagonist has been shown in studies to relieve rheumatoid arthritis, reducing inflammation and joint tissue destruction. The drug appears to slow the autoimmune disease process without seriously affecting other functions of the immune system.
Conclusion

Priority areas for international action in health should be:

1. Integration of disease-specific interventions in both physical and mental health into a comprehensive chronic disease control package that incorporates prevention, diagnosis, treatment and rehabilitation, and improved training of health professionals.

2. Fuller application of existing cost-effective methods of disease detection and management, including improved screening, taking into account the genetic diversity of individuals.

3. A major intensified but sustained global campaign to encourage healthy lifestyles, with an emphasis on the healthy development of children and adolescents in relation to risk factors such as diet, exercise and smoking.

4. Healthy public policies, including sustainable financing, and legislation on pricing and taxation, in support of disease prevention programmes.

5. Acceleration of research into new drugs and vaccines, and into the genetic determinants of chronic diseases.

6. Alleviation of pain, reduction of suffering and provision of palliative care for those who cannot be cured.

The World Health Report 1997 indicates priorities for action that are intended to improve humanity’s ability to prevent, treat, rehabilitate and where possible, cure major noncommunicable diseases, and to reduce the enormous suffering and disability that they cause.

Inevitably, each human life reaches its end. Ensuring that it does so in the most dignified, caring and least painful way that can be achieved deserves as much priority as any other. This is a priority not merely for the medical profession, the health sector or the social services. It is a priority for each society, community, family and individual.