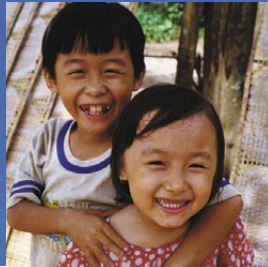




World Health Organization

The World Oral Health Report 2003

Continuous improvement of oral health in the 21st century
– the approach of the WHO Global Oral Health Programme



The World Oral Health Report

2003

**Continuous improvement of oral health in the 21st century
- the approach of the
WHO Global Oral Health Programme**

Poul Erik Petersen

*Oral Health Programme
Noncommunicable Disease Prevention and
Health Promotion
World Health Organization
Geneva, Switzerland
petersenpe@who.int*

© World Health Organization 2003

All rights reserved. Publications of the World Health Organization can be obtained from Marketing and Dissemination, World Health Organization, 20 Avenue Appia, 1211 Geneva 27, Switzerland (tel: +41 22 791 2476; fax: +41 22 791 4857; email: bookorders@who.int). Requests for permission to reproduce or translate WHO publications – whether for sale or for noncommercial distribution – should be addressed to Publications, at the above address (fax: +41 22 791 4806; email: permissions@who.int).

The designations employed and the presentation of the material in this publication do not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted lines on maps represent approximate border lines for which there may not yet be full agreement.

The mention of specific companies or of certain manufacturers' products does not imply that they are endorsed or recommended by the World Health Organization in preference to others of a similar nature that are not mentioned. Errors and omissions excepted, the names of proprietary products are distinguished by initial capital letters.

The World Health Organization does not warrant that the information contained in this publication is complete and correct and shall not be liable for any damages incurred as a result of its use.

The named authors alone are responsible for the views expressed in this publication.

CONTENTS

PREFACE

BACKGROUND 1

POLICY BASIS FOR THE WHO ORAL HEALTH PROGRAMME 3

Oral health is integral and essential to general health	3
Oral health is a determinant factor for quality of life	3
Oral health - general health	3
Proper oral health care reduces premature mortality	3
What is the burden of oral disease?	3
Oral disease burdens and common risk factors	9
Oral health surveillance and goals	10

THE POLICY FRAMEWORK FOR THE WHO ORAL HEALTH PROGRAMME 14

STRATEGIES AND APPROACHES IN ORAL DISEASE PREVENTION AND HEALTH PROMOTION 15

Health promotion and oral health	17
----------------------------------	----

PRIORITY ACTION AREAS FOR GLOBAL ORAL HEALTH 19

Oral health and fluorides	19
Diet, nutrition and oral health	20
Tobacco and oral health	21
Oral health through Health Promoting Schools	23
Oral health of youth	24
Oral health improvement amongst the elderly	25
Oral health, general health and quality of life	26
Oral health systems	27
HIV/AIDS and oral health	28
Oral health information systems, evidence for oral health policy and formulation of goals	29
Research for oral health	31

CONCLUSION 33

REFERENCES 34

PREFACE

Chronic diseases and injuries are the leading health problems in all but a few parts of the world. The rapidly changing disease patterns throughout the world are closely linked to changing lifestyles which include diet rich in sugars widespread use of tobacco and increased consumption of alcohol.

In addition to socio-environmental determinants, oral disease is highly related to these lifestyle factors which are risks to most chronic diseases as well as protective factors such as appropriate exposure to fluoride and good oral hygiene. Oral diseases qualify as major public health problems owing to their high prevalence and incidence in all regions of the world, as for all diseases, the greatest burden of oral diseases is on disadvantaged and socially marginalized populations. The severe impact in terms of pain and suffering, impairment of function and effect on quality of life must also be considered.

Traditional treatment of oral diseases is extremely costly in several industrialized countries and not feasible in most low-income and middle-income countries. The WHO Global Strategy for prevention and control of noncommunicable diseases and the common risk factor approach is a new strategy for managing prevention and control of oral diseases. The WHO Oral Health Programme has also strengthened its work for improved oral health globally through links with other technical programmes within the Department for Noncommunicable Disease Prevention and Health Promotion.

This report outlines the current oral health situation at global level and the strategies and approaches for better oral health in the 21st century.



Dr Pekka Puska
Director
Noncommunicable Disease Prevention
and Health Promotion



Dr Poul Erik Petersen
Chief
Oral Health Programme

BACKGROUND

The **World Health Report 2002** outlined the extent of disease, disability and death in the world today that can be attributed to a number of the most important risks to human health¹. This is of great interest in itself but, more importantly, the report also indicated how much of this burden could be avoided in the next couple of decades if the same risk factors were reduced from now onwards. The report identified a number of cost-effective interventions to counter some of these risk factors. Intervention is defined broadly as "any health action - any promotive, preventive, curative, or rehabilitative activity where the primary intent is to improve health". Apart from the obvious health benefits, reducing risks to health will promote sustainable development and reduce inequities in society.

The mission of the WHO Noncommunicable Diseases and Mental Health Cluster is to provide global leadership in the promotion of health throughout life and to assist Member States to reduce the rate of morbidity, disability and premature mortality caused by these diseases. Emphasis is placed on focusing available resources on the priorities identified by the global strategy for the prevention of noncommunicable diseases (NCDs).

The recommended actions for health comprise:

- * Formulating risk prevention policies, including more support for scientific research, improved surveillance systems and better access to global information.
- * Giving top priority to developing effective, committed policies for the prevention of globally increasing high risks to health such as tobacco consumption; unhealthy diet, unsafe water, lack of sanitation and hygiene, and unsafe sex in connection with HIV/AIDS.
- * Strengthening international and intersectoral collaboration to improve risk management and increase public awareness and understanding of risks to health.
- * Ensuring a balance in action between government, community and individual.

Noncommunicable chronic diseases, which continue to dominate in lower-middle and upper income countries, are becoming increasingly prevalent in many of the poorest developing countries. They create a double burden on top of the infectious diseases that continue to afflict these countries¹.

The objectives of the **WHO Global Oral Health Programme**, one of the technical programmes within the Department of Noncommunicable Disease Prevention and Health Promotion (NPH), have been reoriented according to the new strategy of disease prevention and promotion of health. Greater emphasis is put on developing global policies in oral health promotion and oral disease prevention, coordinated more effectively with other priority programmes of NPH and other clusters and with external partners.

POLICY BASIS FOR THE WHO ORAL HEALTH PROGRAMME

Oral health is integral and essential to general health

Oral health means more than good teeth; it is integral to general health and essential for well-being. It implies being free of chronic oro-facial pain, oral and pharyngeal (throat) cancer, oral tissue lesions, birth defects such as cleft lip and palate, and other diseases and disorders that affect the oral, dental and craniofacial tissues, collectively known as the craniofacial complex.

Oral health is a determinant factor for quality of life

The craniofacial complex allows us to speak, smile, kiss, touch, smell, taste, chew, swallow, and to cry out in pain. It provides protection against microbial infections and environmental threats. Oral diseases restrict activities in school, at work and at home causing millions of school and work hours to be lost each year the world over. Moreover, the psychosocial impact of these diseases often significantly diminishes quality of life.

Oral health - general health

The interrelationship between oral and general health is proven by evidence. Severe periodontal disease, for example, is associated with diabetes². The strong correlation between several oral diseases and noncommunicable chronic diseases is primarily a result of the common risk factors. Many general disease conditions also have oral manifestations that increase the risk of oral disease which, in turn, is a risk factor for a number of general health conditions.

This wider meaning of oral health does not diminish the relevance of the two globally leading oral afflictions - dental caries and periodontal diseases. Both can be effectively prevented and controlled through a combination of community, professional and individual action.

Proper oral health care reduces premature mortality

Early detection of disease is in most cases crucial to saving lives. A thorough oral examination can detect signs of nutritional deficiencies as well as a number of general diseases including microbial infections, immune disorders, injuries, and oral cancer. The craniofacial tissues also provide an understanding of organs and systems in less accessible parts of the body. For example, the salivary glands are a model of the exocrine glands, and an analysis of saliva can provide important clues to general health or disease.

What is the burden of oral disease?

Despite great achievements in the oral health of populations globally, problems still remain in many communities around the world - particularly among underprivileged groups in developed and developing countries. Dental caries and periodontal diseases have historically been considered the most important global oral health burdens. At present, the distribution and severity of oral diseases vary in different parts of the world and within the same country or

region. The significant role of socio-behavioural and environmental factors in oral disease and health is demonstrated in a large number of epidemiological surveys.

Dental caries is still a major oral health problem in most industrialized countries, affecting 60-90% of schoolchildren and the vast majority of adults. It is also a most prevalent oral disease in several Asian and Latin American countries, while it appears to be less common and less severe in most African countries. **Figure 1** highlights the dental caries experience among 12-year-old children in the six WHO regions in the year 2000^{3,4}, based on the DMFT (Decayed, Missing and Filled Teeth) Index, which measures the lifetime experience of dental caries in permanent dentition. Currently, the disease level is high in the Americas but relatively low in Africa. In light of changing living conditions, however, it is expected that the incidence of dental caries will increase in many developing countries in Africa, particularly as a result of a growing consumption of sugars and inadequate exposure to fluorides.

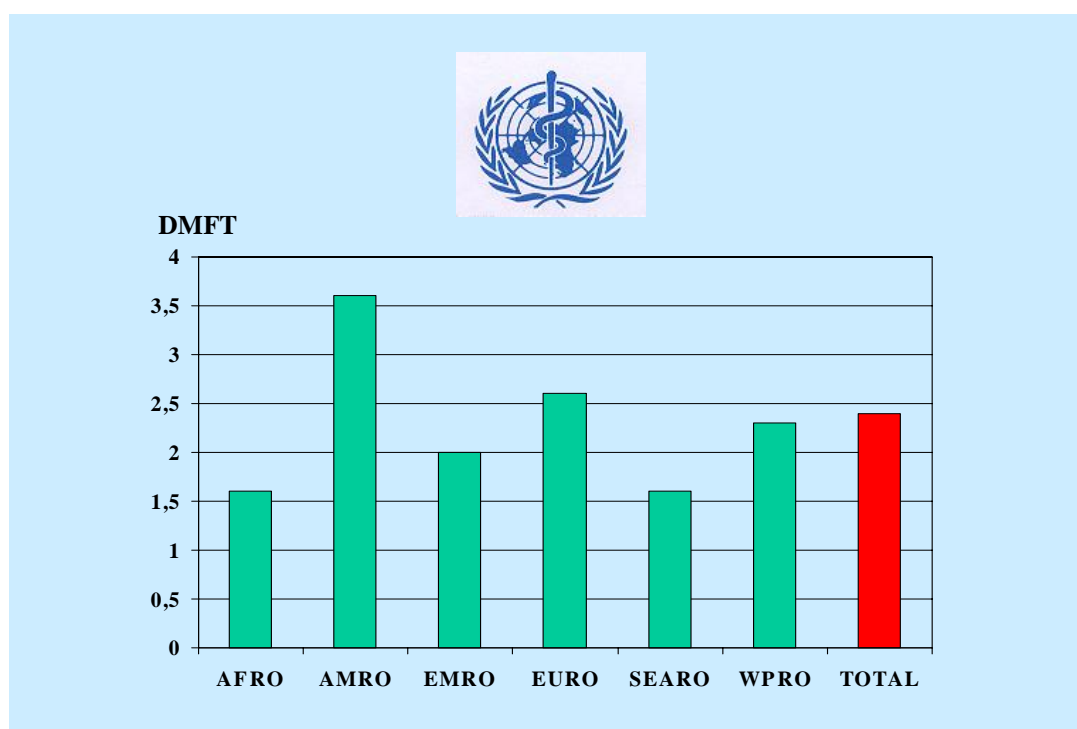


Figure 1 Dental caries experience (DMFT) of 12-year-old children according to WHO regional offices (Source: WHO Global Oral Health Data Bank and WHO Oral Health Country/Area Profile Programme, 2000)^{3,4}.

In many developing countries, access to oral health services is limited and teeth are often left untreated or are extracted because of pain or discomfort. Throughout the world, losing teeth is still seen by many people as a natural consequence of ageing. While in some industrialized countries there has been a positive trend of reduction in tooth loss among adults in recent years, the proportion of edentulous adults aged 65 years and older is still high in some countries (**Table 1**).

Table 1 Prevalence of edentulousness (%) of elderly reported for selected countries throughout the world (Source: WHO Global Oral Health Data Bank and WHO Oral Health Country/Area Profile Programme, 2000)^{3,4}.

WHO region/country	Pct Edentulous	Age group (yrs)
Africa		
Gambia	6	65+
Madagascar	25	65-74
The Americas		
Canada	58	65+
USA	26	65-69
Eastern Mediterranean		
Egypt	7	65+
Lebanon	20	64-75
Saudi Arabia	31-46	65+
Europe		
Albania	69	65+
Austria	15	65-74
Bosnia and Herzegovina	78	65+
Bulgaria	53	65+
Denmark	27	65-74
Finland	41	65+
Hungary	27	65-74
Iceland	15	65-74
Italy	19	65-74
Lithuania	14	65-74
Poland	25	65-74
Romania	26	65-74
Slovakia	44	65-74
Slovenia	16	65+
United Kingdom	46	65+
South-East Asia		
India	19	65-74
Indonesia	24	65+
Sri Lanka	37	65-74
Thailand	16	65+
Western Pacific		
Cambodia	13	65-74
China	11	65-74
Malaysia	57	65+
Singapore	21	65+

Globally, most children have signs of gingivitis and, among adults, the initial stages of periodontal diseases are prevalent. **Figure 2** illustrates the periodontal health status of 35-44-year-olds by WHO region⁴, using the so-called Community Periodontal Index. Severe periodontitis, which may result in tooth loss, is found in 5-15% of most populations. Juvenile or early-onset aggressive periodontitis, a severe periodontal condition affecting individuals during puberty that leads to premature tooth loss, affects about 2% of youth⁵.

In industrialized countries, studies show that smoking is a major risk factor for adult periodontal disease, responsible for more than half of the periodontitis cases in this age group⁶. Risk decreases when smokers quit, and the prevalence of periodontal disease has decreased in countries experiencing reductions in tobacco use⁷.

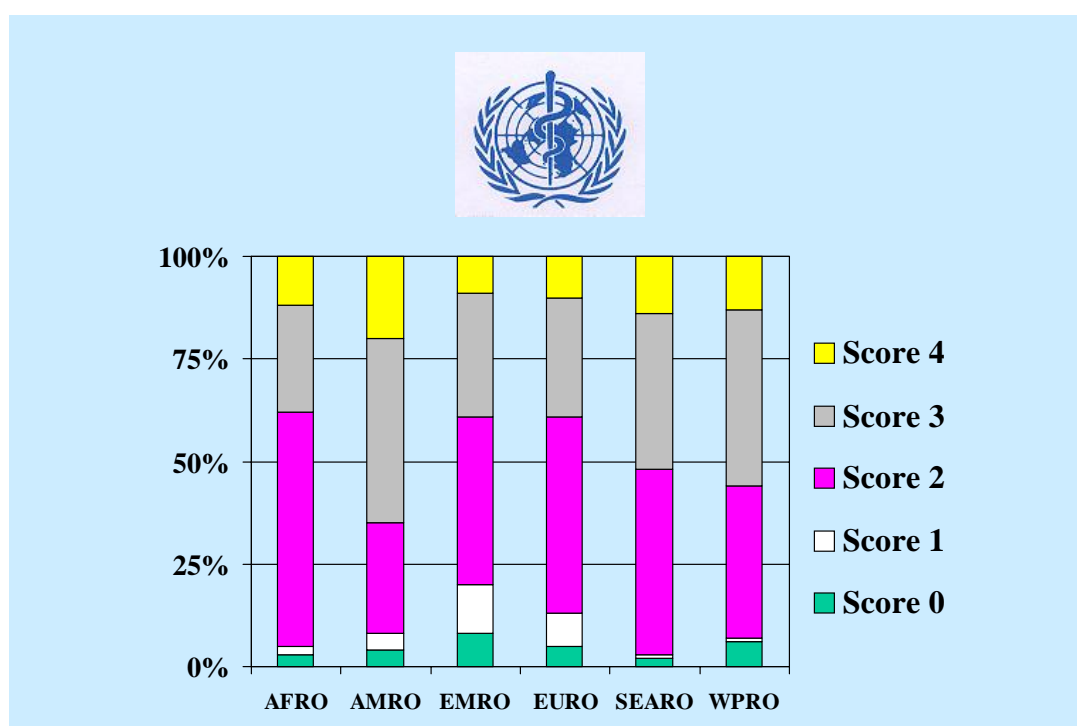


Figure 2 Mean percentages of 35-44-year-olds by maximum Community Periodontal Index scores according to WHO regional offices (Source: WHO Global Oral Health Data Bank and WHO Oral Health Country/Area Profile Programme, 2000)^{3,4}.

While oral and pharyngeal cancers are both preventable, they remain a major challenge to oral health programmes. The prevalence of oral cancer is particularly high among men, the eighth most common cancer worldwide (**Figure 3**)⁸. Incidence rates for oral cancer vary in men from 1-10 cases per 100 000 inhabitants in many countries. In south-central Asia, cancer of the oral cavity ranks amongst the three most common types of cancer. However, sharp increases in the incidence rates of oral/pharyngeal cancers have been reported for several countries and regions such as Denmark, Germany, Scotland, central and eastern Europe and, to a lesser extent, Australia, Japan, New Zealand and the USA⁸.

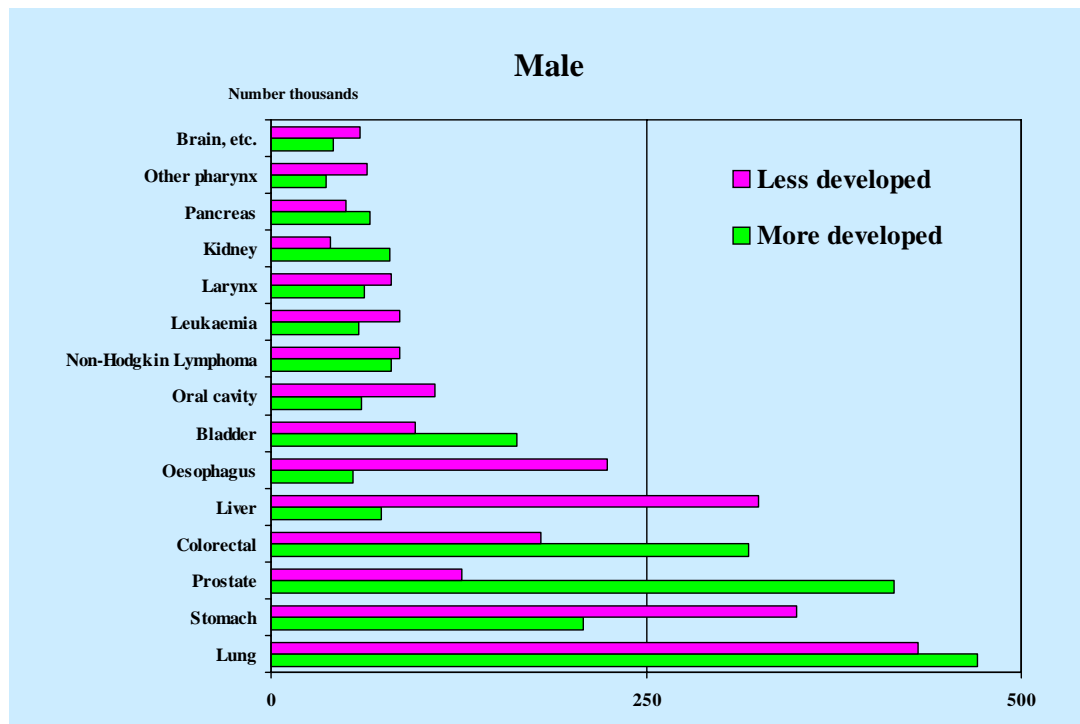


Figure 3 Comparison of the most common cancers in males in more and less developed countries, in 2000 (*Source: WHO International Agency for Research on Cancer, 2003*)⁸.

In Asia, the age standardized incidence rate of oral cancer per 100 000 population ranges from 0.7 in China to 4.6 in Thailand and 12.6 in India. The high incidence rates relate directly to risk behaviours such as smoking, use of smokeless tobacco (e.g. betel nut or miang chewing) and alcohol consumption. In Thailand, for example, the prevalence of smoking is about 60%, betel nut chewing 15% while alcohol consumption is 35%⁹.

It is noteworthy that at the global level few systematic epidemiological studies of oral mucosal disease have been carried out. Prevalence rates of oral leukoplakia vary from 0.1% to 10.6% depending on region or geographical location⁴. Erythroplakia seems more seldom with prevalence rates of 1% or less⁴.

Qat is a leafy narcotic substance that is popular in several countries in East Africa and the Arabian Peninsula. Qat can be consumed as a liquid in the form of tea or smoked like tobacco. However, the most common mode of ingestion is by chewing the fresh leaves. Consumption of Qat can lead to adverse oral effects including oral mucosal lesions, dryness of the mouth, discoloration of teeth, poor oral hygiene and periodontal disease.

There are variations in oral health profiles across regions. In some developing countries, oral diseases are increasing and countries in Africa and Asia must urgently address a number of very serious oral conditions including noma (cancrum oris), ANUG (acute necrotizing ulcerative gingivitis), oral pre-cancer and cancer. Cases of noma are reported for young

children aged 3-5 years in Africa, Latin America and Asia (**Figure 4**); with 90% of them dying without having received any care.

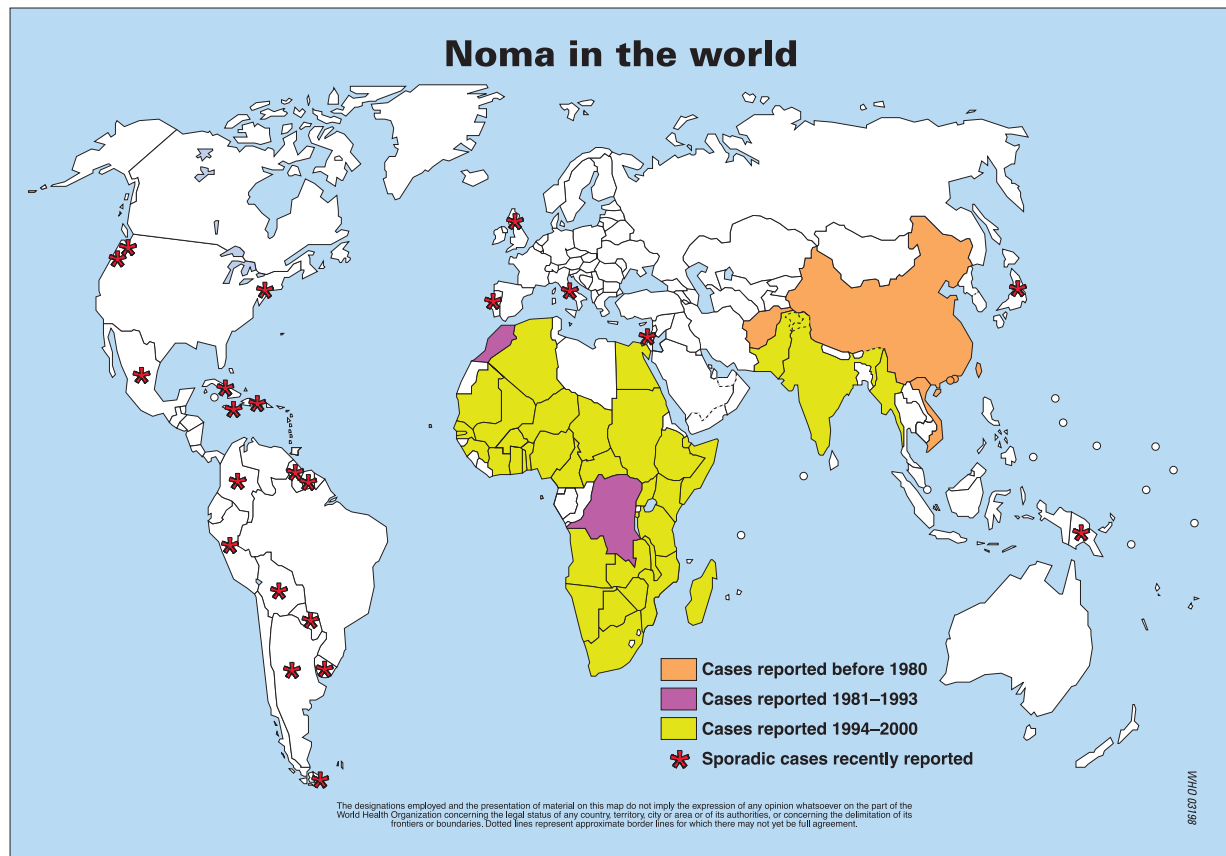


Figure 4 Cases of noma reported around the world (*Source: WHO Oral Health Programme, Geneva, Switzerland*).

Also, Africa and Asia have the highest prevalence of HIV/AIDS, oral manifestations of which are widespread¹⁰. Analyses of HIV/AIDS cases show that oral manifestations such as candida infections, hairy leukoplakia, oral ulcers and gingival bleeding, necrotizing periodontitis, leukoplakia and Kaposi's sarcoma are frequent.

In contrast to dental caries and periodontal disease, reliable data on the frequency and severity of oro-dental trauma are still lacking in most countries, particularly in developing countries¹¹. Some countries in Latin America report dental trauma for about 15% of schoolchildren, while prevalence rates of 5-12% are found in children aged 6-12 years in the Middle East. However, recent studies from certain industrialized countries have revealed that the prevalence of dental traumatic injuries is on the increase, ranging from 16-40% among 6-year-old children and in 4-33% among 12-14-year-old children¹¹. A significant proportion of dental trauma relates to sports, unsafe playgrounds or schools, road accidents or violence. In industrialized countries, the costs of immediate and follow-up care for dental trauma patients are high.

Estimates of the frequency of different traits of malocclusion are available from a number of countries, primarily in northern Europe and north America. For example, prevalence rates of dento-facial anomalies are reported at 10%, according to the Dental Aesthetic Index¹². Malocclusion is not a disease but rather a set of dental deviations which in some cases can influence quality of life. There is insufficient evidence that orthodontic treatment enhances dental health and function. Treatment is often justified by the potential enhancement of social and psychological well-being through improvements in appearance¹³.

Diagnosis and treatment of craniofacial anomalies such as cleft lip and palate present a number of challenges to public health. Oro-facial clefts occur in around 1 per 500-700 births, the rate varying substantially across ethnic groups and geographical areas¹⁴. Other conditions that may lead to special health care needs include Down's syndrome, cerebral palsy, learning and developmental disabilities, and genetic and hereditary disorders with oro-facial defects. Oro-facial clefts appear to have substantial environmental causes, higher risk first of all associated with maternal tobacco, alcohol and nutritional factors. There is no consistent evidence of time trends, nor is there consistent variation by socioeconomic status, but these aspects have not been adequately studied¹⁴. Also, there are many parts of the world in which there is little or no information available on the frequency of craniofacial anomalies, in particular parts of Africa, central Asia, eastern Europe, India and the Middle East.

Oral disease burdens and common risk factors

Given the extent of the problem, oral diseases are major public health problems. Their impact on individuals and communities, as a result of pain and suffering, impairment of function and reduced quality of life, is considerable. Moreover, traditional treatment of oral disease is extremely costly, the fourth most expensive disease to treat in most industrialized countries. In many low-income countries, if treatment were available, the costs of dental caries alone in children would exceed the total health care budget for children¹⁵.

A core group of modifiable risk factors is common to many chronic diseases and injuries. The four most prominent NCDs - cardiovascular diseases, diabetes, cancer and chronic obstructive pulmonary diseases - share common risk factors with oral diseases, preventable risk factors that are related to lifestyle. For example, dietary habits are significant to the development of NCDs and influence the development of dental caries. Tobacco use has been estimated to account for over 90% of cancers in the oral cavity, and is associated with aggravated periodontal breakdown, poorer standards of oral hygiene and thus premature tooth loss.

The greatest burden of *all* diseases is on the disadvantaged and socially marginalized. A major benefit of the common risk factor approach is the focus on improving health conditions for the whole population as well as for high risk groups, thereby reducing inequities. The solutions to the problems associated with chronic disease are to be found through shared approaches. The WHO Global Strategy for the prevention and control of noncommunicable diseases is a new approach to managing the prevention and control of oral diseases. Continuing surveillance of levels and patterns of risk factors is of fundamental importance to planning and evaluating community preventive activities and oral health promotion.

Oral health surveillance and goals

In 1979 the most important goal ever to be formulated for global oral health was announced by WHO. By the year 2000, the global average for dental caries was to be no more than 3 DMFT at 12 years of age. At the World Health Assembly in 1979, this declaration was unanimously designated as being the overriding priority for WHO. In 1983 oral health was declared to be part of the *Strategy for Health for All* (resolution WHA36.14) and in 1989 the Organization endorsed the promotion of oral health as an integral part of Health for All by the year 2000 (WHA42.39). In addition, World Health Day in 1994 was dedicated to oral health, which also reflects the importance attached to this issue.

WHO developed oral disease surveillance systems several years ago, particularly in relation to dental caries in children. The first global map with data on DMFT for 12-year-olds was presented in 1969 and showed high prevalence of caries in industrialized countries and generally low values in the developing countries. A database was established and over a number of years an increasing number of epidemiological studies documented a pattern of change in caries prevalence, i.e. increasing levels of caries in certain developing countries and a decline in caries in many industrialized countries. Several oral epidemiological studies have been carried out applying WHO methodology and criteria¹⁶. **Figures 5-6** present the current global maps on dental caries levels among children aged 12 and adults aged 35-44 years^{3,4}.

According to the WHO Oral Health Data Bank³ in 1980, DMFT values at age 12 were available for 107 of 173 countries. Of these, 51% had 3 DMFT or less, while the remaining 49% had higher values. In the year 2000, data were available for 184 countries as recorded in the WHO Oral Health Country/Area Profile Programme⁴. Of these, 68% had less than 3 DMFT.

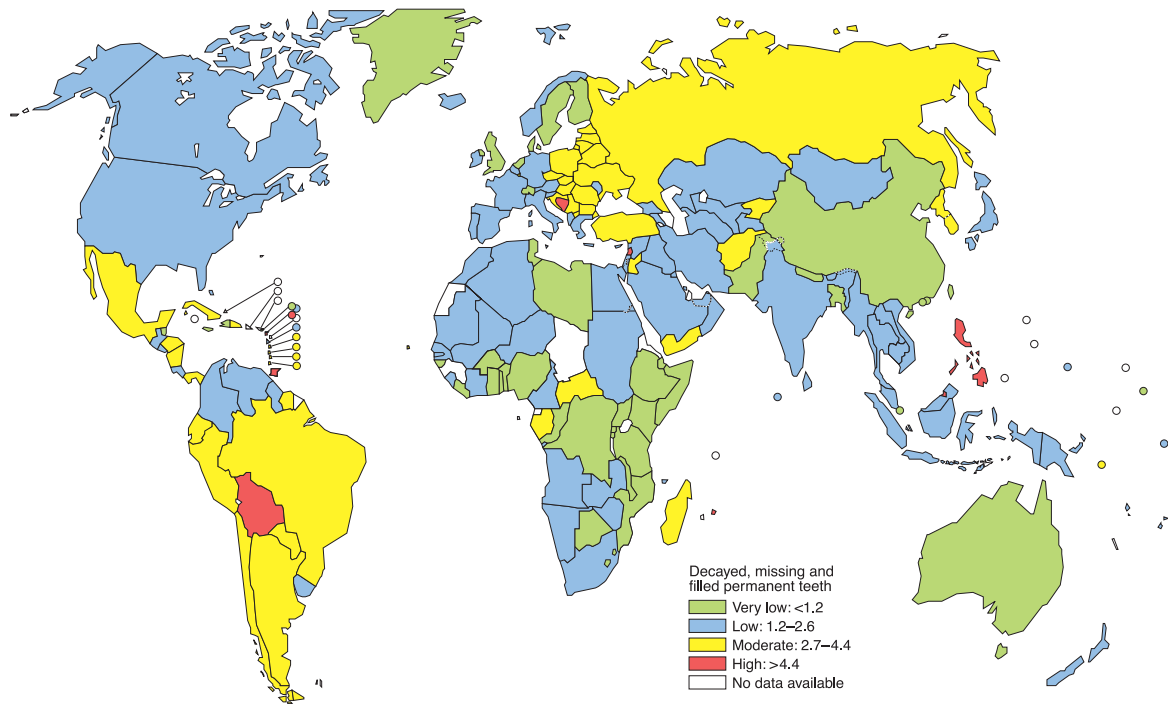


Figure 5 Dental caries levels (DMFT) of 12-year-olds worldwide^{3,4}.

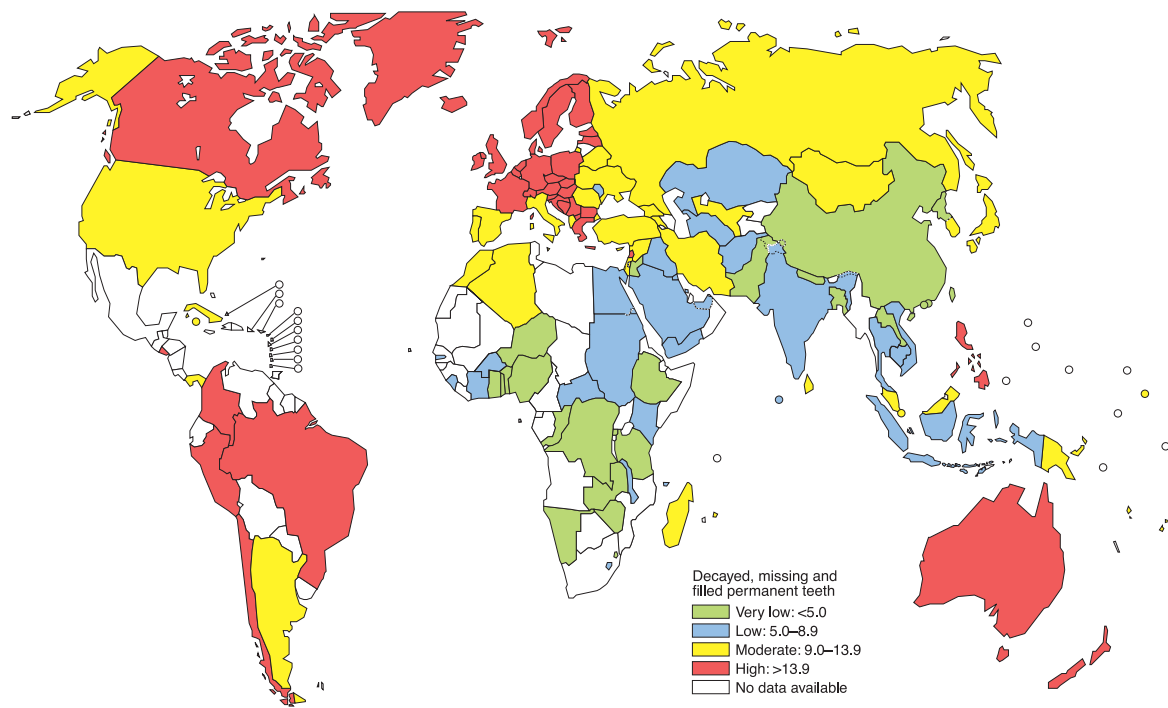


Figure 6 Dental caries levels (DMFT) of 35-44-year-olds worldwide^{3,4}.

The caries decline observed in many developed countries (**Figure 7**) was the result of a number of public health measures, coupled with changing living conditions, lifestyles and improved self-care practices. In some countries this positive trend could deter action to further improve oral health, or to sustain achievements. It might also lead to the belief that caries problems no longer exist at least in developed countries, resulting in precious resources currently available for caries prevention being diverted to other areas. However, it must be stressed that dental caries, as a disease, is not eradicated but only controlled to a certain degree.

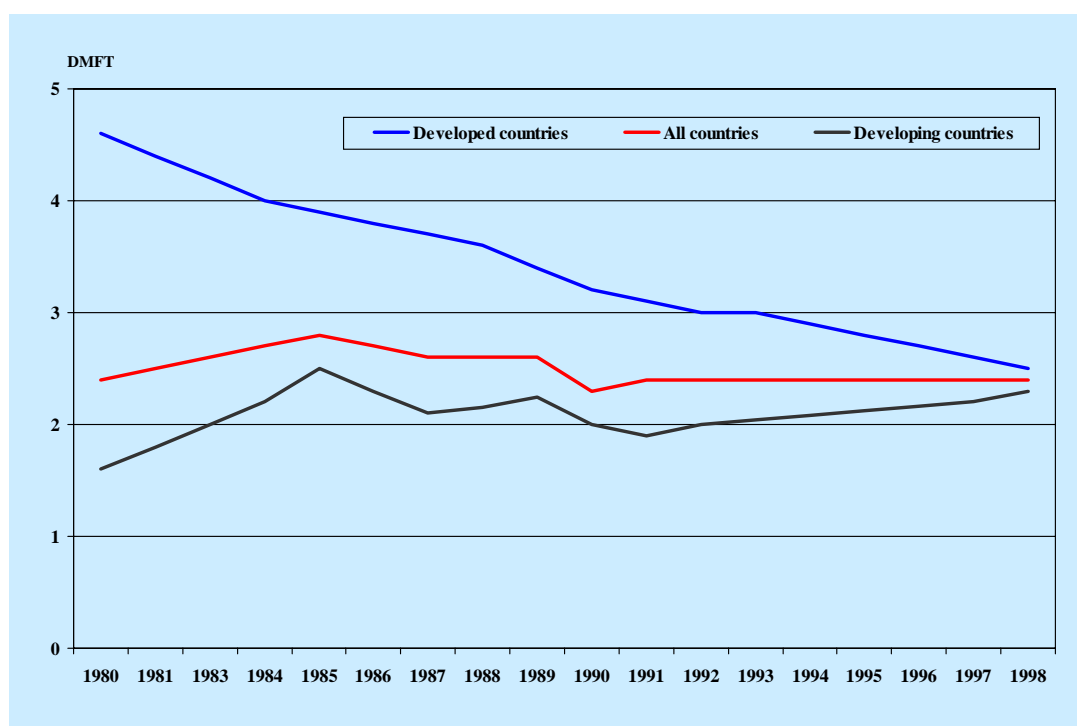


Figure 7 Changing levels of dental caries experience (DMFT) among 12-year-olds in developed and developing countries^{3,4}.

In 1981, WHO and the FDI World Dental Federation jointly formulated goals for oral health to be achieved by the year 2000¹⁷, as follows:

1. 50% of 5-6 year-olds to be free of dental caries.
2. The global average to be no more than 3 DMFT at 12 years of age.
3. 85% of the population should have all their teeth at the age of 18 years.
4. A 50% reduction in edentulousness among 35-44-year-olds, compared with the 1982 level.
5. A 25% reduction in edentulousness at age 65 years and over, compared with the 1982 level.

6. A database system for monitoring changes in oral health to be established.

For the new millennium, new oral health goals are urgently needed not only to strengthen dental caries control and prevention activities, but also to address other significant components of the oral disease burden such as periodontal health conditions, oral mucosal lesions, oral precancer and cancer, craniofacial trauma, pain, and oral health-related quality of life. Such global goals for oral health will assist regions, countries and local health care planners to develop preventive programmes that are targeted at populations and high risk groups, and to further improve the quality of oral health systems.

THE POLICY FRAMEWORK FOR THE WHO ORAL HEALTH PROGRAMME

The latter part of the 20th century saw a transformation in both general health and oral health unmatched in history. Yet, despite the remarkable achievements in recent decades, millions of people worldwide have been excluded from the benefits of the socioeconomic development and scientific advances that have improved health care and quality of life. The past decade has been a time of significant change in international health. The understanding of the causes and consequences of ill-health is changing: the social, economic, political and cultural determinants of health are now considered to be significant and it may be argued that better health can be achieved by reducing poverty. Health systems, including oral health systems, have roles to play. Systems are becoming more complex and people's expectations of health care are rising dramatically. In many countries, the role of the state is changing rapidly, and the private sector and civil society are emerging as important players. In developing countries in particular, a growing number of development organizations, private foundations and nongovernmental organizations (NGOs) are becoming active in the health sector.

WHO's goals are to build healthy populations and communities and to combat ill-health. Four strategic directions provide the broad framework for focusing WHO's technical work which also have implications for the Oral Health Programme.

1. Reducing the burden of oral disease and disability, especially in poor and marginalized populations.
2. Promoting healthy lifestyles and reducing risk factors to oral health that arise from environmental, economic, social and behavioural causes.
3. Developing oral health systems that equitably improve oral health outcomes, respond to people's legitimate demands, and are financially fair.
4. Framing policies in oral health, based on integration of oral health into national and community health programmes, and promoting oral health as an effective dimension for development policy of society.

In accordance with WHO overall priorities, the Global Oral Health Programme has adopted the following priorities and strategic orientations.

STRATEGIES AND APPROACHES IN ORAL DISEASE PREVENTION AND HEALTH PROMOTION

The threat posed by noncommunicable diseases and the need to provide urgent and effective public health responses led to the formulation of a global strategy for prevention and control of these diseases, endorsed in 2000 by the 53rd World Health Assembly (resolution WHA 53.17). Priority is given to diseases linked by common, preventable and lifestyle related risk factors (e.g. unhealthy diet, tobacco use), including oral health. Key socio-environmental factors involved in the promotion of oral health are outlined in **Figure 8**, which also shows some important modifiable risk behaviours.

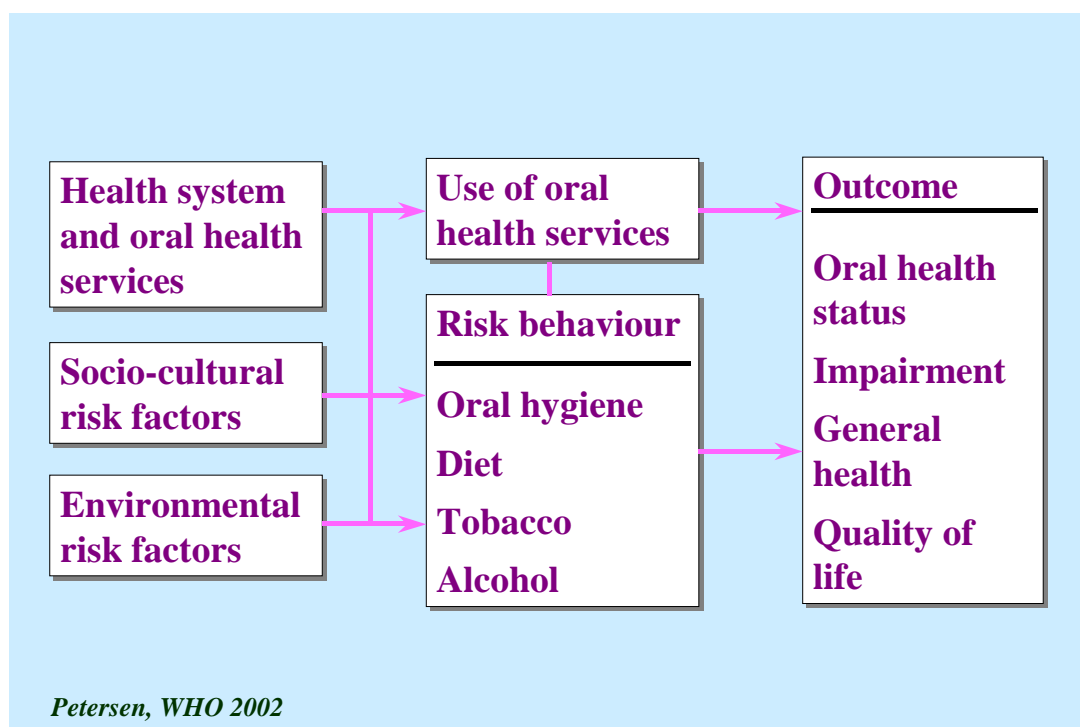


Figure 8 The risk-factor approach in the promotion of oral health.

High relative risk of oral disease relates to sociocultural determinants such as: poor living conditions; low education level; and lack of traditions, beliefs and culture in support of oral health. Communities and countries with inappropriate exposure to fluorides imply higher risk of dental caries. Poor access to safe water or sanitary facilities are environmental risk factors to oral health as well as general health. Control of oral disease also depends on availability and accessibility of oral health systems but reduction of risks to disease is only possible if services are oriented towards primary health care and prevention. In addition to the distal sociocultural and environmental factors, the model emphasizes the role of intermediate, modifiable risk behaviours, i.e. oral hygiene practices, sugars consumption (amount, frequency of intake, types) as well as tobacco use and excessive alcohol consumption. Such behaviours may not only affect oral health status negatively as expressed by clinical measures but also impact on quality of life.

Clinical and public health research has shown that a number of individual, professional and community preventive measures are effective in preventing most oral diseases¹⁸. However, optimal intervention in relation to oral disease is not universally available or affordable because of escalating costs and limited resources. This, together with insufficient emphasis on primary prevention of oral diseases, poses a considerable challenge for many countries, particularly developing countries and countries with economies and health systems in transition.

Most of the evidence relates to dental caries prevention and control of periodontal diseases. Gingivitis can be prevented by good personal oral hygiene practices, including brushing and flossing, which are also important to the control of advanced periodontal lesions. Community water fluoridation is effective in preventing dental caries in both children and adults. Water fluoridation benefits all residents served by community water supplies regardless of their social or economic status. Salt and milk fluoridation schemes have been shown to have similar effects when used in community preventive programmes. Professional and individual measures, including the use of fluoride mouthrinses, gels, toothpastes and the application of dental sealants are additional means of preventing dental caries. In a number of developing countries, the introduction of affordable fluoridated toothpaste has been shown to be a valuable strategy, ensuring that people are exposed appropriately to fluorides.

Individuals can take actions for themselves and for persons under their care to prevent disease and maintain health. With appropriate diet and nutrition, primary prevention of many oral, dental and craniofacial diseases can be achieved. Lifestyle behaviour that affects general health such as tobacco use, excessive alcohol consumption and poor dietary choices affect oral and craniofacial health as well. These individual behaviours are associated with increased risk of craniofacial birth defects, oral and pharyngeal cancers, periodontal disease, dental caries, oral candidiasis and other oral conditions.

Opportunities exist to expand oral disease prevention and health promotion knowledge and practices among the public through community programmes and in health care settings. Oral health care providers can also play a role in promoting healthy lifestyles by incorporating tobacco cessation programmes and nutritional counselling into their practices.

However, there are profound oral health disparities across and within regions and countries. These may relate to socioeconomic status, race or ethnicity, age, gender, or general health status. Although common dental diseases are preventable, not all community members are informed of or are able to benefit from appropriate oral health-promoting measures. Underserved population groups are found in both developed and developing countries. In many countries, moreover, oral health care is not fully integrated into national or community health programmes.

The major challenges of the future will be to translate knowledge and experiences of disease prevention into action programmes. Social, economic and cultural factors and changing population demographics all impact the delivery of oral health services in countries and communities and the ways in which people care for themselves. Reducing disparities requires far-reaching, wide-ranging approaches that target populations at highest risk of specific oral disease, and involves improving access to existing care. Meanwhile, in several developing countries the most important challenge is to offer essential oral health care within the context of

primary health programmes. Such programmes should meet the basic health needs of the population, strengthen active outreach to the community, organize primary care, and ensure effective patient referral.

To implement oral disease prevention programmes globally, existing partnerships must be strengthened, notably with national and international NGOs and WHO Collaborating Centres on Oral Health. WHO will coordinate global alliances, in collaboration with the international oral health community, with a view to sharing responsibilities for implementation of the global strategy. One major responsibility for WHO will be to map the changing patterns of oral diseases and to analyse their determinants, with particular reference to poor or disadvantaged populations. WHO's work for oral health will also focus on devising tools for intersectoral collaboration, community participation, supportive policy decisions, oral health care reform, and development of community-based strategies for oral disease control.

Health promotion and oral health

Good health is a major resource for social, economic and personal development. Political, economic, social, cultural, environmental, behavioural and biological factors can enhance or impair health. Health promotion action aims at making these conditions conducive to health. Health promotion therefore goes beyond health care. It puts health on the agenda of policy-makers in all sectors and at all levels, directing them to be aware of the health consequences of their decisions and to accept their responsibilities for health. Health promotion policy combines diverse but complementary approaches including legislation, fiscal measures, taxation and organizational change. It is a coordinated effort towards creating supportive environments and strengthening community action. Health promotion works through concrete and effective community actions in setting priorities, making decisions, planning strategies and implementing them to achieve better health. Community development and empowerment draws on existing human and material resources in the community to facilitate self-help, social support, participation and ownership.

Health promotion deals with the broader determinants of health and aims at reducing risks through sensitive policies and actions. Promotion of health in the settings where people live, work, learn and play is clearly the most creative and cost-effective way of improving oral health and, in turn, the quality of life.

Water is essential to life, health and food production. Yet approximately 20% of the world's population does not have access to safe drinking water and nearly 40% lacks adequate sanitation¹⁹. Around the world, biological contaminants and chemical pollutants are compromising water quality, leading to a range of diseases that are often life threatening. Poor sanitation, a common condition in most developing countries, affects both general and oral hygiene. It therefore remains a challenge to many communities in developing countries to promote hygiene education and behavioural changes among parents, child caregivers and children. Communities should also strive to develop effective programmes on school sanitation and proper water handling in relation to oral hygiene.

Increasing urbanization, demographic and socio-environmental changes require different approaches to oral health actions. It is unlikely that improvements in oral health can be

achieved by isolated interventions that target specific behaviours. The most effective, sustainable interventions combine social policy and individual action through which healthy living conditions and lifestyles are promoted.

At the global level, WHO technical and policy support is needed to enable countries to integrate oral health promotion with general health promotion. The expertise of WHO Collaborating Centres on Oral Health is valuable in this process. Countries can also draw on local experiences and strengths, to encourage communities to contribute actively to their own health future, and to facilitate community empowerment and action for health promotion. The WHO Oral Health Programme applies the philosophy "*think globally - act locally*"²⁰. The development of programmes for oral health promotion in targeted countries focuses on:

- * Identification of health determinants; mechanisms in place to improve capacity to design and implement interventions that promote oral health.
- * Implementation of community-based demonstration projects for oral health promotion, with special reference to poor and disadvantaged population groups.
- * Building capacity in planning and evaluation of national programmes for oral health promotion and evaluation of oral health promotion interventions in operation.
- * Development of methods and tools to analyse the processes and outcomes of oral health promotion interventions as part of national health programmes.
- * Establishment of networks and alliances to strengthen national and international actions for oral health promotion. Emphasis is also placed on the development of networks for exchange of experiences within the context of the WHO Mega Country Programme.

PRIORITY ACTION AREAS FOR GLOBAL ORAL HEALTH

Oral health and fluorides

Research has shown that fluoride is most effective in dental caries prevention when a low level of fluoride is constantly maintained in the oral cavity²¹. The goal of community-based public health programmes, therefore, should be to implement the most appropriate means of maintaining a constant low level of fluoride in as many mouths as possible. Fluorides can be obtained from fluoridated drinking-water, salt, milk, mouthrinse or toothpaste, as well as from professionally applied fluorides; or from combinations of fluoridated toothpaste with either of the other fluoride sources. There is clear evidence that long-term exposure to an optimal level of fluoride results in diminishing levels of caries in both child and adult populations.

However, there are some undesirable side-effects of excessive fluoride intake. Experience has shown that it may not be possible to achieve effective fluoride-based caries prevention without some degree of dental fluorosis, regardless of which methods are chosen to maintain a low level of fluoride in the mouth. Public health administrators must seek to maximize caries reduction while minimizing dental fluorosis.

Fluoride is being widely used on a global scale, with much benefit. More than 500 million people worldwide use fluoridated toothpaste, about 210 million people benefit from fluoridated water, some 40 million people from fluoridated salt, while other forms of fluoride applications (clinical topical fluorides, mouthrinses, tablets/drops) are administered to about 60 million people. However, populations in many developing countries do not have access to fluorides for prevention of dental caries for practical or economic reasons.

In WHO Technical Report Series No. 846 on "Fluorides and oral health" (1994)²¹, the recommendation on use of fluoridated toothpastes reads as follows:

Because fluoridated toothpaste is a highly effective means of caries control, every effort must be made to develop affordable fluoridated toothpastes for use in developing countries. The use of fluoride toothpastes being a public health measure, it would be in the interest of countries to exempt them from the duties and taxation applied to cosmetics.

Recommendation 12, page 36

One of WHO's policies is to support the widespread use of affordable fluoridated toothpaste in developing countries. This is particularly important in light of the changing diet and nutrition status in these countries. Recent local studies have shown that affordable fluoridated toothpaste is effective in caries prevention and should be made available for use by health authorities in developing countries²². The WHO Global Oral Health Programme is currently undertaking further demonstration projects in Africa, Asia and Europe in order to assess the effects of affordable fluoridated toothpaste, milk fluoridation and salt fluoridation.

Diet, nutrition and oral health

Today the world faces two kinds of malnutrition, one associated with hunger or nutritional deficiency and the other with dietary excess. Urbanization and economic development result in rapid changes in diets and lifestyles. Market globalization has a significant and worldwide impact on dietary excess leading to chronic diseases such as obesity, diabetes, cardiovascular diseases, cancer, osteoporosis and oral diseases. Diet and nutrition affects oral health in many ways. Nutrition, for example, influences craniofacial development, oral cancer and oral infectious diseases. Dental diseases related to diet include dental caries, developmental defects of enamel, dental erosion and periodontal disease.

The effects of nutritional changes demonstrate how common risks influence public health, including oral health. The public health community involved with oral health should gain an understanding of the health effects of these complex developments in order to prevent or control oral diseases.

The major challenges are:

- * To implement nutritional counselling, covering not only the general health aspects of good nutritional behaviour but also emphasizing the aspects directly linked to oral health. The post-eruptive effect of sugar consumption is one of the etiologic factors for dental caries.
- * To facilitate awareness-raising activities in the promotion of breastfeeding. Among other important health benefits, breast milk prevents the occurrence of rampant early childhood caries. Early childhood caries is caused by frequent and prolonged exposure of the teeth to sugar and is often the result of a child going to bed with a bottle of a sweetened drink or drinking at will from a bottle during the day.
- * To advise on the benefits of decreasing the consumption of sugary soft drinks, which is a major risk factor in dental caries. Dental erosion also seems to be a growing problem and in some countries an increase in erosion of teeth is associated with an increase in the consumption of beverages containing acids.
- * To promote a rational and healthy diet among people living in deprived and more remote areas of low-income and middle-income countries by encouraging the use of natural products with good nutritional values instead of refined, industrialized food.
- * To advocate a healthy diet which can also help prevent oral cancer. Fresh yellow-green fruits and vegetables have been identified as beneficial as are vitamin A, C and E supplements. Excessive consumption of alcohol is an important risk factor in the etiology of oral precancerous and neoplastic lesions, and such habits should be modified.

WHO/FAO recently published a Global Strategy on Diet, Physical Activity and Health²³, based on analysis of the best available evidence on the relationship between diet and physical activity patterns and the major nutrition-related chronic diseases. The strategy aims at reducing the growing burden of NCDs in both developing and developed countries. Recommendations are

made to facilitate the formulation of regional strategies and national guidelines to reduce the burden of nutrition-related chronic diseases. Among other recommendations, free (added) sugars should remain below 10% of energy intake and the consumption of foods/drinks containing free sugars should be limited to a maximum of four times per day. For countries with high consumption levels it is recommended that national health authorities and decision-makers formulate country-specific and community-specific goals for reduction in consumption of free sugars. Many countries that are currently undergoing nutrition transition do not have adequate fluoride exposure. It is the responsibility of national health authorities to ensure implementation of feasible fluoride programmes for their country.

In order to minimize the occurrence of dental erosion which seems to be closely related to the consumption of acidic beverages, the amount and frequency of intake of soft drinks and juices should be limited. Elimination of undernutrition prevents enamel hypoplasia and other potential effects of undernutrition on oral health (e.g. salivary gland atrophy, periodontal disease, oral infectious disease).

The WHO Oral Health Programme contributes to the implementation of the Global Strategy on Diet, Physical Activity and Health. There are many intervention activities at national level but the following areas should be addressed:

- * oral health services
- * schools: curricula, school lunches and school health
- * food industry, supermarkets
- * restaurants, catering, etc.
- * NGOs (health related and others)
- * legislation and policy
- * media
- * monitoring, surveillance and research

The Ministries of Health in countries should ensure that the mechanisms for intersectoral collaboration are carefully considered. Strategies include taxation and pricing, food labelling, school lunch policies and support to nutrition programmes.

Tobacco and oral health

Prevalence of tobacco use has declined in some high-income countries but continues to increase in low-income and middle-income countries, especially among young people and women^{1,24}. Undoubtedly, the increasing number of smokers and smokeless tobacco users among young people in some parts of the world will considerably affect the general and oral health of future generations. The prevalence of tobacco use in most countries is highest amongst people of low educational background and among poor and marginalized people.

Tobacco use is a major preventable cause of premature death and of several general diseases. In addition, cigarette, pipe, cigar and bidi smoking, betel quid chewing (pan), guhtka use and other traditional forms of tobacco have several effects in the mouth^{25,26}. Tobacco is a risk factor for oral cancer, oral cancer recurrence, adult periodontal diseases and congenital defects such as cleft lip and palate in children. Tobacco suppresses the immune system's response to oral

infection, compromises healing following oral surgery and accidental wounding, promotes periodontal degeneration in diabetics and adversely affects the cardiovascular system. Moreover, the risks of tobacco use greatly increase when it is used in combination with alcohol or areca nut. Most of the oral consequences of tobacco use impair quality of life, be they as simple as halitosis, as complex as oral birth defects, as common as periodontal disease or as troublesome as complications during wound healing.

The WHO Oral Health Programme aims to control tobacco-related oral diseases and adverse conditions through several strategies. Within WHO, the Programme forms part of the WHO tobacco-free initiatives, with fully integrated oral health-related programmes. Externally, the Programme encourages the adoption and use of WHO tobacco-cessation and control policies by international and national oral health organizations. Primary partners are WHO Collaborating Centres in Oral Health and NGOs that are in official relations with WHO, i.e. the International Association for Dental Research (IADR) and the FDI World Dental Federation. A number of projects have been initiated in Canada, European Union countries, Japan, New Zealand and the USA, and more programmes are being considered in China and India.

There are several ethical, moral, and practical reasons why oral health professionals should strengthen their contributions to tobacco-cessation programmes, including the following:

- * They are especially concerned about the adverse effects in the oropharyngeal area of the body that are caused by tobacco practices.
- * They meet, children, youth and their caregivers on a regular basis, and thus have opportunities to influence individuals to entirely avoid tobacco, postpone initiation or quit using tobacco before they become strongly dependent.
- * They often have more time with patients than many other clinicians, providing opportunities to integrate education and intervention.
- * They often treat women of childbearing age, and thus are able to inform such patients about the potential harm to their babies from tobacco use.
- * They are as effective as other clinicians in helping tobacco users quit and results are improved when more than one discipline assists individuals during the quitting process.
- * They can build their patient's interest in discontinuing tobacco use by showing actual tobacco effects in the mouth.

The tobacco-related goal of the WHO Oral Health Programme is to ensure that oral health teams and oral health organizations are directly, appropriately and routinely involved in influencing patients and the public at large to avoid and discontinue the use of all forms of tobacco.

The aim of cancer control is a reduction in both the incidence of the disease and associated morbidity and mortality. This requires not only knowledge of the natural history of the disease but also an understanding of the underpinning social, economic and cultural factors. Screening

and early detection can save lives. Several developed and developing countries are in the process of implementing cancer prevention programmes, including oral cancer prevention. It is essential to educate people to recognize the early signs and symptoms of oral cancer. Particularly in developing countries, primary health care workers trained in the detection of oral cancer will become a considerable force for prevention through early detection and health promotion to raise awareness in the community. An effective referral system must be identified to ensure that vital actions are taken.

The WHO Oral Health Programme supports the inclusion of oral cancer prevention as part of national cancer control programmes, based on careful planning, monitoring and evaluation, and partnership-building²⁷.

Oral health through Health Promoting Schools

WHO's Global School Health Initiative, launched in 1995, seeks to mobilize and strengthen health promotion and education activities at local, national, regional and global levels. The initiative is designed to improve the health of children, school personnel, families and other members of the community, through schools. The Health Promoting School can be characterized as a school constantly strengthening its capacity as a healthy setting for living, learning and working. The WHO Global School Health Initiative consists of four broad strategies²⁸:

1. Building capacity to advocate for improved school health programmes.
2. Creating networks and alliances for the development of Health Promoting Schools.
3. Strengthening national capacity.
4. Carrying out research to improve school health programmes.

To help individuals and groups advocate for the development of Health Promoting Schools, WHO has produced an "Information Series on School Health". Guidelines are given on how to assist school and community leaders to improve the health and education of young people, and individual documents in the series encourage schools to address one or more important health issues.

The WHO Oral Health Programme has prepared an oral health technical document to strengthen the implementation of an oral health component of the Health Promoting Schools programme²⁹. Strong arguments for oral health promotion through schools include the following:

- * Pupils and students can be accessed during their formative years, from childhood to adolescence. These are important stages in people's lives when lifelong oral health related behaviour as well as beliefs and attitudes are being developed.
- * Schools can provide a supportive environment for promoting oral health. Access to safe water, for example, may allow for general and oral hygiene programmes. Also, a safe physical environment in schools can help reduce the risk of accidents and concomitant dental trauma.

- * The burden of oral disease in children is significant. Most established oral diseases are irreversible, will last for a lifetime and have an impact on quality of life and general health.
- * School policies, the physical environment and education for health are essential for the attainment of oral health and control of risk behaviours, such as intake of sugary foods and drinks, tobacco use and alcohol consumption.
- * Schools can provide a platform for the provision of oral health care, i.e. preventive and curative services.

Through an extensive Health Promoting Schools network, WHO works at global and regional levels with Education International, UNAIDS and UNESCO to enable teachers' representative organizations throughout the world to use their capacities and experiences to improve health through schools. The WHO Oral Health Programme links up to those networks in addition to school oral health networks established across countries and regions.

Training-of-trainers programmes for schoolteachers are conducted to increase national capacities for integration of oral health promotion in schools. As part of the development of WHO's Mega Countries Health Promotion network, the WHO Oral Health Programme encourages the exchange of good practice among persons responsible for school health and health promotion in countries with the world's largest populations.

WHO compiles and consolidates research on interventions that can improve health through schools in order to build capacity at national level and to monitor the health status of children and teachers³⁰. The WHO Oral Health Programme has developed methodologies for process and outcome evaluation of school oral health programmes in order to strengthen the implementation of such programmes, and to strengthen the work of the WHO Collaborating Centres on Oral Health.

Oral health of youth

One-fifth of the world's population is adolescent, defined by WHO as a person between 10 and 19 years of age. A young person with high self-esteem and good social skills who is clear about her/his values and has access to relevant information is likely to make positive decisions about health. External factors have a tremendous impact on how adolescents think and behave; the values and behaviours of their peers are increasingly important while parents and other family members continue to be influential. Factors within the wider environment are also significant (e.g. mass media, industries, community institutions). Programmes aimed at improving the oral health of youth need to take these factors into account, for example in relation to consumption of sweets, sugary beverages, tobacco and alcohol. Effective alliances of the home, schools, oral health professionals and community organizations are needed in order to control risks to oral health in young people.

Oral health improvement amongst the elderly

The age distribution of the world's population is changing. With advances in medicine and prolonged life expectancy, the proportion of older people will continue to rise worldwide. The 1998 World Health Report recorded 390 million people aged over 65 years, for example. This figure, it is estimated, will double by 2025³¹. The post-war baby boom generation will reach 65 years of age in 2011, significantly augmenting the number of older people.

In many developing countries, particularly in Asia and Latin America, increases of up to 300% of the elderly population are expected by 2025. By 2050, there will be 2 billion people over the age of 60, 80% of them living in developing countries³². The growth in this population is staggering, posing tremendous challenges in caring for the ageing population.

As people age, their susceptibility to chronic and life-threatening diseases as well as acute infections increases, exacerbated by compromised immune systems³³. Cancer, cardiovascular diseases, diabetes, infections and poor oral health, most notably tooth loss and severe periodontal conditions, are more prevalent in this age group. The consequences of these diseases and conditions are significant, leading to disabilities and reduced quality of life.

Oral diseases are usually progressive and cumulative. The process of ageing may directly or indirectly increase the risk of oral diseases and tooth loss, which are compounded by poor general health, illnesses or chronic diseases³⁴. Among the elderly, high prevalence of co-morbidities and barriers to care are observed, together with oral health care challenges in relation to:

- * changing dentition status
- * caries prevalence with unmet need for care
- * periodontal pocketing/loss of attachment and poor oral hygiene
- * edentulousness and limited oral functioning
- * denture related conditions, ill-fitting removable dentures
- * oral cancer
- * xerostomia
- * craniofacial pain and discomfort.

The interrelationship between oral health and general health is particularly pronounced among older people. Poor oral health can increase the risks to general health and, with compromised chewing and eating abilities, affect nutritional intake. Similarly, systemic diseases and/or the adverse side-effects of their treatments can lead to an increased risk of oral diseases, reduced salivary flow, altered senses of taste and smell, oro-facial pain, gingival overgrowth, alveolar bone resorption and mobility of teeth³⁴. The high prevalence of multi-medication therapies in this age group may further complicate the impact on oral health. Other relevant issues include high sugar content diets, inadequate oral hygiene owing to poor dexterity, and alcohol and tobacco use, risk factors that are detrimental to oral health³⁵.

Barriers to oral health care among the elderly are considerable. Impaired mobility impedes access to oral health care, particularly for those who reside in rural areas with poor public transport³⁶. The situation is worsened in developing countries when oral health services and

domiciliary care are not available. Given that some older people may experience financial hardship following retirement, the cost or perceived cost of dental treatment, together with negative attitudes to oral health, may deter them from visiting a dentist. The fear of violence may make them apprehensive of strangers, hindering good communications with oral health services providers.

In some countries, older people tend to live alone, away from friends and family. The lack of social support and feelings of loneliness and isolation may affect their mental health and well-being. Clearly, there is unmet need among this group. It is important that health care service providers recognize these important psychosocial factors that affect the health and well-being of older people. There is a need to provide sensitive oral health services that are accessible, appropriate and acceptable to them. Their general health must be taken into account when planning complex treatment that may involve surgical procedures. Special needs diagnosis and advanced treatment planning are crucial. Finally, the implications for research and training are considerable^{33,37}.

The WHO Oral Health Programme intends to develop strategies for improved oral health of older people. Based on experiences from demonstration programmes in countries, national oral health planners are encouraged to integrate systematic oral health activities towards improved quality of life. The programme will enact these strategies in collaboration with the WHO Kobe Centre in Japan, the WHO regional offices, WHO Collaborating Centres on Oral Health, and NGOs.

Oral health, general health and quality of life

Oral health is integral to general health. Periodontal disease, for example, is associated with general health conditions such as cardiovascular disease and diabetes. Those with complex health conditions are at greater risk of oral diseases that, in turn, further complicate their overall health³⁸. Some general health diseases manifest in the mouth, and oral lesions may be the first signs of other life threatening diseases such as HIV/AIDS. Moreover, some common medications and therapies used to treat general health conditions can compromise the health of the mouth and oral functioning.

If left untreated even for a short period of time, oral diseases can have adverse consequences. Oral infection can kill. It has been considered a risk factor in a number of general health conditions. The systemic spread of bacteria can cause, or seriously aggravate, infections throughout the body, particularly in individuals with suppressed immune systems. People with cardiovascular disease and diabetes are particularly vulnerable. Studies have suggested that oral diseases (e.g. dental caries and periodontal disease) are associated with other NCDs,³⁸⁻⁴¹ and interrelationship which merits further investigation.

Poor oral health can have a profound effect on the quality of life. The experience of pain, endurance of dental abscesses, problems with eating and chewing, embarrassment about the shape of teeth or about missing, discoloured or damaged teeth can adversely affect people's daily lives and well-being. In recent years, much research has demonstrated the impact of oral health on quality of life⁴². A number of oral health related quality of life measures have been

developed to assess the functional, psychological, social and economic implications, measures that are highly relevant to the evaluation of community oral health programmes.

General health risk factors such as excessive alcohol intake, smoking or other tobacco use and poor dietary practices also affect oral health. The correlation between these lifestyle behaviours and increased risk of dental caries, periodontal disease, oral infections, craniofacial defects, oral cancer and other oral conditions indicate that there is a need to adopt an integrated approach to the promotion of both oral and general health. The common risk factor approach provides a valuable opportunity to incorporate oral health promotion into general health promotion. Such an approach is likely to be more efficient and effective than programmes targeting a single disease or condition.

The WHO Oral Health Programme will provide analysis-for-policy and analysis-of-policy information instrumental to the integration of oral health into national and community health programmes. Such initiatives include state-of-the-science analysis and establishment of global databanks on oral health – general health and common risk factors.

Oral health systems

More than 20 years after its widespread adoption, the strategy of Health for All through primary health care still has not been fully implemented⁴³. In many countries, national capacity and resources - human, financial and material - are still insufficient to ensure availability of and access to essential health services of high quality for individuals and populations, especially in deprived communities. Several countries are now engaged in the processes of change. Some are reforming the public sector as a whole. Other countries are reforming the health sector only, by decentralizing public services, fostering private sector participation and reorganizing ways of financing and providing health services. The objectives of these changes are primarily to reduce inequities in access to health services, promote universal coverage, and improve the efficiency of the health system.

Oral health services transition coincides with the general trend in health services reform. In several Western industrialized countries, oral health services are made available to the population, comprise preventive and curative services, and are based on either private or public systems. Meanwhile, people in deprived communities, certain ethnic minorities, homeless people, homebound or disabled individuals and the elderly are not sufficiently covered by oral health care. In countries of central and eastern Europe, decentralization and deregulation of oral health services has taken place during recent years. With privatization, growing numbers of people cannot afford private dental care. In some east European countries, third-party payment systems have been introduced but priority is not given to preventive oral care. The demand for radical treatment services has increased, particularly for low-income groups. In addition, many children are not covered by oral health programmes since the school dental services formerly offered in most east European countries have now been discontinued.

In developing countries, oral health services are mostly offered from regional or central hospitals of urban centres and little, if any, importance is given to preventive or restorative dental care. Many countries in Africa, Asia and Latin America have a shortage of oral health personnel and generally the capacity of the systems is limited to pain relief or emergency care.

In Africa, the dentist to population ratio is approximately 1 : 150 000 against about 1 : 2000 in most industrialized countries.

The WHO Oral Health Programme supports the development of oral health services that match the needs of the country. The work to reorient oral health services towards prevention and oral health promotion is carried out in collaboration with the regional offices and the WHO country offices. A basic package of oral care⁴⁴ has been developed and the tools may be feasible in certain countries. For developing countries in particular, primary health care models for essential oral health care are encouraged and several community demonstration projects based on sociocultural conditions are supported or carried out jointly with the WHO Oral Health Programme. Moreover, the WHO Oral Health Programme has designed an oral health component of the project *Integrated Management of Adolescent/Adult Illness - Guidelines for First-level Facility Health Workers in Low Resource Settings*⁴⁵.

The issue of oral health personnel – which categories of personnel need to be educated, their duties and the numbers of each – has for many years been of great concern. The importance of this matter really has become evident in a number of countries where the production of dentists appears irrelevant to the oral health needs and demands. The problem of production of inappropriate types and numbers of oral health professionals is still being faced by some countries. It has been reported, particularly in countries where over-production exists, that duties which traditionally have been performed by assisting personnel are now being carried out by the dentists themselves. In those countries, the introduction of ancillary personnel has been delayed. The changing pattern of oral disease and socio-demographic factors imply that adjustment of existing oral health manpower structures are needed for several developed countries. In developing countries, the challenge is to stimulate training programmes for types of personnel which would match the oral health needs and the infrastructure of the country.

HIV/AIDS and oral health

The HIV/AIDS epidemic is one of the most serious to have affected humanity. About 40 million people were infected with HIV in 2001, and millions have already died of AIDS. Many more people are affected because their parents, other family members, friends and co-workers have died of AIDS or are infected with HIV. HIV/AIDS is the fastest-growing threat to development today and the epidemic is particularly severe in sub-Saharan Africa and Asia. National programmes, international organizations, civil society, communities and individuals have responded to the epidemic. The initial efforts were often weak and scattered as the full nature and scope of the threat were not fully understood. As the epidemic has progressed, understanding of its complex causes and effects has increased. The greatest challenge in responding to HIV/AIDS at present is to ensure that proven, gender sensitive strategies for prevention and care are widely implemented to a level where there will be significant impact on the epidemic.

The WHO Oral Health Programme can make important contributions to the early diagnosis, prevention and treatment of this disease. A number of studies have demonstrated that about 40-50% of HIV-positive persons have oral fungal, bacterial or viral infections, often occurring early in the course of the disease¹⁰. Oral lesions strongly associated with HIV infection are

pseudo-membranous oral candidiasis, oral hairy leukoplakia, HIV gingivitis and periodontitis, kaposi sarcoma, non-Hodgkin lymphoma, and dry mouth owing to a decreased salivary flow.

The WHO Oral Health Programme has prepared a guide⁴⁶ to provide a systematic approach to the implementation of epidemiological studies of oral conditions associated with HIV infection; to provide guidelines for the collection, analysis, reporting and dissemination of data from such studies; and to facilitate comparison of findings from different studies. It also aims to encourage oral health personnel and public health practitioners to make oral health status an integral part of optimum case management and of surveillance activities of the diseases associated with HIV infection.

The WHO Oral Health Programme, in collaboration with other WHO technical programmes and WHO Collaborating Centres on Oral Health, will facilitate and coordinate the expansion of successful initiatives through technical and managerial support.

Such activities may focus on:

- * Identification of the most indicative oral manifestations of HIV/AIDS.
- * Involvement of oral health personnel in the documentation of HIV/AIDS to ensure appropriate medical evaluation, prevention and treatment.
- * Training of other health professionals on how to screen for oral lesions and extra-oral manifestations; using the "train the trainer" approach to reach health care workers at community or village level.
- * Dissemination of information on the disease and its prevention through every possible means of communication.
- * WHO technical support to meetings at regional or interregional levels aiming at sharing country experiences in monitoring HIV/AIDS prevention and lifestyle modification through campaigns and community programmes.

Oral health information systems, evidence for oral health policy and formulation of goals

The burden of oral disease and the needs of populations are in transition and oral health systems and scientific knowledge are changing rapidly. In order to meet these challenges effectively, public health care administrators and decision-makers need the tools, capacity and information to assess and monitor health needs, choose intervention strategies, design policy options appropriate to their own circumstances, and improve the performance of the oral health system.

The WHO/FDI goals for oral health by the year 2000 urged Member States to establish oral health information systems, and this remains a challenge for most countries of the world. The WHO Oral Health Programme is prepared to assist countries in their efforts to develop oral health information systems which include data additional to epidemiological indicators.

The information obtainable through a health information system may be usefully categorized into the following interrelated subsystems:

- * epidemiological surveillance
- * service coverage of the population
- * service records and reporting
- * administration and resource management
- * quality of care provided
- * oral health programme monitoring and outcome evaluation.

Systematic evaluations of oral health systems are much needed and the WHO Oral Health Programme advocates a comprehensive model whereby input, processes, output and outcomes are measured (**Figure 9**).

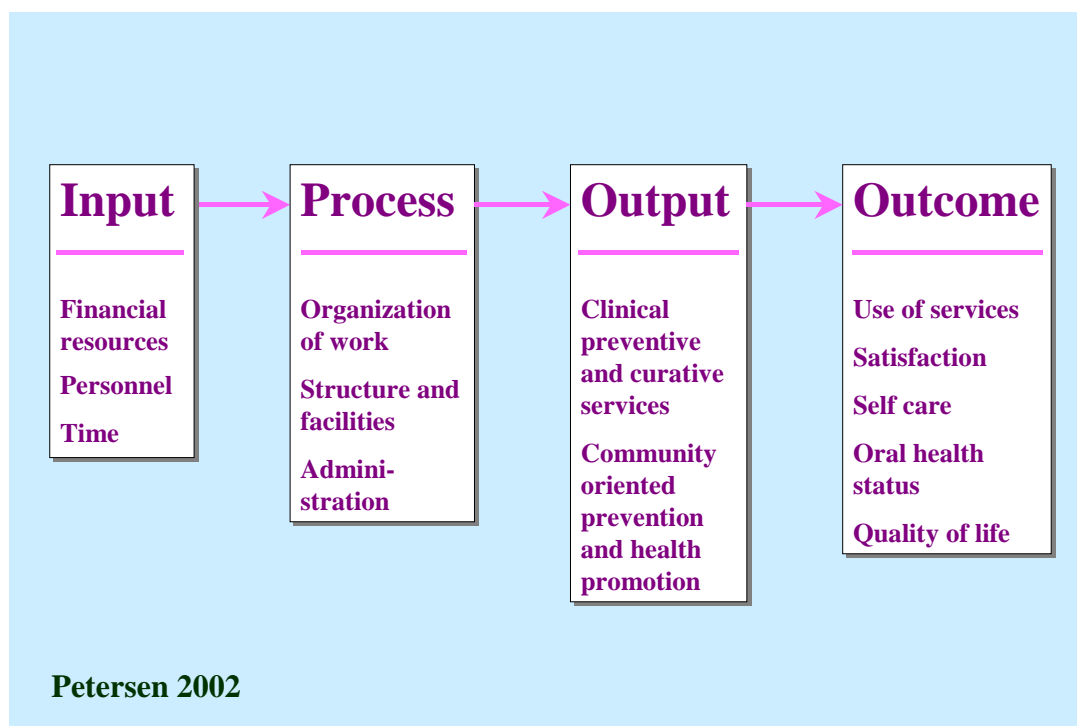


Figure 9 Oral health systems evaluation model.

At WHO, information systems are being established for the surveillance of global trends in oral disease and risk factors. The WHO Global Oral Health Data Bank compiles valuable information for monitoring the global epidemiological picture and trends overtime in oral health. The WHO Oral Health Programme has initiated integration of the existing database with other WHO health databases and surveillance systems on risk factors. The main surveillance tool is called STEPS (STEP-wise approach to surveillance), a simple approach which provides countries with core standardized methods but leaves them flexibility to expand tools by adding information relevant to the local situation⁴⁷.

The WHO Oral Health Programme provides modern global health information systems through several activities:

- * Revision of the WHO Oral Health Surveys Basic Methods, taking new oral disease patterns into account (e.g. dental erosion and consumption of soft drinks) and allowing recording of quality of life and risk factors to oral health (including risk behaviours such as dietary habits, tobacco use, alcohol consumption, and oral health care habits).
- * Development of procedures for management and analysis of data based on the use of information technology.
- * Linking the Global Oral Health Data Bank with the Country/Area Profile Programme information system.
- * Development of methodologies and approaches for evaluation of the effectiveness of community oral health programmes, focusing on health promotion and disease prevention. Such evaluation also includes process documentation in order to allow sharing of experiences from programmes.

WHO Oral Health Programmes at headquarters and regional levels recently assessed the accomplishment of the WHO/FDI goals for oral health by the year 2000. The formulation of new WHO goals has been initiated. The WHO Regional Office for Europe specified oral health targets (target 8.5) for the year 2020 as part of the Health21 policy⁴⁸. WHO, FDI and IADR are jointly preparing new goals for the period up to the year 2020. The objectives and targets have been broadened in order to cover significant indicators related to oral health and care of population groups. The global goals are not intended to be prescriptive: the framework is primarily designed to encourage health policy-makers at regional, national and local levels to set standards for oral health in relation to pain, functional disorders, infectious diseases, oropharyngeal cancer, oral manifestations of HIV infection, noma, trauma, craniofacial anomalies, dental caries, developmental anomalies of teeth, periodontal disease, oral mucosal diseases, salivary gland disorders, tooth loss, health care services and health information systems.

The WHO Oral Health Programme will support countries directly as well as through regional and country offices in their formulation of goals, targets and standards of oral health.

Research for oral health

Research is the systematic process for generating new knowledge. Based on the advances in biomedical and social sciences, public health, and information technology, new concepts lead to innovative interventions that have a direct impact on the diagnostic, preventive, therapeutic, ethical and social aspects of human health and disease. Advances in knowledge, however, have not yet benefited developing countries to the fullest extent possible. It has been estimated, for example, that only 10% of funding for global health research is allocated to health problems that affect 90% of the world's population⁴⁹. Clear disparities in economic strength, political will, scientific resources and capabilities, and the ability to access global information networks have, in fact, widened the knowledge gap between rich and poor countries.

The WHO Oral Health Programme contributes to the process of redressing the imbalance in the distribution of knowledge about oral health, so that the results of research will benefit everyone, including the poor, in a sustainable and equitable manner. As knowledge is a major vehicle for improving the health of poor people in particular, the WHO Oral Health Programme will focus on stimulating oral health research in the developed and the developing world to reduce risk factors and the burden of oral disease, and to improve oral health systems and the effectiveness of community oral health programmes. In particular, more research should be devoted to: inequity in oral health; the psychosocial implications of oral health/illness; diet, nutrition and oral health; tobacco cessation programmes; oral health - general health - quality of life interrelationships; and HIV/AIDS.

Building and strengthening research capacity is one of the more effective, efficient and sustainable strategies for enabling developing countries to benefit from advances in knowledge, in particular through the promotion of regional or intercountry oral health research networks. The WHO Oral Health Programme intends to stimulate oral health research for, with and by developing countries in several ways:

- * Supporting initiatives that will strengthen research capability in developing countries so that research is recognized as the foundation of oral health policy.
- * Increased involvement of WHO Collaborating Centres in Oral Health in high-priority areas of research within national, regional or interregional centre networks.
- * Encouraging oral health research training programmes at local level or based on interuniversity collaborative "sandwich" programmes.
- * Providing universities in developing countries with easy access to the scientific literature within oral health and online access to scientific articles.
- * Reducing the 10/90 gap in oral health research through work within the framework of the Global Forum for Health Research⁴⁹. This forum provides support to priority-setting methodologies, dissemination of findings and measurement of results in order to break the vicious circle of "ill health and poverty".

CONCLUSION

Unhealthy dietary habits, smoking and other tobacco use, alcohol consumption and stress are some of the common risk factors for many NCDs, including oral health. The Global Oral Health Programme is ideally placed within the NPH at headquarters to enable effective execution of the common risk factor approach in disease prevention and health promotion. While there has been encouraging improvement in oral health in many countries over the past few decades, much work remains to be done. With many challenges ahead, it is important to build on our achievements, and on strategies that work.

The guiding principles of the Ottawa Charter for Health Promotion (adopted in 1986) form a valuable platform for this work, while acknowledging the important prerequisites for health and well-being. Since then, a number of developments have underlined the relevance and importance of key strategies in health promotion, including healthy public policy at a conference in Adelaide in 1988 and supportive environments for health in Sundsvall in 1991. The Jakarta conference in 1997 further reiterated the five key action areas of the charter as the way forward, leading health promotion into the 21st century.

Some countries should reorient their existing investments in health, to reflect the varying needs of a diverse population. Healthy public policies are fundamental to improving access, promoting equity and creating supportive environments. Public accountability for health can be a driving force for change, a vital element in the advancement of healthy public policies. In order to build effective partnerships for health development and to form healthy alliances, global, national and local commitment is critical.

This report highlights the priority areas for the Global Oral Health Programme and provides a framework for implementation. The Regional Offices play an important role in this process. The expert contribution from the WHO Collaborating Centres is crucial, as is support from NGOs. Good communication and concerted actions are essential for success. Through investment and action, it is envisaged that the Global Oral Health Programme will help achieve greater equity in oral health, building a brighter future.

REFERENCES

1. World Health Organization. *The World Health Report 2002. Reducing Risks, Promoting Healthy Life*. Geneva: World Health Organization, 2002.
2. Grossi SG, Genco RJ. Periodontal disease and diabetes mellitus: a two-way relationship. *Ann Periodontol* 1998; 3:51-61.
3. World Health Organization. *Global Oral Health Data Bank*. Geneva: World Health Organization, 2002.
4. World Health Organization. WHO Oral Health Country/Area Profile. (Available from the Internet on the Internet from: <http://www.whocollab.od.mah.se/index.html>).
5. Albander JM, Brown LJ, Loe H. Clinical features of early-onset periodontitis. *Journal of the American Dental Association* 1997; 128:1393-9.
6. Tomar SL, Asma S. Smoking attributable periodontitis in the United States: findings from NHANES III. *Journal of Periodontology* 2000; 71:743-51.
7. U.S. Department of Health and Human Services. *Oral Health in America: A Report of the Surgeon General*. Rockville, MD: U.S. Department of Health and Human Services, National Institute of Dental and Craniofacial Research, National Institute of Health, 2000.
8. Steward BW, Kleihues P. *World Cancer Report*. Lyon: WHO International Agency for Research on Cancer, 2003.
9. World Health Organization. *Health Situation in the South-East Asia Region 1998-2000*. New Delhi: WHO Regional Office for South-East Asia, 2002.
10. Pindborg JJ. *Selected and Annotated Bibliography on Oral Manifestations of the HIV Infection 1981-1987*. Copenhagen: WHO Collaborating Centre for Oral Manifestations of the HIV infection, 1990.
11. Andreasen JO, Andreasen FM. Dental trauma. In: Pine C (ed). *Community Oral Health*. London: Elsevier Science Limited, 2002. p. 94-9.
12. Chen M et al. *Comparing Oral Health Systems. A Second International Collaborative Study*. Geneva: World Health Organization, 1997.
13. Shaw W. Dentofacial irregularities. In: Pine C (ed). *Community Oral Health*. London: Elsevier Science Limited, 2002. p. 104-11.
14. World Health Organization. *Global Strategies to Reduce the Health Care Burden of Craniofacial Anomalies*. Geneva: World Health Organization, 2002.

15. Yee R, Sheiham A. The burden of restorative dental treatment for children in third world countries. *International Dental Journal* 2002; 52:1-9.
16. World Health Organization. *Oral Health Surveys - Basic Methods*. 4th ed. Geneva: World Health Organization, 1997.
17. Federation Dentaire Internationale/World Health Organization. Global goals for oral health in the year 2000. *International Dental Journal* 1982; 23:74-7.
18. Cohen L, Gift H. (eds). *Disease Prevention and Oral Health Promotion. Socio-dental Sciences in Action*. Copenhagen: Munksgaard, 1995.
19. World Health Organization. *Children in the New Millennium. Environmental Impact on Health*. Geneva: World Health Organization, 2002.
20. United Nations Conference on Environment and Development. Agenda 21. The 1992 Rio Earth Summit, Rio de Janeiro, Brazil, 1992.
21. World Health Organization. *Fluorides and Oral Health*. WHO Technical Report Series No. 846. Geneva: World Health Organization, 1994.
22. Adyatmaka A et al. *School-based Primary Preventive Programme for Children. Affordable Toothpaste as a Component in Primary Oral Health Care*. Geneva: World Health Organization, 1998.
23. World Health Organization. *Diet, Nutrition and the Prevention of Chronic Diseases*. WHO Technical Report Series 916. Geneva: World Health Organization, 2003.
24. Machay J, Eriksen M. *The Tobacco Atlas*. Geneva: World Health Organization, 2002.
25. Johnson NW, Bain C. Tobacco and oral disease. EU-Working Group on Tobacco and Oral Health. *Brit Dent J* 2000; 189:200-6.
26. Reibel J. Tobacco and oral diseases: an update on the evidence, with recommendations. *Med Princ Pract* 2003; 12 (suppl 1):22-32.
27. World Health Organization. *National Cancer Control Programmes. Policies and Managerial Guidelines*. 2nd ed. Geneva: World Health Organization, 2002.
28. World Health Organization. *The Status of School Health*. Geneva: World Health Organization, 1996.
29. World Health Organization. *Oral Health Promotion Through Schools. WHO Information Series on School Health. Document 11*. Geneva: World Health Organization, in press 2003.

30. World Health Organization. *Research to Improve Implementation and Effectiveness of School Health Programmes*. Geneva: World Health Organization, 1996.
31. World Health Organization. *World Health Report 1998. Life in the 21st Century, A Vision for All*. Geneva, World Health Organization, 1998.
32. World Health Organization. *Active Ageing: A Policy Framework*. Geneva: World Health Organization, 2002.
33. WHO Kobe Centre for Health Development. *Globe Review on Oral Health in Ageing Societies*. WHO Ageing and Health Technical Report 3. Kobe: World Health Organization, 2002.
34. Shay K, Berkey D, Beck J, *et al*. The First International Conference on rural Ageing: A Global Challenge. Proceedings of the oral health component. Charleston, West Virginia, USA, 2000. *International Dental Journal* 2001; 51:177-264.
35. WHO Kobe Centre for Health Development. *Good Oral Health in Ageing Societies. To Keep Healthy Teeth for Your Healthy Life*. Proceedings of a WHO international symposium, Kobe, Japan, November 2001. Kobe: World Health Organization, 2002.
36. Walls AWG, Steele JG. Geriatric oral health issues in the United Kingdom. *International Dental Journal* 2001; 51:183-187.
37. World Health Organization. *The Implications for Training of Embracing a Life Course Approach to Health*. Geneva: World Health Organization, 2000.
38. Firatli E. The relationship between clinical periodontal status and insulin-dependent diabetes mellitus. Results after 5 years. *Journal of Periodontology* 1997; 68:136-40.
39. Hung HC *et al*. Oral health and peripheral arterial disease. *Circulation* 2003; 107:1152-1157.
40. Morrison HI, Ellison LF, Taylor GW. Periodontal disease and risk of fatal coronary heart and cerebrovascular diseases. *J Cardiovasc Risk* 1999; 6:7-11.
41. Slade GD *et al*. Conference summary: assessing oral health outcomes – measuring health status and quality of life. *Community Dental Health* 1998; 15:3-7.
42. Rohr Inglehart M, Bagramian RA. *Oral Health-Related Quality of Life*. Chicago: Quintessence, 2002.
43. World Health Organization. *Formulating Strategies for Health for All by the Year 2000: Guiding Principles and Essential Issues*. Geneva: World Health Organization, 1979.
44. WHO Collaborating Centre for Oral Health Care Planning and Future Scenarios. Basic Package for Oral Care. Nijmegen: University of Nijmegen, 2002.

45. World Health Organization. Extending essential care. Integrated management of adolescent and adult illness. Geneva: WHO, 2003.
46. Melnick SL et al. *A Guide for Epidemiological Studies of Oral Manifestations of HIV Infection*. Geneva: World Health Organization, 1993.
47. World Health Organization. *The SuRF Report 1. Surveillance of Risk Factors Related to Noncommunicable Diseases*. Geneva: World Health Organization, 2003.
48. World Health Organization. *Health21 - Health for All in the 21st Century*. Copenhagen: WHO Regional Office for Europe, 1999.
49. Global Forum for health research. The 10/90 report on health research 2001-2002. (Available on the Internet from: <http://www.globalforumhealth.org>).



Selected WHO Publications of related interest

Application of the International Classification of Diseases to Dentistry and Stomatology (ICD-DA) 3rd ed., 1994 (243 pages)

Trace elements in human nutrition and health
1996 (361 pages)

A guide for epidemiological studies of oral manifestations of HIV infection
S.L. Melnick et al., 1993 (36 pages)

Fluorides and oral health
Report of a WHO Expert Committee on Oral Health Status and Fluoride Use.
WHO Technical Report Series, No. 846, 1992 (43 pages)

Recent advances in oral health
Report of a WHO Expert Committee.
WHO Technical Report Series, No. 826, 1992 (43 pages)

Guidelines for drinking-water quality, 2nd ed.
Volume 1: Recommendations, 1993 (198 pages)
Volume 2: Health criteria and other supporting information, 1996 (989 pages)

Oral Health Surveys Basic Methods
4th ed., 1997 (66 pages)

Diet, nutrition and the prevention of chronic diseases
Report of a Joint WHO/FAO Expert Consultation, 2003 (149 pages)

Fluorides
Environmental Health Criteria Series, No. 227, 2002 (288 pages)