

## Commentary

# Improving the oral health of older people: the approach of the WHO Global Oral Health Programme

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**Abstract** – The proportion of older people continues to grow worldwide, especially in developing countries. Non-communicable diseases are fast becoming the leading causes of disability and mortality, and in coming decades health and social policy-makers will face tremendous challenges posed by the rapidly changing burden of chronic diseases in old age. Chronic disease and most oral diseases share common risk factors. Globally, poor oral health amongst older people has been particularly evident in high levels of tooth loss, dental caries experience, and the prevalence rates of periodontal disease, xerostomia and oral precancer/cancer. The negative impact of poor oral conditions on the quality of life of older adults is an important public health issue, which must be addressed by policy-makers. The means for strengthening oral health programme implementation are available; the major challenge is therefore to translate knowledge into action programmes for the oral health of older people. The World Health Organization recommends that countries adopt certain strategies for improving the oral health of the elderly. National health authorities should develop policies and measurable goals and targets for oral health. National public health programmes should incorporate oral health promotion and disease prevention based on the common risk factors approach. Control of oral disease and illness in older adults should be strengthened through organization of affordable oral health services, which meet their needs. The needs for care are highest among disadvantaged, vulnerable groups in both developed and developing countries. In developing countries the challenges to provision of primary oral health care are particularly high because of a shortage of dental manpower. In developed countries reorientation of oral health services towards prevention should consider oral care needs of older people. Education and continuous training must ensure that oral health care providers have skills in and a profound understanding of the biomedical and psychosocial aspects of care for older people. Research for better oral health should not just focus on the biomedical and clinical aspects of oral health care; public health research needs to be strengthened particularly in developing countries. Operational research and efforts to translate science into practice are to be encouraged. WHO supports national capacity building in the oral health of older people through intercountry and interregional exchange of experiences.

**Key words:** disease prevention; health promotion; older people; operational research; oral health policy; oral health systems development

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Throughout the world, a demographic revolution is underway. The proportion of older people is growing faster than of any other age group (Fig. 1) (1). Approximately 600 million people are aged 60 years and over, and this number will double by

2025. By 2050, it will be 2 billion, 80% living in developing countries (Fig. 2) (1, 2). This poses tremendous challenges to health and social policy planners, particularly because disease patterns will shift concurrently. Chronic diseases such as car-

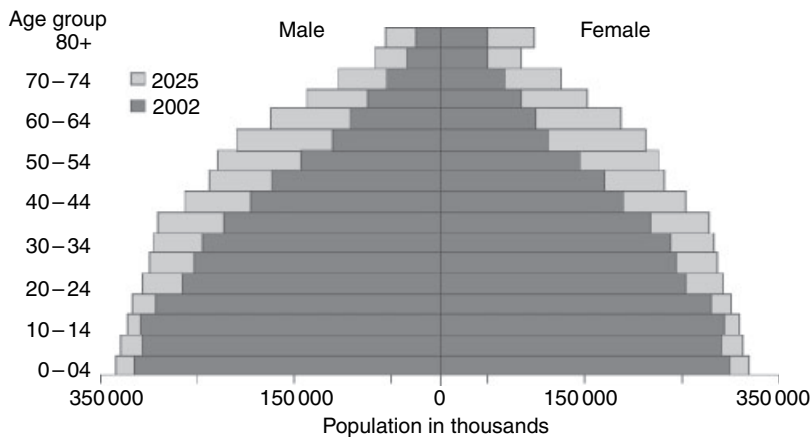


Fig. 1. Global population pyramid in 2002 and 2025 (1).

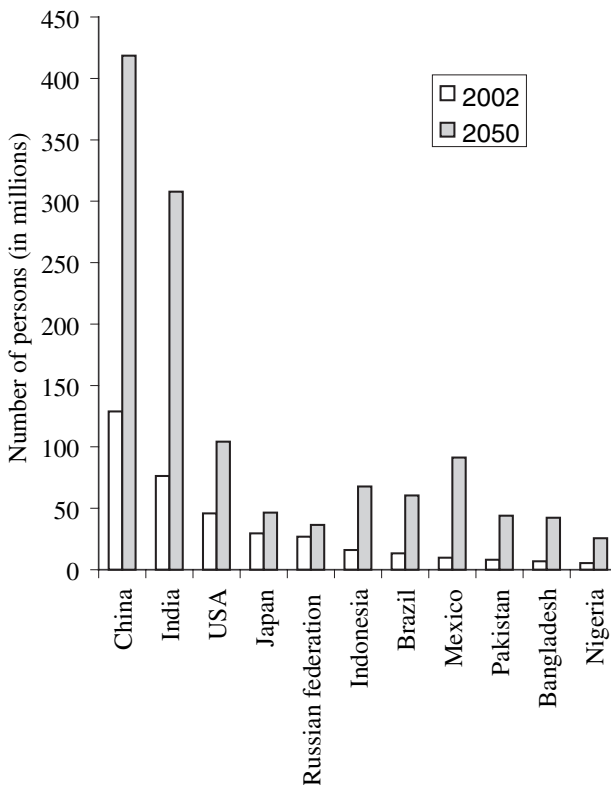


Fig. 2. Number of old-age persons (in millions) living in selected countries by 2050 according to United Nations projections (1, 2).

diovascular disease, hypertension, cancer and diabetes are prevalent in old age, which partly explains why these non-communicable diseases (NCDs) are fast becoming the leading causes of disability and mortality (3). However, experiences from developed countries show that the prevalence of chronic disease and high levels of disability in older people can be reduced through health promotion and appropriate NCD prevention strategies designed to improve quality of life (4). Older people can be a valuable resource; they can contribute to society within their families, commu-

nities and national economies as either a formal or an informal part of the workforce, or through volunteer work. In Sub-Saharan Africa and many countries of Asia, old-age people will play an important role in relation to taking care of children whose parents have died of AIDS.

### WHO and the health of elderly people

In 1995, in response to the global challenges of ageing populations, the World Health Organization (WHO) launched a programme on ageing and health (2). It was designed to advance knowledge about health care in old age through targeted training and research efforts, information dissemination and policy development. The World Health Report 1998 emphasized the need to strengthen health promotion amongst older people (5). The health implications of ageing should be better elucidated and understood. Concern for the older members of society is part of the intergenerational relationship that needs to be developed in the 21st century. The young and old must learn to understand each other's differing expectations and requirements.

In 2000, WHO reiterated the priority of health for older people through the programme 'Ageing and Life Course' (2), which focussed on the concept of 'active ageing'. In 2002, WHO issued a document entitled 'Active Ageing – A Policy Framework', which outlines the essential approaches towards healthy ageing (2). The proposed policy framework rests on three basic pillars: health, social participation and security. When risk factors for chronic diseases and functional decline are minimized and protective factors are maximized, people enjoy longer life and higher quality of life. Where labour market, employment, education, health and social policies and programmes support full participation

of the elderly in socio-economic and cultural activities, people will continue to make a significant contribution to society as they grow older. When policies and programmes address the social, financial and physical security needs and rights of people as they age, the elderly are ensured protection, dignity and care in the event that they are no longer able to care for themselves.

Oral health is an important component of 'Active Ageing' (2) and is included in policy proposals related to health, one of the three basic pillars. The impacts of oral diseases on the general health and quality of life of elderly people and the significance of oral health promotion are also emphasized in the document.

### Oral health problems in older people

Globally, poor oral health among older people has particularly been seen in a high level of tooth loss, dental caries experience, high prevalence rates of periodontal disease, xerostomia, and oral precancer/cancer (6). The negative impact of poor oral conditions on daily life is particularly significant among edentulous people. Extensive tooth loss reduces chewing performance and affects food choice; for example, edentulous people tend to avoid dietary fibre and prefer foods rich in saturated fats and cholesterol (7). Edentulousness is also shown to be an independent risk factor for weight loss (8) and, in addition to the problem with chewing, old-age people may have social handicaps related to communication (9). Moreover, poor oral health and poor general health are interrelated, primarily because of common risk factors; for example, severe periodontal disease is associated with diabetes mellitus (10), ischemic heart disease (11) and chronic respiratory disease (12). Tooth loss has also been linked with increased risk of ischemic stroke (13) and poor mental health (6).

#### Tooth loss

Edentulism is prevalent among older people all over the world (Table 1) (14) and is highly associated with socio-economic status. Epidemiological studies show that persons of low social class or income and individuals with little or no education are more likely to be edentulous than persons of high social class and high levels of income and education (6, 15). In parallel, surveys of old-age people document the social gradient for incremental tooth loss (15). Functional dentitions, as meas-

Table 1. Prevalence of edentulousness (%) of elderly reported for selected countries throughout the world

WHO region/Country	Edentulous (%)	Age group (year)
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+
UK	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+

Source: WHO Global Oral Data Bank (14) and WHO Oral Health Country/Area Profile Programme (40).

ured by presence of at least 20 natural teeth, are found to be most frequent among elderly of high socio-economic status in contrast to individuals of low socio-economic status (15). For some industrialized countries there has been a positive trend towards decline in tooth loss among adults (15-18), including the older people, in recent years but social inequality in dentate status persists even in countries with advanced public dental health programmes (18). Severe dental caries and periodontal disease are the major reasons for tooth extraction (6, 17, 19, 20). Tobacco use is also a risk factor in tooth loss (17), particularly among people with a high consumption over many years. Relatively few epidemiological studies of tooth loss at old age have been conducted in developing coun-

tries. However, in those countries access to oral health services is limited and teeth are often extracted because of pain or discomfort, or because of lack of materials for dental treatment. In Madagascar, for example, edentulousness recently was reported at 25% nationally for people aged 65–74 years (21).

Removable dentures are particularly frequent among older people in the industrialized world (22). Some countries report that one-third to half of the older people wear full dentures while up to three-quarters wear removable full and/or partial dentures (18, 23). Again, the prevalence of removable dentures shows considerable variation by socio-economic status (6, 17, 18); the rates are high among the socio-economically disadvantaged.

### *Denture-related conditions*

Denture stomatitis is a common oral mucosal lesion of clinical importance in old-age populations (24). The prevalence rate of stomatitis is reported within the range of 11–67% in complete denture wearers (24). In many cases of denture stomatitis, colonization of yeast to the fitting surface of the prosthesis is observed (24). Other factors of stomatitis include allergic reaction to the denture base material or manifestations of systemic disease (24).

The prevalence of denture stomatitis correlates strongly to denture hygiene or the amount of denture plaque (25, 26). Usage of denture at night (25), neglect of denture soaking at night (26) and use of defective and unsuitable dentures (27) are also risk factors for denture stomatitis, as is tobacco and alcohol consumption (28). The lower the level of education, the higher the prevalence of stomatitis, and finally, the longer since the last dental visit, the higher the likelihood of denture-related lesions (28).

Other major denture-related lesions include denture hyperplasia and traumatic ulcer; their prevalence rates in old-age denture wearers range from 4 to 26% (25, 28, 29). Denture hyperplasia is particularly frequent in persons with ill-fitting and/or unretentive dentures (9). Both lesions have been observed more often among complete denture wearers than in persons wearing removable partial dentures (27–29). Moreover, low education, tobacco and alcohol use, and infrequent dental visits are factors associated with increased prevalence rate of denture-related lesions (28).

### *Coronal dental caries and root surface caries*

High prevalence rates of coronal dental caries and root surface caries are found among old-age

populations in several countries worldwide (6). Surveys indicate that the mean numbers of decayed and filled coronal surfaces range from 22 to 35 in developed countries (30–32). In developing countries data on dental caries among older people are scarce. A recent survey of 65–74-year-old in Madagascar (21) observed that the mean number of DMFT was 20.2; untreated dental caries was high (DT = 5.3) while the number of restored teeth was low (FT = 0.4). In China, the second national oral health survey revealed that the mean number of decayed and filled teeth was 2.5 at old age (33), and a study in India confirmed this figure observed in China, the mean number of decayed teeth being 2.5 (34).

The mean number of decayed and filled root surfaces in older people lies between 2.2 and 5.3 in developed countries (30–32), and in meta-analyses the root caries increment has been estimated at 0.47 surfaces per year (35). The Root Caries Index, i.e. the number of decayed and filled root surfaces with gingival recession over the number of decayed, filled and sound root surfaces with recession (36), was 5.4 in a study of older people in China (37). In contrast, 12% of elderly subjects in India had exposed root surfaces, but none experienced root surface caries (34).

The available data worldwide show that dental caries is a major public health problem in older people and closely linked to social and behavioural factors (6, 14). The pattern is mostly that persons of low income (38), those who do not visit a dentist regularly (38, 39), do not brush their teeth frequently (39), consume many sugars (39) and smoke (38), tend to suffer more from coronal and root surface caries.

### *Periodontal disease*

Globally, the percentage of the subjects with Community Periodontal Index scores 4 (deep pockets) ranges from approximately 5 to 70% among older people (40). Epidemiological studies show that poor oral hygiene or high levels of dental plaque are associated with high prevalence rates and severity of periodontal disease (6, 40). Low education, no dental check-ups, few teeth present, and regular smoking have independent effects on progression of periodontal diseases in older adults (41, 42). In some industrialized countries studies have shown that use of tobacco accounts for more than half of the periodontitis cases in adults (43). Relatively few systematic surveys on periodontal health status of older people have been undertaken

in developing countries. At ages 65–74 years, 17.1% of persons in Madagascar had shallow or deep periodontal pockets (21) and such conditions were found for 22.2% of Chinese elderly (33).

### *Xerostomia*

Dry mouth is a common complaint in older people and the condition is reported in approximately 30% of the population aged 65 and older (44). Persons suffering from dryness of the mouth are likely to experience severe oral problems, including high levels of dental caries, in addition to difficulties in chewing, eating and communicating (6). A reduced unstimulated salivary flow and subjective oral dryness are significantly associated with age (45) and the female gender (45, 46).

Drug-induced xerostomia is most common in old age because high proportions of older adults take at least one medication that causes salivary dysfunction (45, 47). The drugs mostly responsible for dry mouth are tricyclic antidepressants, antipsychotics, atropinics, beta blockers and antihistamines, thus the complaint of dry mouth is particularly frequent in patients treated for hypertension, psychiatric or urinary problems (44, 46). Smoking is another important risk factor of dry mouth (46).

### *Oral precancer and oral cancer*

Age-specific rates for cancer of the oral cavity increase progressively with age, most cases occurring in the groups above 60 years. Oral cancer is more common in populations of less developed than developed countries (48). The prevalence of leukoplakia and lichen planus in older people ranges from 1.0 to 4.8% (29, 49, 50) and 1.1 to 6.6% (29, 49, 50), respectively. Leukoplakia is more frequent among men while lichen planus is associated with the female gender (29, 49). Tobacco use is the most important determinant of oral cancer and premalignant lesions (51) including leukoplakia (29, 50), but heavy consumption of alcohol is also a significant factor in relation to these conditions (50). Socio-economic status such as low levels of education (49) and income (52) is a risk factor for leukoplakia. In contrast, high fruit and vegetable intake are protective factors because of the high content of carotenoids and vitamin C (53).

### *Oral health – general health – and quality of life*

In recent years, much research has demonstrated the impact of oral health on quality of life and general health (54–56). 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, self-esteem and well-being. The interrelationship between oral health and general health is particularly pronounced among older people (54, 57). Poor oral health can increase the risks to general health and with compromised chewing and eating abilities, affect nutritional intake (7, 9). Similarly, systemic diseases and/or the adverse side effects of their treatments can lead to increased risk of oral diseases, dry mouth and altered sense of taste and smell. The high prevalence of multi-medication therapies in advanced age may further complicate the impact on oral health and oral health care (54).

## **Oral health programmes for older people**

Several reports worldwide have shown that use of professional dental health services is low among older people, particularly among the socio-economically disadvantaged (58). In many developing countries elderly people share the problem of poor access to oral health care with other age groups as these countries have shortage in dental manpower. Barriers to oral health care among older people in industrialized countries are considerable (58). Impaired mobility impedes access to care, particularly for those who reside in rural areas with poor public transport. Given that some older people may experience financial hardship following retirement, the cost or perceived cost of treatment, together with lack of dental care tradition and negative attitudes to oral health, may deter them from visiting a dentist. The fear of violence may make them apprehensive of strangers, hindering good communication with oral health care providers.

Clinical and community-based intervention projects have focussed on strategies and approaches in improving oral health care in older people (6). Such projects particularly considered the control of dental caries and periodontal disease in non-institutionalised and institutionalised population groups. Meanwhile, compared with the situation for other age groups there is a remarkable shortage of published research papers reporting results of oral health intervention programmes (6), both in relation to efficacy analysis (demonstrated in RCTs) and effectiveness (demonstrated in community trials).

*Clinical intervention*

As for other age groups, use of fluoride is effective in prevention of dental caries in elderly. Topical application and mouthrinsing with fluorides are shown to reduce the number of root surface caries lesions, both in active old-age people (59) and in seniors in long-term care facilities (60) and fluoride containing dentifrices are also effective in preventing both coronal and root surface caries (61). Topical application of fluoride can additionally prevent tooth mortality in older people when combined with chlorhexidine rinsing (60). Rinsing with a chlorhexidine solution tends to reduce gingival inflammation, pocket depth, and incidence of denture stomatitis (62). Further, chewing chlorhexidine acetate/xylitol gums may reduce denture stomatitis and angular cheilitis prevalence in frail older people (63). The addition of chlorhexidine rinses to usual dental care resulted in a 15% reduction in tooth mortality in a group of older people (64).

Clinical studies suggest that oral health education for elderly patients is effective (6). A randomized clinical trial for older periodontal patients revealed that group-based behaviour modification intervention helped patients improve their self-care skills such as brushing and flossing, and reduced gingival bleeding (65).

*Community-based health promotion and oral disease prevention*

Oral health programmes have been designed to improve the oral health status of the institutionalised elderly. For example, an oral health care programme established for residents of nursing homes or long-term care facilities provided oral examination, dental treatment, oral prophylaxis, and instructions to both nursing staff and residents and the programme demonstrated a reduction in the number of teeth with decay and in periodontal treatment need, reduced prevalence of denture stomatitis, and improved denture hygiene (66, 67). Toothbrushing by nurses and caregivers combined with professional oral care by dentists or dental hygienists were associated with decreased pneumonia, febrile days, death from pneumonia and improved daily living activities and cognitive functions of institutionalized older people (68). Some programmes focused on education of caregivers for improved oral health status of institutionalised elderly, and tried to break down practical, informational, and psychological barriers

to caregivers' provision of oral care for residents, the result being improvement in the caregivers' knowledge, attitudes and oral health care of the elderly as well as in the oral health status of the residents (69).

Successful community-based oral health programmes for older people have been reported. A dental health promotion programme based on the concept of Predisposing, Reinforcing, and Enabling Courses in Educational Diagnosis and Evaluation (PRECEDE), resulted in significant improvements in the oral health status of a volunteer group of healthy elderly persons (70). Furthermore, oral health promotion programmes addressing self-monitoring approaches improved oral health behaviours, attitudes and health status among elderly persons (71).

Modifications in oral health care systems by elimination of financial barriers and establishment of outreach services have been shown to improve the oral health of active older people. A public health programme providing free, comprehensive dental care to old-age pensioners resulted in improvement of their oral health status and quality of life (72). The programme aimed at empowerment and selfcare capacity-building of older people and enhanced their attitudes, knowledge and oral hygiene practices, and in addition increased their use of dental health services.

The effectiveness of early detection in reducing the prevalence of oral cancer is controversial. A systematic review of the cost-effectiveness and applicability of screening failed to find sufficient evidence to determine its public health relevance in controlling morbidity, mortality, or quality of life (73). However, a recent study suggested that screening by visual inspection of the mouth could reduce mortality from oral cancer (74).

**WHO and oral health of older people**

Poor oral health among old-age people is an important public health issue and a growing burden to countries worldwide. Most industrialized countries have information about the oral health status of old-age people whereas such data are rare for developing countries. Data are particularly scarce as regards the predominantly rural nations of Africa and the most populous countries of China and India. The evidence available shows profound oral health disparities among older people across and within regions and countries, such

disparities relating primarily to living conditions and availability of oral health services. Institution-alized and homebound elderly have poorer oral health status than active elderly (75–77). Some positive trends in dentate status are seen in many developed countries as future generations of older adults preserve more natural teeth and functional dentition. The prevalence of certain oral diseases varies according to gender. Behavioural risk factors including oral hygiene behaviour, diet and tobacco use contribute significantly to the disparities. Studies show that these lifestyle factors are modifiable and there are positive experiences from intervention programmes instrumental to improved oral health status of older people.

The WHO Oral Health Programme encourages national oral health planners to strengthen the implementation of systematic oral health programmes oriented towards better oral health and quality of life for older people (14). National health authorities are also urged to formulate oral health goals, targets and standards of oral health for elderly people. WHO/Fédération Dentaire Internationale (FDI) goals for the year 2000 (78) focussed on reducing rates of edentulousness and increasing the number of elderly with natural, functional dentition. New goals for the year 2020 have been suggested jointly by WHO, FDI and the International Association for Dental Research (IADR) (78). Accordingly, for the continuous improvement of oral health in the elderly, specific country or community targets for oral health of older people should be formulated in measurable terms, such as:

- Dental caries: reduce the number of teeth extracted because of dental caries at age 65–74 years by X%;
- Periodontal diseases: reduce the number of teeth lost because of periodontal diseases by X% at age 65–74 years with special reference to tobacco use, poor oral hygiene, stress and inter-current systemic diseases;
- Tooth loss: reduce the number of edentulous persons by X% at age 65–74 years, increase the number of natural teeth present by X%, and increase the number of individuals with functional dentitions (20 or more natural teeth) by X% at age 65–74 years.

Moreover, guidelines for formulation of targets in relation to oral cancer control, xerostomia and improved quality of life are also given (78).

In order to evaluate the accomplishment of such goals, the WHO Oral Health Programme supports countries in establishing appropriate oral health

surveillance systems. Essential oral health data include number of teeth present, dental caries, periodontal disease, oral cancer, oral mucosal lesions and quality of life. Adding information on lifestyles such as consumption of tobacco and alcohol, oral hygiene status, general health status, oral health systems and living conditions to the traditional oral health surveillance variables may be useful to determine the impact of risk factors for the oral diseases among older people in each country and to design intervention programmes targeting these risk factors.

## Strategies towards improved oral health of older people

Globally, important mechanisms for better oral health would relate to strengthening oral health policy development; national capacity building within oral health care for the underserved; education and training for service and care for the elderly, and research for oral health. However, the challenges vary from country to country and region to region; the differences are particularly notable between developed and developing countries.

### *Oral health policy*

As emphasized in the World Oral Health Report 2003 (14), WHO sees oral health as integral to general health and as a determinant for quality of life. The interrelationship between oral health and general health is particularly pronounced among older people primarily because several oral diseases have risk factors in common with chronic diseases. Today, few countries have clearly stated policies and goals specifically for oral health promotion and oral health care for older people. Generally speaking, oral health policies and programmes should be an integral part of national and community health programmes. Thus, in many countries – developing and developed – strengthened analysis *for* policy and analysis *of* policy are urgently needed for advocacy, legislation, goal-setting, and design of public oral health programmes for old-age persons. Oral diseases can be prevented through shared public health approaches. Oral health planners and administrators are encouraged to use the common risk factors approach to integrate interventions for oral health among older adults into general health programmes (14, 79). A benefit of this approach is the focus on improving health conditions for the

whole population as well as high risk groups such as older adults, thereby alleviating inequities. WHO recently developed two global strategies for prevention of chronic disease; Global Strategy on Diet, Physical Activity and Health, and Global Strategy for Chronic Disease Prevention (14). These strategies are intended to serve as guidelines for countries to strengthen prevention of disease, which also would apply to strengthening oral disease prevention through integrated approaches.

Public health programmes should apply the appropriate strategies to older people; this group includes the physically and economically vulnerable, the homebound, the institutionalized as well as the active. Where active older people are concerned, outreach activities may target social environments such as clubs, recreational centres, libraries, health care centres and pharmacies. Such programmes must focus on enhancing awareness of the importance of oral health and help translate oral health knowledge into practice, as older people are less likely to have received health education early in life. As concerns the institutionalized and homebound, the involvement of caregivers may lead programmes to success, as trained nurses and caregivers play important roles in both general and oral hygiene and diet and nutrition. Advocating oral health intervention programmes to administrators of retirement villages and nursing homes can qualify decisions affecting the oral health of residents. Such programmes can also serve to educate older people, non-dental health professionals including physicians, nursing personnel, nutritionists, social workers and policy makers, prompting perceptions of oral health as an integral part of general health and quality of life.

### *Oral health care*

The industrialized countries' oral health services were established, and most oral health care providers were educated, before geriatric dentistry developed as a speciality and academic discipline. It is now necessary to reorient these services towards prevention and to deliver the appropriate care to meet the diversified needs of the large and growing heterogeneous older population. The needs and demands for oral health care among the elderly vary across age groups, i.e. the old versus the very old. Oral health systems should effectively address factors that prevent or hinder the older population's access to and use of appropriate services. Some people, for example, experience financial hardship following retirement, and

the cost or perceived cost of dental treatment may deter them from visiting a dentist. Such barriers to oral health care should be reduced. Age-friendly and prevention-oriented third-party payment systems may contribute to effective use of oral health services amongst old age people.

In developing countries barriers to oral health care are particularly high as there is a shortage of dental manpower and low priority is allocated to oral health by national health authorities. Affordable oral health care should be organized to ensure adequate early detection, prevention and treatment for all seniors as well as other age groups. It remains a challenge to health authorities in several developing countries to establish prevention-oriented oral health systems based on the Primary Health Care Approach. Community models for outreach service and provision of essential oral health care must be implemented urgently, particularly in low-income communities of Africa and Asia. In a number of developing countries community demonstration projects, based on socio-cultural conditions and focussing on the elderly, are supported or carried out jointly with the WHO Oral Health Programme. The WHO Oral Health Programme has designed an oral health component of the global project Integrated Management of Adolescent and Adult Illness – Guidelines for First-level Facility Health Workers in Low Resource Settings (80). This project facilitates development of community-based infrastructures for early detection, first-level care and referral to advanced care for disadvantaged and underserved population groups and also includes symptoms of oral illness and oral health problems affecting old-age people.

### *Training for service and care*

Training in geriatric dentistry has been included in curricula for dental students and practitioners for decades; such courses are for the most part apparently oriented towards the biomedical and clinical aspects of care rather than the sociological and behavioural factors of aging and care. Understanding the economic and psychosocial dimensions of poor oral health also in terms of function impairment and the negative impact on quality of life is fundamental to provision of adequate oral health care, communication and health education, and the organization of public health programmes for improved oral health of older people. Thus, enhanced training of oral health professionals in social science dimensions of oral health care and in the importance of multidisciplinary approaches



would be needed to meet the needs and expectations of older people in the future. These perspectives have been emphasized recently by WHO in a policy document entitled 'Towards Age-friendly Primary Health Care' (81).

In many developing countries today, care for the elderly in general remains in the hands of family rather than society and professionals, however there are clear indications that family-support systems are eroding here, just as they are in developed countries. It is essential to increase the involvement of other health professionals and caregivers in oral health education and promotion programmes for older people in order to overcome the barriers in oral health service utilization, to improve self-care capacity in oral health and provide for a healthy diet and nutrition amongst the elderly. However, such personnel often show an alarming lack of knowledge about oral health in this age group. Systematic training of these important key groups, focussing particularly on development of skills in relation to health education and health promotion, is critical to the successful integration of oral health into general health improvement initiatives among older people.

#### *Research for oral health of older people*

There is no doubt that oral health professionals and researchers in recent years have become more aware of and pay more attention to older people as a group. Dental associations, scientific societies, and educational and political organizations have published many documents on aging and oral health. However, systematic efforts must be made to translate existing knowledge into practice and operational research on outcomes of oral health intervention programmes are urgently needed for policy development.

In strengthening research into the oral health of older people, basic research as well as health systems research should be considered. The growing biomedical research on oral health – general health interrelationships can provide a better understanding of disease mechanisms in old age and sound knowledge is instrumental to both clinical and public health practice. Epidemiological research of the oral health status among older people has been carried out in several industrialised countries, but is badly needed in most developing countries. Traditionally, epidemiological research relies on clinical oral health indicators. There is a growing awareness that such information should be complemented by socio-behavioural

data on feelings of well-being, oral functioning and quality of life. Research into socio-dental indicators and measurements may assist analysis of the impacts of oral diseases and disorders on individuals as well as at society level.

As for other age groups, most oral diseases among older adults occur in certain population groups. These groups with a higher burden of oral disease and reduced quality of life appear to be best distinguished from the rest of the population by social, behavioural and cultural factors. It is recommended that socioepidemiological research focus on using methods to identify these high risk groups, or individuals who may be 'at risk' within groups, and on developing programmes to improve oral health for targeted groups or individuals.

There is an extreme paucity of research on oral health promotion and population-directed oral disease prevention for older people. Apart from a few intervention studies conducted in some industrialized countries, research on community-based oral health promotion activities among older adults is totally lacking in the vast majority of countries, particularly in developing countries. However, there is sufficient knowledge to develop and evaluate oral health intervention programmes for the elderly, and demonstration projects are urgently needed to share experiences across countries. Recently, WHO published a report on strengthening the quality of evaluation of community-based oral health promotion and disease prevention (82); more emphasis should be given to appropriate evaluation designs, implementation analysis and process and outcome evaluation.

## **Conclusion**

The proportion of older people continues to grow worldwide, especially in developing countries. This, along with an increase in the prevalence of oral disease and non-communicable diseases, will significantly challenge health and social policy planners. The WHO Oral Health Programme encourages public health care administrators and decision-makers to design effective and affordable strategies and programmes for better oral health and quality of life of the elderly, which are integrated into general health programmes. Demonstration projects on oral disease control, health promotion and quality of life improvement should be initiated and evaluated systematically as to outcomes and processes for sharing of

experiences across countries. Finally, surveillance systems targeted at the oral health of the elderly can help assess the attainment of goals for oral health of the elderly and provide data for analysis of the cost-effectiveness of oral health programmes.

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## References

1. United Nations Population Division. World Population Prospects: The 2002 Revision, New York, NY, USA: United Nations; 2003.
2. World Health Organization. Active Ageing: a Policy Framework. Geneva, Switzerland: WHO; 2002.
3. World Health Organization The World Health Report 2003. Shaping the Future. Geneva, Switzerland: WHO; 2003.
4. Puska P, Pietenen P, Uusitalo U. Influencing public nutrition for non-communicable disease prevention: from community intervention to national programme – experiences from Finland. *Public Health Nutr* 2002;5:245–51.
5. World Health Organization. The World Health Report 1998. Life in the 21st Century: A Vision for All. Geneva, Switzerland: WHO; 1998.
6. Schou L. Oral health, oral health care, and oral health promotion among older adults: social and behavioral dimensions. In: Cohen LK, Gift HC, editors. *Disease Prevention and Oral Health Promotion*. Copenhagen: Munksgaard; 1995.
7. Walls AWG, Steele JG, Sheiham A, Marcenes W, Moynihan PJ. Oral health and nutrition in older people. *J Public Health Dent* 2000;60:304–7.
8. Ritchie CS, Joshipura K, Silliman RA, Miller B, Douglas CW. Oral health problems and significant weight loss among community-dwelling older adults. *J Gerontol A Biol Sci Med Sci* 2000;55:M366–71.
9. Smith JM, Sheiham A. How dental conditions handicap the elderly. *Community Dent Oral Epidemiol* 1979;7:305–10.
10. Shlossman M, Knowler WC, Pettitt DJ, Genco RJ. Type 2 diabetes and periodontal disease. *J Am Dent Assoc* 1990;121:532–6.
11. Joshipura KJ, Rimm EB, Douglass CW, Trichopoulos D, Ascherio A, Willett WC. Poor oral health and coronary heart disease. *J Dent Res* 1996;75:1631–6.
12. Scannapieco F. Role of oral bacteria in respiratory infection. *J Periodontol* 1999;70:793–802.
13. Joshipura KJ, Hung H-C, Rimm EB, Willett WC, Ascherio A. Periodontal disease, tooth loss, and incidence of ischemic stroke. *Stroke* 2003;34:47–52.
14. Petersen PE. The World Oral Health Report 2003: continuous improvement of oral health in the 21st century – the approach of the WHO Global Oral Health Programme. *Community Dent Oral Epidemiol* 2003;31 (Suppl. 1): 3–24.
15. Chen M, Andersen RM, Barmes DE et al. Comparing Oral Health Care Systems. A Second International Collaborative Study. Geneva, Switzerland: WHO; 1997.
16. Centers for Disease Control and Prevention. Public health and aging: retention of natural teeth among older adults – United States, 2002. *Morbidity and Mortality Weekly Report* 2003;52:1226–9.
17. US Department of Health and Human Services. Oral Health in America: A Report of the Surgeon General. Rockville, MD, USA: National Institutes of Health, National Institute of Dental and Craniofacial Research; 2000.
18. Petersen PE, Kjoller M, Christensen LB, Krustup U. Changing dentate status of adults, use of dental health services, and achievement of national dental health goals in Denmark by the year 2000. *J Public Health Dent* 2004;64:127–35.
19. Morita M, Kimura T, Kanegae M, Ishikawa A, Watanabe T. Reasons for extraction of permanent teeth in Japan. *Community Dent Oral Epidemiol* 1994;22:303–6.
20. Shimazaki Y, Soh I, Koga T, Miyazaki H, Takehara T. Risk factors for tooth loss in the institutionalised elderly; a six-year cohort study. *Community Dent Health* 2003;20:123–7.
21. Petersen PE, Razanamihaja N, Poulsen VJ. Surveillance of Oral Health Among Children and Adults in Madagascar. Geneva, Switzerland: WHO; 2004.
22. Commission of Oral Health, Research and Epidemiology Report of a Working Group. Oral health needs of the elderly – an international review. *Int Dent J* 1993;43:348–54.
23. Randolph WM, Ostir GV, Markides KS. Prevalence of tooth loss and dental service use in older Mexican Americans. *J Am Geriatr Soc* 2001;49:585–9.
24. Jeganathan S, Lin CC. Denture stomatitis – a review of the aetiology, diagnosis and management. *Aust Dent J* 1992;37:107–14.
25. Vigild M. Oral mucosal lesions among institutionalized elderly in Denmark. *Community Dent Oral Epidemiol* 1987;15:309–13.
26. Shou L, Wight C, Cumming C. Oral hygiene habits, denture plaque, presence of yeasts and stomatitis in institutionalized elderly in Lothian, Scotland. *Community Dent Oral Epidemiol* 1987;15:85–9.
27. Fleishman R, Peles DB, Pisanti S. Oral mucosal lesions among elderly in Israel. *J Dent Res* 1985;64:831–6.
28. Hand JS, Whitehill JM. The prevalence of oral mucosal lesions in an elderly population. *J Am Dent Assoc* 1986;112:73–6.
29. Jankittivong A, Aneksuk V, Langlais RP. Oral mucosal conditions in elderly dental patients. *Oral Diseases* 2002;8:218–23.
30. Papas A, Joshi A, Giunta J. Prevalence and intraoral distribution of coronal and root caries in middle-aged and older adults. *Caries Res* 1992;26:459–65.
31. Winn DM, Brunelle JA, Selwitz RH, Kaste LM, Oldakowski RJ, Kingman A et al. Coronal and root caries in the dentition of adults in the United States,

- 1988–1991. *J Dent Res* 1996;75 (Special Issue): 642–51.
32. Slade GD, Spencer AJ. Distribution of coronal and root caries experience among persons aged 60+ in South Australia. *Aust Dent J* 1997;42:178–84.
  33. Wang H-Y, Petersen PE, Bian J-Y, Zang B-X. The second national survey of oral health status of children and adults in China. *Int Dent J* 2002;52:283–90.
  34. Thomas S, Raja RV, Kutty R, Strayer MS. Pattern of caries experience among an elderly population in South India. *Int Dent J* 1994;44:617–22.
  35. Griffin SO, Griffen PM, Swann JL, Zlobin N. Estimating rates of new root caries in older adults. *J Dent Res* 2004;83:634–8.
  36. Katz RV. Assessing root caries in populations: the evolution of the root caries index. *J Public Health Dent* 1980;40:7–16.
  37. Lin HC, Schwarz E. Oral health and dental care in modern-day China. *Community Dent Oral Epidemiol* 2001;29:319–28.
  38. Beck JD. The epidemiology of root surface caries. *J Dent Res* 1990; 69:1216–21.
  39. Vehkalahti MM, Paunio IK. Occurrence of root caries in relation to dental health behavior. *J Dent Res* 1988;67:911–4.
  40. World Health Organization. WHO Oral Health Country/Area Profile. Available from: <http://www.whocolab.od.mah.se/index.html>.
  41. Locker D, Leake JL. Risk indicators and risk markers for periodontal disease experience in older adults living independently in Ontario, Canada. *J Dent Res* 1993;72:9–17.
  42. Ogawa H, Yoshihara A, Hirotohi T, Ando Y, Miyazaki H. Risk factors for periodontal disease progression among elderly people. *J Clin Periodontol* 2002;29:592–7.
  43. Tomar SL, Asma S. Smoking attributable periodontitis in the United States: findings from NHANES III. *J Periodontol* 2000;71:743–51.
  44. Ship JA, Pillemer SR, Baum BJ. Xerostomia and the geriatric patient. *J Am Geriatr Soc* 2002;50:535–43.
  45. Bergdahl M, Bergdahl J. Low unstimulated salivary flow and subjective oral dryness: association with medication, anxiety, depression, and stress. *J Dent Res* 2000;79:1652–8.
  46. Thomson WM, Chalmers JM, Spencer AJ, Slade GD. Medication and dry mouth: findings from a cohort study of older people. *J Public Health Dent* 2000;60:12–20.
  47. Streckfus CF. Salivary function and hypertension: a review of the literature and case report. *J Am Dent Assoc* 1995;126:1012–7.
  48. Steward BW, Kleihues P. *World Cancer Report*. Lyon, France: WHO International Agency for Research on Cancer; 2003.
  49. Reichart PA. Oral mucosal lesions in a representative cross-sectional study of aging Germans. *Community Dent Oral Epidemiol* 2000;28:390–8.
  50. García-Pola Vallejo MJ, Martínez Díaz-Canel AI, García Martín JM, González García M. Risk factors for oral soft tissue lesions in an adult Spanish population. *Community Dent Oral Epidemiol* 2002;30:277–85.
  51. Thomas G, Hashibe M, Jacob BJ, Ramadas K, Mathew B, Sankaranarayanan R et al. Risk factor for multiple oral premalignant lesions. *Int J Cancer* 2003;107:285–91.
  52. Hashibe M, Jacob BJ, Thomas G, Ramadas K, Mathew B, Sankaranarayanan R et al. Socioeconomic status, lifestyle factors and oral premalignant lesions. *Oral Oncol* 2003;39:664–71.
  53. Gupta PC, Hebert JR, Bhonsle RB, Murti PR, Mehta H, Mehta FS. Influence of dietary factors on oral precancerous lesions in a population-based case-control study in Kerala, India. *Cancer* 1999;85:1885–93.
  54. Rohr-Inglehart M, Bagramian RA. *Oral Health-Related Quality of Life*. Chicago, IL, USA: Quintessence; 2002.
  55. Locker D. Measuring oral health: a conceptual framework. *Community Dent Health* 1988;5:5–13.
  56. Slade GD, Spencer AJ. Development and evaluation of the oral health impact profile. *Community Dent Health* 1994;11:3–11.
  57. Petersen PE, Nörtov B. General and dental health in relation to lifestyle and social network activity among 67-year-old Danes. *Scand J Prim Health Care* 1989;7:225–30.
  58. Petersen PE, Holst D. Utilization of dental health services. In: Cohen L, Gift HC, editors. *Disease Prevention and Oral Health Promotion*. Copenhagen: Munksgaard; 1995.
  59. Wallace MC, Retief H, Bradley EL. The 48-month increment of root caries in an urban population of older adults participating in a preventive dental program. *J Public Health Dent* 1993;53:133–7.
  60. Wyatt CCL, MacEntee MI. Caries management for institutionalized elders using fluoride and chlorhexidine mouthrinses. *Community Dent Oral Epidemiol* 2004;32:322–8.
  61. Jensen ME, Kohout F. The effect of a fluoridated dentifrice on root and coronal caries in an older adult population. *J Am Dent Assoc* 1988;117:829–32.
  62. Persson RE, Truelove EL, Leresche L, Robinovitch R. Therapeutic effects of daily or weekly chlorhexidine rinsing on oral health of a geriatric population. *Oral Surg Oral Med Oral Pathol* 1991;72:184–91.
  63. Simons D, Brailsford SR, Kidd EAM, Beighton D. The effect of medicated chewing gums on oral health in frail older people: a 1-year clinical trial. *J Am Geriatr Soc* 2002;50:1348–53.
  64. Hujuel PP, Powell LV, Kiyak HA. The effects of simple interventions on tooth mortality: findings in one trial and implications for future studies. *J Dent Res* 1997;76:867–74.
  65. Little SJ, Hollis JF, Stevens VJ, Mount K, Mullooly JP, Johnson BD. Effective group behavioral intervention for older periodontal patients. *J Periodont Res* 1997;32:315–25.
  66. Vigild M, Brinck JJ, Hede B. A one-year follow-up of oral health care programme for residents with severe behavioural disorders at special nursing homes in Denmark. *Community Dent Health* 1998;15:88–92.
  67. Budtz-Jørgensen E, Mojon E, Rentsch A, Deslauriers N. Effects of an oral health program on the occurrence of oral candidosis in a long-term care facility. *Community Dent Oral Epidemiol* 2000;28:141–9.

68. Yoneyama T, Yoshida M, Ohru T, Mukaiyama H, Okamoto H, Hoshiha K et al. Oral care reduces pneumonia in older patients in nursing homes. *J Am Geriatr Soc* 2002;50:430–3.
69. Frenkel HF, Harvey I, Newcombe RG. Improving oral health in institutionalised elderly people by educating caregivers: a randomised controlled trial. *Community Dent Oral Epidemiol* 2001;29:289–97.
70. Knazan YL. Application of PRECEDE to dental health promotion for a Canadian well-elderly population. *Gerodontology* 1986;2:180–5.
71. Kiyak HA. Oral health promotion in old age. In: Schou L, Blinkhorn AS, eds. *Oral Health Promotion*. Oxford: Oxford University Press; 1993; pp. 207–31.
72. Petersen PE, Nortov B. Evaluation of a dental public health program for old-age pensioners in Denmark. *J Public Health Dent* 1994;54:73–9.
73. Truman BI, Gooch BF, Sulemana I, Gift HC, Horowitz AM, Evans CA et al. Review of evidence on interventions to prevent dental caries, oral and pharyngeal cancers, and sports-related craniofacial injuries. *Am J Prev Med* 2002;23(1S): 21–54.
74. Sankaranarayanan R, Mathew B, Jacob BJ, Thomas G, Somanathan T, Pisanti P et al. Early findings from a community-based, cluster-randomized, controlled oral cancer screening trial in Kerala, India. *Cancer* 2000;88:664–73.
75. Pajukoski H, Meurman JH, Snellman-Gröhn S, Sulkava R. Oral health in hospitalized and nonhospitalized community-dwelling elderly patients. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 1999;88:437–43.
76. Martin KU, Martin JO. Meeting the oral health needs of institutionalized elderly. *Dysphagia* 1992;7:73–80.
77. Strayer MS. Dental health among homebound elderly. *J Public Health Dent* 1993;53:12–16.
78. Hobdell M, Petersen PE, Clarkson J, Johnson N. Global goals for oral health 2020. *Int Dent J* 2003;53:285–8.
79. Sheiham A, Watt R. The common risk factor approach – a rational basis for promoting oral health. *Community Dent Oral Epidemiol* 2000;28:399–406.
80. World Health Organization. *Extending Essential Care. Integrated Management of Adolescent and Adult Illness*. Geneva, Switzerland: WHO; 2003.
81. World Health Organization. *Towards Age-friendly Primary Health Care*. Geneva, Switzerland: WHO; 2004.
82. Petersen PE, Kwan S. Evaluation of community-based oral health promotion and oral disease prevention – WHO recommendations for improved evidence in public health practice. *Community Dent Health* 2004;21(Supplement):319–29.