

HEALTH PROMOTION AND DISEASE PREVENTION A Handbook for Teachers, Researchers, Health Professionals and Decision Makers	
Title	Oral Health and Oral Health Promotion
Module: 5.12	ECTS: 0.5
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Key words	Oral health; health promotion; oral hygiene; health behaviour; dental health surveys
Learning objectives	<p>The educational objectives of this module are:</p> <ul style="list-style-type: none"> • To increase the awareness of health professionals about the positive effects of oral health promotion programmes on oral health of a population; • To sensitise health professional for developing an attitude about promoting oral health as a very important task of their work. Health professionals represent a bridge to policy-makers in the sense of thought-transference and implementation of research achievements into practice. <p>After completing this module participants should be capable to:</p> <ul style="list-style-type: none"> • Assess the data currently available; • Collect additional data; • Analyse interpret and present the data; and • Formulate a policy response to the results.
Abstract	<p>World Health Organization recognizes oral health as an important component of general health, and furthermore, oral health is essential for well-being. The majority of oral diseases is related to lifestyles and reducing these mostly chronic diseases relies much on changing behaviour. Changes for the better in behaviour can and do occur, but require commitment and expertise within health promotion. Customs, practices and lifestyle issues play a role in the oral health of a community and should be considered when national policies and programmes are being formulated.</p> <p>Oral health and general health share common factors related to diet, the use of tobacco, and the excessive consumption of alcohol and the solutions to control oral disease are to be found through shared approaches with integrated chronic disease prevention.</p>

	<p>Oral health promotion is an integral part of general health promotion. Together, oral health promotion and general health promotion address the inseparable issues of systemic and oral diseases, general and oral hygiene, general and oral health care attitudes, and general health services as well as dental services. Thus, oral health promotion and oral disease prevention should embrace what is termed ‘the common risk factor approach’; leading to the integration of oral health promotion into broader health promotion.</p> <p>Each country should produce a thorough description of its population in terms of demographics, socioeconomics, health, diet, nutrition, and cultural factors affecting oral health knowledge, attitudes, beliefs, and behaviours. The case of Slovenia is used as an example.</p>
<p>Teaching methods</p>	<p>For the purposes of this training programme a workshop will be executed. The whole programme will be carried out as a discussion led by moderator. After every activity specific learning objectives will be determined for every participant and until the next workshop their professional tasks should be performed. Their achievements will be reported (within 10 minutes) and discussed with other participants at the next meeting. The formulated document should be submitted to policy-makers.</p> <p>Resources: The computer room for 20 participants needs to be assured. Statistical package SPSS for Windows should be installed on every computer and if necessary, programme should be also installed to the personal computers of the participants. Equipment: data show for PowerPoint presentation, overhead projector, paper, pencils. The refreshment for participants could be provided.</p>
<p>Specific recommendations for teachers</p>	<ul style="list-style-type: none"> • work under teacher supervision/individual students’ work proportion: 67%/33%; • facilities: a computer room; • equipment: computers (1 computer on 2-3 students), LCD projection equipment, internet connection, access to the bibliographic data-bases; • training materials: recommended readings are mainly available in the internet; • target audience: master degree students according to Bologna scheme. <p>It is recommended that participants (group of 15 to 20) are all familiar with statistical package SPSS for Windows.</p>
<p>Assessment of students</p>	<p>Changes in attitude of participants will be examined with the attitude test. The questionnaires will be applied at the beginning of the first meeting and at the end of this training course, or essay, discussing professional impact.</p>

ORAL HEALTH AND ORAL HEALTH PROMOTION

Barbara Artnik

Theoretical background

World Health Organization (WHO) recognizes oral health as an important component of general health, and furthermore, oral health is essential for well-being (1). The majority of oral diseases is related to lifestyles and reducing these predominantly chronic diseases relies much on changing behaviour. Changes for the better in behaviour can and do occur, but require commitment and expertise within health promotion. Customs, practices and lifestyle issues play a role in the oral health of a community and should be considered when national policies and programmes are being formulated.

It has also become clear that risk factors for oral diseases are often the same as those implicated in the major general diseases (2). Oral health and general health share common factors related to diet, the use of tobacco, and the excessive consumption of alcohol and the solutions to control oral disease are to be found through shared approaches with integrated chronic disease prevention.

Oral health promotion is an integral part of general health promotion. Together, oral health promotion and general health promotion address the inseparable issues of systemic and oral diseases, general and oral hygiene, general and oral health care attitudes, and general health services as well as dental services. Thus, oral health promotion and oral disease prevention should embrace what is termed 'the common risk factor approach'; leading to the integration of oral health promotion into broader health promotion concept as reported earlier (3). As a result, any advances in the evaluation of oral health promotion programmes are likely to benefit the development of health promotion in general.

Each country should produce a thorough description of its population in terms of various factors affecting oral health knowledge, attitudes, beliefs and behaviours. This information should be analysed in relation to known and acceptable oral health strategies used in other countries so as to establish the potential appropriateness of establishing such interventions. International exchanges of information are important in this context (1).

Healthy behaviour

Appropriate oral hygiene performed by individuals reduces dental plaque and improves gingival health. Teeth can be brushed several times a day but for a sufficient maintenance of oral hygiene is necessary to brush them at least once a day before sleeping. Dentists should be visited at least once a year for professional checking and treatment if needed. Dental visits are also important for eventual additional information about good oral hygiene of an individual. Proper oral health care includes as well healthy dietary habits. Sweets and soft drinks contain a large amount of sugar and should be avoided (4).

Many of the direct risk factors for oral diseases are known. A reduction or elimination in the effects of risk factors is possible through appropriate knowledge and behaviour such as preventive self-care, limiting high-risk behaviours like use of tobacco and alcohol, taking part in professionally provided preventive, diagnostic and therapeutic care, and having a supportive environment (e.g. community water fluoridation). In order to confront negative behaviours through education and health promotion so as to improve the oral health status of the population, action is necessary not only at the individual level but also at the levels of the health care professions and society.

General and oral health education and promotion

Preventive dental services can improve health only if they are used by the public and the oral health care providers (1). Appropriate use of self-care and professionally provided services requires both, the dissemination of information to the oral and general health care providers, and to the public at large. Studies on services provided by dental practices have shown that the majority of services are for the restoration of diseased teeth rather than for prevention (5, 6). The dissemination of knowledge to the public is also critical in order to stimulate appropriate utilization of dental services and self-care behaviours. Knowledge of factors related to caries and periodontal disease is poorer among older adults than among younger adults (7). The regular use of dental services is associated with improved knowledge. This demonstrates the importance of education provided by dental practices and other sources.

According to several studies there is a significant relationship between general health and oral health on the one hand and socioeconomic and cultural factors on the other. A European and North American survey (8) showed that people of lower education and lower income families and individuals with little or no education were more likely to be edentulous than others. A Swedish study (9) indicated a strong relationship between general health, social factors and oral health among women at retirement age. Moreover, chronic disabling medical conditions, social and psychological factors such as social participation, and negative life events had an important influence on oral health (10). It was also reported (11) that deprivation indices were sensitive to variations in oral health behaviours and could be used to identify small areas with high levels of need, and that they had a major role to play in research into features of people and places and how these promote and/or damage both oral and general health. A worldwide study by Parkin and Muir (12) revealed that tobacco and alcohol use heightened the risk of oral cancer, especially in older adults.

Social and economic factors need to be addressed in both general and oral health promotion. Predisposing risk factors such as gender, age, geographical location, culture and racial/ethnic status are seldom modifiable but they strongly influence oral health status and must be acknowledged in the development of programmes aimed at reducing risk factors for oral diseases and conditions. A lack of perceived need is a prime example of a predisposing attitude.

Socioeconomic and demographic factors are consistently associated also with seeking and obtaining professional dental services. Persons with low income, low educational levels, no insurance coverage, or residing in locations with few health care providers are less likely to have visited a dentist during the past year than others (13). Other indirect influences include individual enabling factors such as: educational and income levels; transportation; lifestyle, including smoking and alcohol consumption; and community support, such as financial assistance programmes and the availability of appropriate health care providers. The removal of barriers to both self-care and professionally provided strategies is necessary if a reduction in the burden of oral impairments in the population is to be achieved. This requires an oral health care delivery system that is different and more inclusive than what is traditional in most countries.

In order to maintain and improve the oral health of adults it is necessary to move beyond the focus on oral health as being primarily dependent on individual lifestyle choices. The social contexts of these choices remain hidden if an exclusively individual approach is adopted. The amount of control that people have over their own health is overestimated.

The maintenance of oral integrity places enormous challenges on the behaviours not only of individuals but also of health care providers and the system, and requires the continuation and improvement of research, education, community programmes and clinical care (1).

Preventive oral care programmes in Europe

Over the past 20 years, a marked decline in the prevalence of oral disease has been observed in several Western European countries. In the adult population, fewer adults are now edentulous and more maintain their functional dentition as measured by having at least 20 natural teeth present. In children, improved oral health is seen in the systematic decline in dental caries and a continually growing number of caries free individuals. This is ascribed to changing life-styles and living conditions, a more sensible approach to sugar consumption, improved oral hygiene practices, use of fluorides in toothpaste, fluoride mouth rinsing or topical application of fluorides, and systematic school-based preventive programmes.

Such positive trends of lower dental caries experience are observed also in children in Slovenia where school oral health programmes were established and maintained up to recent time. However, the general pattern is that the prevalence rate of dental caries in children has remained high in most of South, Central and Eastern Europe (14-16).

Because of the economic and political changes in Eastern Europe, oral health systems are now in transition. Prior to 1989, oral health care for children was provided by public health services and most countries of the region had established school dental services. Since 1989, privatization and decentralization of oral health services have taken place and most public health programmes have been brought to a halt. This change in systems has had a negative impact on utilization of oral health services. In Eastern Europe, high numbers of children attend the dentist with dental emergencies (pain/problems) rather than for preventive reasons. By contrast, the example of Slovenia is interesting since the country consolidated preventive oral care programmes for children in kindergartens and schoolchildren throughout the years of socio-political transition.

Recent surveys carried out in Eastern Europe also revealed that the dental self-care capacity of schoolchildren needs to be improved (17, 18). For example, studies in Poland showed that only 64 % of schoolchildren brushed their teeth at least twice a day (18). In addition, 70 % of children had sweets every day or several times a week. School health education programmes may be instrumental in development of healthy lifestyles in oral health as well as general health. Several studies conducted in Eastern Europe have shown that in addition to involvement of parents, schoolteachers may assist in this process of oral health promotion.

Case study – oral health promotion in Slovenia

High level of oral health promotion in children

In the past decades, caries prevention in children has been carried out in Slovenia systematically and on a large scale, mainly in the form of fluoride treatment (tablets, topical application, brushing with fluoride gel), education for better oral hygiene, and an extensive fissure-sealing programme (19) (Table 1).

Fluorides have been used for the prevention of dental caries for more than 40 years. In the 1950s and 1960s, fluoride tablets were the mainstay of our preventive programme. After 1968, their use began to decline, and between 1970 and 1975 they were largely replaced

by topical fluoride application, performed in dental clinics customarily twice a year. Since 1980 tooth brushing with concentrated fluoride preparations (F-gel), performed under the supervision of dental hygienists, has been the most widespread measure; it is carried out by children aged 7-15 years in primary schools twice a month or around 16 to 18 times a year. Since about 1985, the vast majority of the population has been using fluoridated dentifrices.

Table 1. Preventive programme in Slovenia

Period	Programme
1957-	Fluoride tablets for children aged 0-11 years and expectant mothers (discontinued in 1970 for mothers)
1968-75	Topical application of 2 % NaF in children aged 7-15 years
1980-	Toothbrushing with amine fluoride gel twice monthly in schools, supervised by dental hygienists. Widespread use of fluoride containing dentifrices
1983-	Competitions held in primary schools "Let's have clean teeth"
1986-	Fissure sealing on a mass scale

Source: Vrbič, 2000

An extensive dental health education programme, which also includes supervised tooth brushing in groups, is implemented in schools and day-care centres for pre-school children. During dental health education classes, held in so-called "prevention rooms", children are taught the correct way of brushing their teeth. In 65 % of primary schools, competitions for healthy teeth have been organized periodically since 1983 (19). The oral health education programme is carried out by dentists, nurses and dental hygienists, with ample assistance from teachers, parents and other health care personnel, united in the Slovenian Society for Oral Health (Founded in 1992 with the aim of promoting oral health, the society organizes annual celebrations of Oral Health Day, which are also attended by representatives of the Ministry of Health and the WHO. On this occasion, the status of oral health in the country is analysed and appropriate future measures are planned).

Fissure sealants were adopted for large-scale use in Slovenia in 1986, after a 5-year trial conducted in four school dental clinics in different parts of Slovenia (20, 21). Treatment starts at the age of 6 years with sealant placement on all sound first permanent molars directly upon eruption. Treatment then continues with sealing of newly erupted molars and, if necessary, premolars until the age of 18.

Slovenia has a well-organized public dental health service. Set up after the World War II, the public dental health service has functioned efficiently throughout the post-war period, and the preventive programme has been systematically implemented. From 1945 to 1992, all Slovenian dentists were employed by the public dental health service and private practice was not allowed. The public dental health service covered the dental care needs of the entire population. The school dental service is part of the public dental health service. Most large primary schools in Slovenia have their own dental clinics, located on the school premises. In 1991, Slovenia became an independent country, and in the following year, private practice was legalized. Since then, a number of school dentists have left the public dental health service to work in the private sector. After 1991, the social and political

system in Slovenia underwent considerable changes, yet the public dental health service continued to function without major problems. This was mirrored in the caries prevalence, which continued to decline during the transition period (19, 22). In some Eastern European countries, the recent social and political changes have created much more serious difficulties in the field of health, and caries levels have remained fairly high.

It is likewise impossible to determine with certainty which factors have been the most influential for the caries decline in children in Slovenia. However, the probability is that these were mainly fluoride treatments, improved oral hygiene and fissure sealing.

Supervised brushing with concentrated fluoride gel is currently carried out in most primary schools (70 %). This has been the most widespread form of fluoride treatment in Slovenia since 1980. Oral hygiene in children and adolescents up to 18 years of age improved over the past decade. This is confirmed by the findings of regular dental examinations, performed by school dentists, in which the presence of dental plaque and gingivitis is recorded. The improvement is understandable since competitions in oral hygiene maintenance have been conducted in primary schools continually for 16 years. Twenty percent of primary schools participated in the competition in 1983, compared to as many as 65% in 1998. These competitions receive considerable attention from the public; the presentation of awards, organized in a different town each year, is attended by about 2500 schoolchildren and teachers. There is no doubt that oral hygiene has improved because of the popularity of the competition (19).

Aside from the above-mentioned measures, Slovenia has an extensive oral health education programme, which won the 1997 Bright Smiles/Bright Futures Award, sponsored by the International Association of Paediatric Dentistry (23).

In 1998, as many as 86 % of Slovenian 12-year olds had sealants on one or more teeth. The proportion of 12-year-olds with sealed teeth in individual regions ranged from 62 %, observed in one region, to 100 % in four of the nine geographic regions of Slovenia. The average (86 %) is among the highest national averages reported worldwide in the literature so far. In 1998, the highest average sealant rate mentioned in the literature was 80 %, reported for Ireland (24). The beginning of large-scale use of sealants in Slovenia in 1986 coincided with the appearance of a clearly declining caries trend, which has continued to the present. Thus we may conclude that sealants have played a major part in the caries decline in Slovenia. More than 95 % of sealants are applied in school dental programmes and the rest by private dentists. Fissure sealing is free of charge for persons under 25 years of age. All the preventive measures mentioned (with the exception of sealant placement on first permanent molars directly after eruption) are implemented in an organized and consistent manner mainly in primary schools and much less so in the pre-school period. This is probably the main reason that the caries decline has not become apparent in the primary dentition (19).

These experiences from Slovenia and other Western European countries clearly indicate that schools provide significant platforms for control of oral disease in children and they are relevant settings for promotion of oral health.

Challenges for the future

The WHO oral health goals have been formulated for the year 2020 as part of the so called WHO Health21 policy for Europe (25). By this year, at least 80 % of 6-year-olds should be caries free and on average no more than 1.5 DMFT should be observed for children of age

12 years. In South Eastern Europe, such goals can only be achieved if oral health promotion and oral disease prevention programmes are implemented at community level. Important demonstration programmes are now established in several countries with the technical support of the WHO. The school oral health programmes are organized according to the concepts of the WHO Health Promoting Schools Project. The evaluation of demonstration programmes may thereby be most instrumental to the development of national oral health programmes and the experiences may also be shared by health professionals and health care planners across countries.

In Slovenia, development of public dental care network for children and adolescents is necessary. A new preventive dental care programme with well-defined responsibilities of all parties concerned should be adopted and should comprise the content, volume, quality, time, monitoring, and financial sources allocated for these purposes. We should not forget the public health measures that should be taken, like fluoridation (e.g. salt), dental health education integrated in health promotion (kindergartens, schools etc.), education of the professionals etc. Such a programme could improve the situation, reduce the differences between the regions, and improve dental health education.

Adults at high risk for poor oral self-care in Slovenia

In contrast to oral health in children, systematic information on the oral health behaviour profile of the adult population is needed in order to support the planning and evaluation of oral health promotion programmes for the public.

In general population, prevalence of poor oral self-care was estimated on average to be 6.9 % (26). The results of the study show that poor oral self-care is unequally distributed among adults in Slovenia. Higher prevalence than average was found in men, in age groups 40-49 and 50-59, in participants with uncompleted primary, primary or vocational educational level, in participants working as heavy workers in rural economy or industry, and those unemployed (job seekers), in participants self-classified in lower or labor social class, in participants from rural residence communities, and in participants from eastern Slovenia. Individuals, and the group as a whole, who are at the highest risk, are people, hardly attainable for educational activities. This population group has unfulfilled baseline socioeconomic conditions for healthy lifestyle.

Since the degree of oral care is rather low in Slovenia according to the collected data, it could be assumed that almost 7 % of Slovene population has been insufficiently informed about the preventive dental care and are not aware how important the oral health is for their overall wellbeing. Because they do not feel the need to take care of their teeth properly they have not developed a dental care friendly lifestyle. This group of people is therefore highly prone to teeth infections, decay and various teeth conditions as well as different health problems that are indirectly connected with the oral health.

Distribution of teeth brushing frequency by gender shows that adult males are much more ignorant towards their oral health than females and are therefore more prone to tooth decay and various oral conditions. The results are more or less the same in similar studies (27-31).

Older people also tend to take less and less care of their teeth compared to younger. Percentage of respondents aged 50-59 who are neglecting their oral health is almost doubled compared to the respondents aged 25-29. These huge differences can be explained with the fact that younger generations (especially those born after 1975) were taking

part in organized dental education in preschool care institutions, schools and community health care centers. Still we can not be entirely satisfied with the awareness of preventive dental care in the age group 25-29 because the basic research report on health behaviour in Slovene adults (32) show that around 32 % of respondents from this age group have not visited dentist for the last 12 months. We have expected much lower share of adults from this age group neglecting their oral health because they had been subjected to extensive dental-health prevention programmes (leading to higher awareness), but obviously we have been wrong. The interesting thing is that the lowest percentage has been reached in the age group 30-39 (28 %). It could have been due to the fact that young adults aged 25-29 do not feel the need to visit dentist because they know their teeth had been taken care of in their childhood so they do not worry about them; but they are subconsciously aware of the need to have their teeth regularly examined for prevention reasons and they start doing it after they reach their 30-ies.

We are even less happy with the widespread drinking of soft drinks amongst the population. The problem lies in uncontrolled consumption of fast sugars between meals that can have potentially disastrous effects on oral health. It usually affects younger adults (25-29 year olds: 39 %, 30-34 year olds: 37 %) and falls under average level no sooner than in the age group 50-54 (32).

People with higher socioeconomic status tend to have more positive attitude towards preventive health care and vice versa. If we take into account the level of poverty in Slovenia (13.6 %) (33), we can clearly see the close connection between the oral health care and socioeconomic situation in the country.

Future perspectives

In Slovenia, renewed national goals for good (oral) health in the next decade should be set up. It is important to permanently monitor oral health status of adults (in the general frame of monitoring health behaviour), especially the frequency of consuming soft drinks which becomes an important issue in Slovenia (not only because of poor oral health but also because of obesity). Besides that, additional questions about protective means and applications in oral cavity should be included in health surveys on risky health behaviour. This is recommendable because protective means can play an important role in oral public health, as reported earlier (31). A special attention should be given to the oral health promotion for men with low educational level belonging to the lowest social classes, as well as of healthy living and lifestyles on general, especially for low socioeconomic groups, and for elderly people (financial and physical accessibility). People should be motivated to take care of their general and oral health actively, whereas the society should enabled them to do so.

Exercise

For the purposes of this training programme four tasks will be executed (one task for every learning objective). The whole programme will be carried out as a discussion led by moderator. After every task specific learning objectives will be determined for every participant and until the next meeting their professional tasks should be performed. Their achievements will be reported (within 10 minutes) and discussed with other participants at the next meeting.

Task 1:

Stimulating introduction at the first meeting will be led by moderator: key words will be used as a target to sensitise the participants that oral health promotion is an integral part of general health promotion. Discussion: The assessment process of the availability of data.

Task 1 they have to achieve until the Meeting 2:

- To inventory the data that are already being collected and that can be used to assess the oral health status in different population groups;
- To assess the informative value of these data;
- To make provisions for generating new data.

Task 2:

At the second meeting the reports should be presented by every participant. Discussion: Existing data sources. The results of the first workshop will determine whether additional data need to be collected or just data from different registries or surveys should be linked.

Task 2 they have to achieve until the Meeting 3 (if necessary):

- To add variables to existing data sources;
- To link data from different registries.

Task 3:

At the third meeting the reports should be presented by every participant. Methodological guidelines should be discussed and refined. It has to be decided:

- Which indicators will be used;
- Should the analysis be limited to measuring the effect of lower socio-economic status on poor oral health of people of lower socio-economic status, or should it also aim at measuring the total impact these differences have on the oral health of the population;
- The choice of an adequate level of analysis and the application of multilevel analysis.

Task 3 should be accomplished until the Meeting 4:

- To analyse differences in oral health;
- To interpret the results carefully;
- To prepare the results for clear and understandable presentation.

Task 4:

At the fourth meeting the results have to be presented clearly and understandably (e.g. to use graphical displays) by every participant. The discussion: Formulating a public health policy response to the results:

- To what extent has the state identified oral health promotion as an important part of general health promotion until now;
- What are the objectives for any interventions;
- Who are the main groups with a concern for poor oral health;
- What are their interests, priorities, and commitments;
- What is the context within which interventions need to be considered;
- etc.

The formulated document should assure that public health policy satisfies identified needs and finally it should be submitted to policy-makers.

Follow up workshops on health policy development should be performed every six months.

References

1. World Health Organization. Global review on oral health in ageing societies. Ageing and health. Technical report volume 3. Kobe: WHO Kobe Centre for Health Development, 2002. Available from: URL: http://www.who.or.jp/AHP/docs/ageing_technical_3.pdf (Accessed: July 26, 2007).
2. World Health Organization. Diet, nutrition and the prevention of chronic diseases. Report of a joint WHO/FAO expert consultation. Geneva: World Health Organization (WHO Technical Report Series 916), 2003.
3. 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 Dental Health* 2004; 21 (4 Suppl): 319-29. Available from: URL: http://www.who.int/oral_health/publications/orh_cdh21-4_p1to11.pdf (Accessed: July 26, 2007).
4. World Health Organization. Population nutrient intake goals for preventing diet-related chronic diseases. Recommendations for preventing dental diseases. In: Diet, nutrition and the prevention of chronic diseases. Report of a joint WHO/FAO expert consultation. Geneva: World Health Organization (WHO Technical Report Series 916), 2003. pp. 105-28. Available from: URL: http://whqlibdoc.who.int/trs/WHO_TRS_916.pdf (Accessed: July 26, 2007).
5. Kim JB. What do the public and profession know about dental caries prevention in Korea? *International Dental Journal* 1998; 48: 399-404.
6. Kawamura M, Sasaki T, Imai-Tanaka T, Yamasaki Y, Iwamoto Y. Service-mix in general dental practice in Japan: a survey in a suburban area. *Australian Dental Journal* 1998; 43(6): 410-6.
7. Schwarz E, Lo ECM. Use of dental services by the middle-aged and the elderly in Hong Kong. *Community Dentistry and Oral Epidemiology* 1994; 22: 374-80.
8. Kandelman D, Bordeur JM, Simard P, Lepage Y. Dental needs of the elderly: a comparison between some European and North American surveys. *Community Dental Health* 1986; 3(1): 19-39.
9. Norlen P, Östberg H, Björn A-L. Relationship between general health, social factors and oral health in women at the age of retirement. *Community Dentistry and Oral Epidemiology* 1991; 19: 296-301.
10. Beck JD, Kohort FJ, Hunt RJ, Heckert D. Root caries: physical, medical and psychosocial factors correlates in an elderly population. *Gerodontology* 1986; 3: 242-7.
11. Locker D, Clarke M, Payne B. Self-perceived oral health status, psychological well-being, and life satisfaction in an older adult population. *Journal of Dental Research* 2000; 79(4): 970-5.
12. Parkin DM, Muir CS. Comparability and quality of data. In: Parkin DM, Muir CS, Whelan SL, Gao Y-T, Ferlay J, Powell J, eds. *Cancer Incidence in Five Continents, Volume VI* (IARC Scientific Publications No. 120). Lyon: International Agency for Research on Cancer; New York: Distributed in the USA by Oxford University Press, 1992: 45-173.
13. United States 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 Institutes of Health, 2000.
14. Dragheim E, Petersen PE, Kalo I, Saag M. Dental caries in schoolchildren of an Estonian and a Danish municipality. *Int J Pediatr Dent* 2000; 10: 271-7.
15. Petersen PE, Rusu M. Oral health status of Romanian schoolchildren - national survey 2000. Copenhagen: World Health Organization Regional Office for Europe, 2002.
16. Szöke J, Petersen PE. Evidence for dental caries decline among children in an East European country (Hungary). *Community Dent Oral Epidemiol* 2000; 28: 155-160.
17. Petersen PE, Danila I, Samoila A. Oral health behavior, knowledge and attitudes of children, mothers and schoolteachers in Romania in 1993. *Acta Odontol Scand* 1995; 53: 363-8.
18. Wierzbicka M, Petersen PE, Szatko F, Dybizbanska E, Kalo I. Changing oral health status and oral health behaviour profile of schoolchildren in Poland. *Community Dent Health* 2002; 19: 243-50.
19. Vrbič V. Reasons for the caries decline in Slovenia. *Community Dent Oral Epidemiol* 2000, 28: 126-132.
20. Vrbič V. Retention of fissure sealant and caries reduction. *Quintessence Int* 1983; 14: 421-4.

21. Vrbič V. Five-year experience with fissure sealing. *Quintessence Int* 1986; 17: 371-2.
22. Premik M. Oral health in Slovenia (in Slovene). In: Vrbovšek J. et al., eds. 20 let čistih zob. Zbornik. Ljubljana: Stomatološka sekcija slovenskega zdravniškega društva, 2003. pp. 6-7.
23. Vrbič V, Bartenjev M, Košir N, Škapin M. Slovenia: national oral health education programme. *Int J Paediatr Dent* 1997; 7: 283-5.
24. O'Mullane DM, Clarke D, Daly F, et al. Use of fissure sealants in the Eastern Health Board in the Republic of Ireland. 45th ORCA Congress. *Caries Res* 1998; 32: 267-317.
25. WHO, Regional Office for Europe. The health for policy framework for the WHO European Region. Copenhagen: WHO Regional Office for Europe, European Health for All Series, No.6, 1998.
26. Zaletel-Kragelj L, Premik M. Low grade of oral self care (in Slovene). In: Zaletel-Kragelj L, Fras Z, Maučec Zakotnik J (editors). Risky behaviours related to health and selected health conditions in adult population of Slovenia: results of Slovenia CINDI Health Monitor Survey 2001. II. Risky behaviours (in Slovene). Ljubljana: CINDI Slovenia, 2004.
27. Helakorpi S, Patja K, Prättälä R, Uutela A. Health behaviour and health among Finnish adult population, spring 2001. Helsinki: Publications of the National Public Health Institute, 2001. Available from: URL: http://www.ktl.fi/portal/suomi/osastot/eteo/yksikot/terveyden_edistamisen_yksikko/tutkimus/elintapaseurannat/aikuisvaeston_terveyskayttaytyminen/raportit/ (Accessed: July 26, 2007).
28. Pudule I, Grinberga D, Rītuma A, et al. Health behaviour among Latvian adult population, 2000. Helsinki: Publications of the National Public Health Institute, 2001.
29. Grabauskas V, Klumbiene J, Petkevičienė J, et al. Health behaviour among Lithuanian adult population, 2000. Helsinki: Publications of the National Public Health Institute, 2001.
30. National Center for Chronic Disease Prevention and Health Promotion. Oral Health Resources. Resource Library. Fact Sheet. Oral Health for Adults, 2006. Available from: URL: <http://www.cdc.gov/OralHealth/factsheets/adult.htm> (Accessed: July 26, 2007).
31. National Center for Chronic Disease Prevention and Health Promotion. Behavioral Risk Factor Surveillance System. Prevalence Data. Oral Health, 2006. Available from: URL: <http://apps.nccd.cdc.gov/brfss/> (Accessed: July 26, 2007).
32. Zaletel-Kragelj L, Fras Z, Maučec Zakotnik J. Health behaviour and health among Slovene adult population, 2001. CINDI Health Monitor Survey 2001. Ljubljana: University of Ljubljana, Faculty of medicine, CINDI Slovenia, 2005.
33. Javornik J, Korošec V, eds. Human development report - Slovenija 2002/2003. Ljubljana: Institute of Macroeconomic Analysis and Development & United Nations Development Programme, 2003
34. National Center for Health Statistics. Health, United States, 2006. Chartbook on trends in the health of Americans. Hyattsville, MD: National Center for Health Statistics, 2006. Available from: URL: www.cdc.gov/nchs/hsus.htm (Accessed: July 26, 2007).

Recommended readings

1. World Health Organization. Global review on oral health in ageing societies. Ageing and health. Technical report volume 3. Kobe: WHO Kobe Centre for Health Development, 2002. Available from: URL: http://www.who.or.jp/AHP/docs/ageing_technical_3.pdf (Accessed: July 26, 2007).
2. 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 Dental Health* 2004; 21 (4 Suppl): 319-29. Available from: URL: http://www.who.int/oral_health/publications/orh_cdh21-4_p1to11.pdf (Accessed: July 26, 2007).
3. World Health Organization. Population nutrient intake goals for preventing diet-related chronic diseases. Recommendations for preventing dental diseases. In: Diet, nutrition and the prevention of chronic diseases. Report of a joint WHO/FAO expert consultation. Geneva: World Health Organization (WHO Technical Report Series 916), 2003. pp. 105-28. Available from: URL: http://whqlibdoc.who.int/trs/WHO_TRS_916.pdf (Accessed: July 26, 2007).