

Promoting oral health of children through schools – Results from a WHO global survey 2012

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This paper reviews the range of school-based approaches to oral health and describes what is meant by a Health Promoting School. The paper then reports the results of a World Health Organization global survey of school-based health promotion. Purposive sampling across 100 countries produced 108 evaluations of school oral health projects spread across 61 countries around the globe. The Ottawa Charter for Health Promotion noted that schools can provide a supportive environment for promoting children's health. However, while a number of well-known strategies are being applied, the full range of health promoting actions is not being used globally. A greater emphasis on integrated health promotion is advised in place of narrower, disease- or project-specific approaches. Recommendations are made for improving this situation, for further research and for specifying an operational framework for sharing experiences and research.

Key words: *child oral health, school oral health policy, health promotion, setting for oral health, school based prevention, organization of school oral health programmes*

Introduction

The most common oral diseases among children are gingivitis and dental caries the latter affecting 60-90% of children globally (Petersen, 2003; WHO/CAPP, 2013b). Dental caries is progressive and cumulative in nature and becomes more complex over time. If untreated it can affect children's quality of life, e.g. ability to eat and chew, the food they choose, how they look and the way they communicate. Pain from teeth or mouth can compromise their concentration and their participation in school, thereby hampering not only their play and development but also denying them the full benefit of schooling (Petersen *et al.*, 2005).

Over the last decades an overall decrease in dental caries among children has taken place in several high income countries. The disease burden in these countries is now mainly found in disadvantaged population groups of society (Whelton and O'Mullane, 2007). The decline in dental caries of children is most likely the result of a combination of factors such as improvement of living conditions, widespread use of fluoride, better oral health behaviour, and the establishment of prevention oriented school health programmes (Downer *et al.*, 2005; Marthaler *et al.*, 1996). For low-income countries however the opposite trend has been noted (Petersen, 2003; Petersen *et al.*, 2005; Sheiham, 1984). The increase of dental caries incidence in these countries is doubtless due to a complicated causal web related to the economic, demographic and nutritional transitions, low tradition of oral health care, limited use of fluoride, and lack of oral health services.

Disparities in oral health status and in use of services exist for population groups at all ages and among children they are found universally (Petersen, 2005). In many coun-

tries across the world significant proportions of children are underserved and they are not adequately targeted by oral disease prevention and health promotion in the context of public health programmes (Kwan and Petersen, 2010).

Promoting oral health through schools

Fortunately, a number of prevention and health promotion interventions exist. In 1995, the World Health Organization (WHO) launched the "Global School Health Initiative" which is designed to improve the health of students, school personnel, families and other members of the community through schools. The direction of the initiative is guided by the Ottawa Charter for Health Promotion (WHO, 1986, see Box 1), the Jakarta Declaration of the Fourth International Conference on Health Promotion (WHO, 1997a), the 1995 WHO Expert Committee Recommendation on Comprehensive School Health Education and Promotion (WHO, 1997b), and the 2009 Nairobi Call to Action – Closing the Implementation Gap in Health Promotion (Petersen and Kwan, 2010).

To assist education and health agencies in their efforts to develop health promoting schools the WHO Global School Health Initiative commissioned the development of an information series on school health. A number of health issues relevant to oral health have so far been covered in a number of documents, e.g. nutrition, tobacco use prevention, teacher's exercise book for HIV prevention, skills for health, promoting physical activity, and promoting oral health (respectively WHO, 1998; 1999; 2002a; 2002b; 2008; 2003). The documents use the same structure covering the following aspects:

- information on the specific health issue and why it should be approached through school

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Box 1. Health Promotion actions according to the Ottawa Charter (WHO, 1986)

“Health Promotion” means:

- Building healthy public policy
- Creating supportive environments
- Strengthening community actions
- Developing personal skills
- Reorienting the health sector towards disease prevention and promotion of health.

Box 2. Features of a Health Promoting School (WHO, 1995)

A Health Promoting School:

- Fosters health and learning with all the measures at its disposal.
- Engages health and education officials, teachers, teachers’ unions, students, parents, health providers and community leaders in efforts to make the school a healthy place.
- Strives to provide a healthy environment, school health education, and school health services along with school/ community projects and outreach, health promotion programmes for staff, nutrition and food safety programmes, opportunities for physical education and recreation, and programmes for counselling, social support and mental health promotion.
- Implements policies and practices that respect an individual’s wellbeing and dignity, provide multiple opportunities for success, and acknowledge good efforts and intentions as well as personal achievements.
- Strives to improve the health of school personnel, families and community members as well as pupils; and works with community leaders to help them understand how the community contributes to, or undermines, health and education.

Box 3. Characteristics of an Oral Health Promoting School (WHO, 2003)

School health policy

- Developed with input from all stakeholders (parents, teachers, students, school nurses, dental staff, community health workers, etc.)
- Providing the framework for all oral health activities

Healthy school environment

- Presence of healthy choices for food, drinks and snacks
- Access to safe water and sanitation
- Ban on vending machines providing sugary drinks
- No access to sweets on school premises
- Ban on tobacco use
- Safe playground and sports facilities
- Exposure to adequate fluoride levels using relevant fluoride vehicles

Oral health education

- Integrated into existing curriculum
- Continuous
- Age-specific
- Child centred
- Skills-based
- Community oriented

- arguments useful for advocacy
- how to convince others that the promotion of the specific topic really works
- how to plan the interventions
- how to integrate health promotion within various components of a school health programme
- how to evaluate the interventions.

The features of a Health Promoting School are detailed in Box 2 while Box 3 summarises the oral health characteristics of these schools (WHO, 1995; 2003).

Schools have proven a powerful setting for secondary socialisation. Students can be accessed during school years, a period that runs from childhood to adolescence. These are influential stages in people's lives when lifelong sustainable health related behaviours, as well as beliefs and attitudes, are being developed. Globally, approximately 90% of children attend primary schools, yet the figure is somewhat lower in Sub-Saharan Africa (77%) (UNESCO, 2011). A substantial part of the child population can thus be reached through primary schools. Children are particularly receptive during this period and the earlier the habits are established, the longer lasting is the impact. Moreover, the messages can be reinforced regularly throughout the school years. Children may also be equipped with personal skills that enable them to make healthy decisions, to adopt a healthy lifestyle and to deal with stressful situations such as violence and conflicts.

To get accurate data on health behaviours and protective factors among school children the "Global School-based Student Health Survey (GSHS)" has been developed addressing the leading causes of morbidity and mortality among children and adults worldwide (alcohol, diet, drug use, hygiene – *including oral hygiene* –, mental health, physical activity, sexual behaviours, tobacco use, violence and unintentional injury)(WHO, 2012). The manual "WHO Oral Health Surveys - Basic Methods" (WHO, 2013a) provides the tools for gathering data on oral health status of children and information about oral health risk factors and quality of life.

School health programmes are important for promoting health and healthy lifestyles of children and youth. Activities should emphasise the development of healthy environments and enable personal health practices. Health education is one key element in health promotion and requires sound planning based on theories of health-related behaviour. Oral health has shown to be easily integrated into such school health activities. A manual on how to incorporate oral health in schools as well as recommendations on how to evaluate community-based oral health promotion and disease prevention has been developed by the WHO (Petersen and Kwan, 2004; Kwan *et al.*, 2005; WHO, 2003).

The range of approaches to oral health through schools

Around the globe oral health is being approached through schools. How this is done, the scope, the strategies applied and the professionals involved varies widely across countries and areas. It depends on a number of factors such as organisation and financing of the health and

education sectors, the socio-economic situation of the country/area, traditions and focus of the oral and general health sector, health policies, and the burden of oral disease among the target group just to mention a few.

However, the vast majority of children globally are not at all covered by comprehensive oral health services at all (Petersen, 2003; Widström and Eaton, 2004). In low-and middle income countries health promoting schools are mainly used as an important platform for health promotion in terms of education, examination and screening while treatment of oral disease may not be implemented out of financial constraints.

In some parts of the world oral health care for children is provided in a systematic way with full coverage of the entire child population. In, for example, Scandinavian countries there are a long tradition and a broad public consensus for public provision and financing of a comprehensive school oral health service for all children and youth up to the age of 18 years (Källestål *et al.*, 1999; Wang *et al.*, 1998). These countries apply the Primary Health Care model. In Denmark, municipal oral health services were introduced in 1911 and the service includes disease prevention and comprehensive clinical care, outreach activities to schools and families, and school and community oriented health promotion. Kindergartens and preschools are served mainly from school-based clinics by municipal dental staff (Christensen *et al.*, 2010; Petersen and Torres, 1999). Such a school oral health system was established in Kuwait in 1982 based on Danish experiences and the positive outcome of comprehensive public health care and health promotion has been demonstrated (Ministry of Health, Kuwait, 2011). In other countries school oral health services are limited to dental treatment which might be partly subsidised by the state while again other countries might offer activities on a project base.

The full range of oral health promotion actions as indicated in the Ottawa Charter is rarely applied. Meanwhile, the school is used as a platform for oral health activities in many countries. Several important activities are frequently implemented such as oral health education, fluoride exposure, and examination and provision of basic treatment. Health education, including oral health, is part of many primary school curricula and "Health Promoting Schools" networks exist in numerous countries providing a structure for an integrated approach to oral health (MacNab *et al.*, 2010; Stokes *et al.*, 2009). Moreover, oral health has the potential to act as entry point for the establishment of a health promoting school (MacNab and Kasangaki, 2012).

Fluoride administration through schools

Dental caries can be prevented by reducing the impact of sugar consumption, by adequate oral hygiene and emphasising the benefits of fluorides (Moynihan and Petersen, 2004). A constantly maintained low level of fluoride in the mouth has been shown to be effective in decreasing dental caries levels in children and adults alike. This preventive effect has been acknowledged by four World Health Assembly resolutions, the first of which was endorsed over 40 years ago (World Health Assembly 1969; 1975; 1978, 2007). Effective use of fluorides can involve action by communities, professionals and indi-

viduals and is one of the priority action areas identified by the WHO to improve oral health globally (Petersen, 2003; 2008). Assuring an adequate fluoride exposure is at the heart of numerous school-based activities aiming at improving children's oral health status. This is predominantly done through the use of fluoridated toothpaste, fluoride rinsing and consumption of fluoridated milk. The choice of vehicle depends on a number of factors related to the specific community context: population of interest, disease pattern, available infrastructure, cost, legal issues and public acceptance (Petersen and Lennon, 2004; Petersen *et al.*, 2012). Toothpaste is the fluoride vehicle most widely used globally (Jones *et al.*, 2005) and supervised tooth brushing exercises are commonly implemented through schools (Al-Jundi *et al.*, 2006; Curnow *et al.*, 2002; Jackson *et al.*, 2005; Petersen and Phantumvanit, 2012; Zero *et al.*, 2012). Apart from the regular exposure to fluoride the supervised tooth brushing has the potential to establish an oral hygiene practice which can easily be performed outside school. The tooth brushing exercise does, if performed correctly, benefit not only the dentition status but also the periodontal health throughout life. Implementing regular school-based fluoride rinsing is another accepted way to expose children to fluoride as the regular exercise can easily be conducted or assisted by school teachers (Levin *et al.*, 2009; Ohara *et al.*, 2000). This is especially effective in areas with high caries burden and little natural fluoride exposure (Centers for Disease Control and Prevention, 2001). A number of countries have used the school as a platform to provide fluoridated milk to schoolchildren hereby simultaneously addressing the nutritional and oral health status of children (Bánóczy *et al.*, 2009; Bian *et al.*, 2003; Ketley *et al.*, 2003; Mariño *et al.*, 2001; Riley *et al.*, 2005). Milk fluoridation projects are implemented in Thailand organised by the Ministry of Health, and supported by the Borrow Foundation, WHO, and the Royal Chitralada Project.

Specific preventive care provided through schools

Preventive care provided through schools varies according to the local situation. Extensive treatment is typically limited to locations with a well-equipped school-based clinic. However, even a basic or mobile clinic can provide useful services such as oral health screening, treatment of high risk children with fluoride varnish, and basic dental care such as ART (Atraumatic Restorative Treatment, Frencken and Holmgren, 1999), and tooth extractions (Lopez *et al.*, 2005; Motsei *et al.*, 2001). The school may also provide a unique platform for fissure sealant programmes and some positive outcome from applications of fissure and pit sealants is shown in countries like Australia, USA, France and Ireland (Armfield and Spencer, 2007, Devlin and Henshaw, 2011; Dorantes *et al.*, 2005; Muller-Bolla *et al.*, 2013; Parnell *et al.*, 2003).

Oral health education

Oral health education is provided in numerous ways using a wide range of techniques and material approaching oral health related topics ranging from diet, oral hygiene, tobacco, oral structures, benefits of oral health, to oral piercings. Diet and oral hygiene and its impact on oral

health are likely to be the topics covered most broadly. Oral health education should be based on principles of active involvement and reinforcement. However, experience show that oral health education for children may have limited impact on its own (Honkala, 1993). If however combined with additional activities and provided on a regular basis health education is likely to have a positive impact on oral health behaviour as well as oral health status (Biesbrock *et al.*, 2004; Frencken *et al.*, 2001; Friel *et al.*, 2002; Hawkins *et al.*, 2000; MacNab and Kasangaki, 2012; Petersen *et al.*, 2004; Sri Wendari *et al.*, 2002; State Government of Victoria, 2011; Tai *et al.*, 2009; Vanobbergen *et al.*, 2004; Worthington *et al.*, 2001).

Oral health in a broader context

In November 2011 the 6th Asian Conference of Oral Health Promotion for School Children was held in Hanoi, Vietnam, with over 400 delegates from 20 Asian countries indicating the high level of interest on school oral health in this region. Some experience has been gained in combining oral health with other health issues. The "Sweet Enough Network" under the "Thai Health Promotion Foundation" aims at reducing the sugar intake of Thais to fight obesity and dental caries alike. One of their goals is the development and implementation of healthy food policies in schools. Innovative projects on reducing the sugar content in food served by school canteens and the ban on carbonated soft drinks in schools have been implemented (Sirichakwal and Sranacharoenpong, 2008). A community trial is currently being implemented in the Province of Songkla, Thailand, investigating how pre-school-based oral health promotion can be implemented in a Thai setting focusing on oral hygiene, use of fluoridated toothpaste, problem-based learning, and involvement of teachers, families and communities. Around the world school-based oral health activities are often linked to personal hygiene, healthy diet or nutrition. A project in the Philippines confirms that the concern for oral health may be combined with general health issues such as hand washing, de-worming, and diet (Monse *et al.*, 2010). Other projects have focussed specifically on how to reduce inequity in oral health through school-based activities (Curnow *et al.*, 2002; Freeman *et al.*, 2001; Levin *et al.*, 2009; NHS Scotland). In Madagascar, a national oral health policy and a country-wide programme on health promoting schools are established as a result of a comprehensive development project undertaken by the WHO Collaborating Centre for Community Oral Health Programmes and Research, University of Copenhagen. The project focused on community engagement and building capacity in oral health promotion through schools (Razanamihaja and Petersen, 1998). In Tanzania, several school health projects have been established by the National School Health authorities in urban and rural areas; in addition to oral health they incorporate diet and nutrition, HIV/AIDS prevention, and personal hygiene.

Documentation of activities

Compared with the overall number of activities and projects implemented globally only few are documented and evaluated systematically. The "6th Asian Conference on Oral Health Promotion for School Children" gave

however an insight into the numbers of projects actually being implemented in the Asian region alone. Publications in peer reviewed journals are however limited and lessons learned thus not shared in a systematic way. Furthermore, the majority of the documented interventions derive from high income countries and they are not always applicable to a low-or middle income context. The experience gained through interventions in low-and middle income countries on the other hand do not benefit the wider school oral health community in these countries.

A WHO Global Survey on oral health through schools

Based on the Health Promoting Schools guidelines the WHO Oral Health Programme has provided technical assistance and support to implementation and evaluation of school oral health projects in countries around the globe. In 2011/2012 a global survey was initiated by the Programme as part of an evaluation of the opportunities in the application of the Health Promoting Schools concept to oral health and an assessment of possible barriers in the implementation of school oral health programmes globally. It was decided to gather information on school oral health activities by means of a questionnaire-based survey. The intention of the survey was not to be quantitative in nature showing the coverage of school oral health interventions worldwide. The intention was more to show the broad spectrum of interventions to be applied around the globe under various economic, organisational, political and cultural situations. Purposive sampling was therefore applied approaching key individuals known to being actively involved in school oral health or being able to forward the questionnaire to the relevant people within the school oral health community in the country of interest. These were people such as public health administrators, Chief Dental Officers and community workers active in public oral health in the different WHO regions. A number of public health specialists and health systems researchers acquired during the “6th Asian Congress on Oral Health Promotion for School Children” were contacted as were a number of WHO Collaborating Centres in Oral Health, and collaborators of the WHO Global Oral Health Programme. A self-explanatory questionnaire was developed aimed at key people involved in school oral health activities. Topics such as organisation and financing of school health, provision of services and activities, monitoring and evaluation, and barriers and supportive factors for school oral health were covered. The questionnaire was pre-tested by colleagues not included in the survey. A cover letter and the questionnaire were translated from English into Spanish and French and the final questionnaire allowed for direct electronic completion. The first questionnaires were sent out by e-mail in late September 2011 and were followed stepwise as new contacts were received. Reminders and follow ups were sent to non-respondents to increase the response rate. The last response was received in September 2012.

In total 100 countries were approached and 61 countries completed the questionnaire. Data processing and analyses was performed by means of the Statistical

Package for the Social Sciences, SPSS 19.0 and 108 sets of responses were included in the analyses.

Results of the global survey on school oral health

Respondents

Of all 108 responses, roughly a third were received from higher middle income countries (HMICs) and another third from high income countries (HICs), 13% were received from low income countries (LICs), while the remaining 16% were received from lower middle income countries (LMICs) (Table 1, Figure 1).

The European region accounted for the majority of all returned questionnaires (31%) followed by the Western Pacific region (28%) and the African region (13%). The American region and the South East Asian region accounted for each 10%, while 8% of the questionnaires were received from the Eastern Mediterranean region.

Chief Dental Officers and staff from various departments within the Ministry of Health accounted for one third of the responses, followed by members of provincial, local or district dental teams (29%) whereas 26% of the respondents were university employees. The remaining 10% of the respondents were members of NGOs, United Nations (UN) organisations or dental associations.

National health authorities – mainly ministries of health and education – were quoted as the initiators of school oral health activities by more than half of the respondents followed by local oral health teams, local government units, and universities.

Types of school

The majority of respondents supported public or both public and private schools although 14% of respondents from the African Region only supported private schools. Schools were generally mixed in regards to size as well as socio-economic standard. The schools most frequently supported by the respondents were primary schools (93%). The support of preschools and kindergartens was stated by 66% and 57% respectively with significant differences across economic background of the countries, the low income countries supporting less frequently (Figure 2). “Other” schools were mainly schools targeting disadvantaged groups such as e.g. special needs schools, orphan villages, schools for defectives and early school leavers. Of all respondents, 19% reportedly supported these disadvantaged populations, most frequently, although not statistically significantly, if higher middle-and high-income countries.

The participation in local or national school health networks was limited in all regions and across countries with different economic situation. In total only 9% of the respondents reported all their schools to be part of a local network while 12% reported all their schools to be part of a national network. More than a third stated their schools not to have contact to any school health network at all.

Providers of oral health interventions

Teachers (93%) were by far the most frequently quoted group involved in oral health activities in schools followed by dental staff (83%), parents (59%) and school nurses (46%). “Others” such as dental students, nurse students, health tutors, midwives, child minders and pupils were

Table 1. Countries and territories contributing to the questionnaire survey according to WHO region

WHO region (n)	Countries responding (n=61)
Africa (9)	Ghana, Kenya, Madagascar, Malawi, Senegal, Seychelles, South Africa, Sudan, Tanzania
Americas (5)	El Salvador, Grenada, Mexico, Saint Lucia, USA
Europe (22)	Austria, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, France, Germany, Hungary, Iceland, Ireland, Israel, Italy, Latvia, Lithuania, Macedonia, Poland, Portugal, Serbia, Sweden, Turkey, United Kingdom
Eastern Mediterranean (8)	Iran, Iraq, Jordan, Kuwait, Pakistan, Qatar, Sudan, UNWRA: Syria / Lebanon / Gaza / West Bank
South East Asia (5)	India, Indonesia, Myanmar, Nepal, Thailand
Western Pacific (12)	Brunei Darussalam, Cambodia, China, Hong Kong, Japan, Korea, Laos, Malaysia, Philippines, Singapore, Taiwan, Vietnam

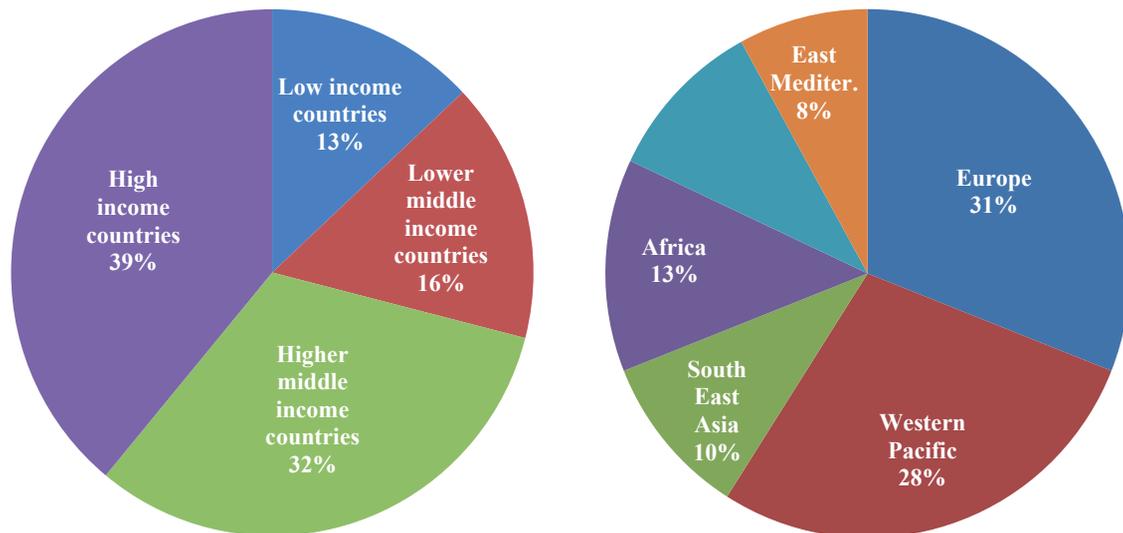
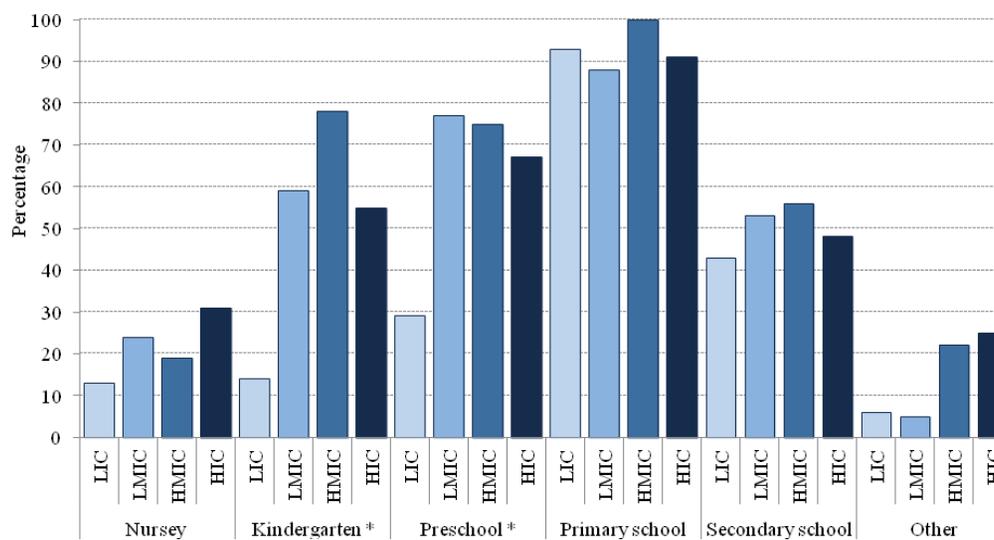


Figure 1. Questionnaire responses (in percent) received by economic status of the country and by geographic region (n=108)



Key: LIC, Low income countries; LMIC, Lower middle income countries; HMIC, Higher middle income countries; HIC, High income countries. * Significant differences across groups

Figure 2. Percentage of respondents stating oral health support to certain schools by economic status of the country (n=108)

mentioned by 18% of the respondents. Only 9% of the respondents considered the capacity of schools and teachers in dealing with oral health issues as “high”, while only 10% considered teachers to be very enthusiastic about getting involved in oral health. Asked on how the capacity of teachers could be improved half of the respondents indicated teacher training, while one quarter suggested including them in decision making and inviting them to conventions of interest. Stronger regulations by the ministries of health and education with clearer guidelines were suggested by 16%.

Opportunities of training

Health promotion courses were stated as being available by most respondents and only 11% indicated that no courses were available while 14% indicated not to know. The courses were mainly offered by Ministries of Education and Ministries of Health (46%) and by Health Promotion Associations (28%). Specific information on relevant health topics (57%), how to implement health promotion in a school setting (41%), and practical guidance on how to start a Health Promoting School (38%) were the courses most often mentioned by the respondents: the last two being offered more frequently in middle income countries (Figure 3).

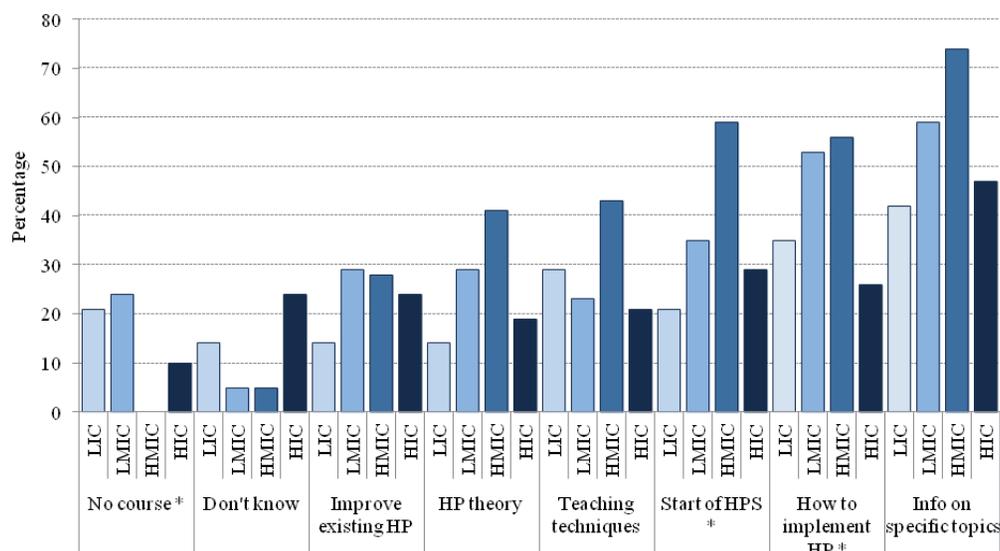
Organisation

As for the organisation of school oral health, nearly 7 out of 10 respondents reported school health being part of the structure of the education sector and oral health being included in the national curriculum. A large fraction of respondents (>80%) gave prevention and health education as their strategies applied to improve oral health while provision of clinical services and health promotion was mentioned by more than 70%.

Funding to run school-based oral health activities were most frequently received from national (61%) and local governments (42%) followed by the commercial sector and NGOs (each 24%) and parents (19%). Additional funding sources such as academia, health insurance companies, national health funds, school budgets, the UN and volunteers were mentioned by 26% of respondents.

Outreach

Influencing the family and the wider community is one of the intentions with health promotion. The vast majority of respondents mentioned various ways families of children are reached, mainly by inviting parents to school oral health days, letting the child take games and material back home, or distributing oral health newsletters. A number of other ways were also mentioned (Table 2).



Key: LIC, Low income countries; LMIC, Lower middle income countries; HMIC, Higher middle income countries; HIC, High income countries. HP, health promotion. * Significant differences across groups

Figure 3. Percentage of respondents stating certain health promotion courses for teachers by economic situation of the countries (n=108)

Table 2. Percentage of respondents reporting certain ways of communication with the families (n=108)

Ways of communication	Percent
Invitations to oral health (OH) days in school	50
Let the child take OH related games/quizzes/material back home to the family	40
Let the child collect OH related information at home (diet, fluoridated paste etc)	31
Oral health newsletters	27
Other (workshop with parents, through parents associations, leaflets, inviting families for examination of their one-year olds, oral treatment camps at school, providing child with communication handbook, letters asking parents for treatment consent, parent satisfaction survey	24
Let the child register own and siblings OH behaviour (tick off for every time they brush/consume sugary items, etc.)	20
Let the child interview family members about OH attitudes, knowledge, behaviour	13
No efforts	10

Apart from the contact direct to the children's immediate family, the wider community is mainly reached through media (48%), community events organised by school staff (42%) and through collaboration with local shops, supermarkets, etc. (8%). Only 9% of the respondents reported no efforts to reach the broader community.

Oral health activities

Of all oral health related activities implemented in schools, oral health education was mentioned by most respondents followed by tooth brushing exercise, provision of nutritious food, and administration of fluoride (Table 3).

Most respondents stated provision of classroom lessons on oral health either annually (28%) or twice annually (23%) while 18% stated these to occur more often. Most respondents (59%) reported 1-9 hours of

oral health education were delivered annually although significant differences were observed across geographic regions (Figure 4). In terms of integrating oral health into other general health issues, 20% of the respondents reported all their schools to do this, while 32% of the respondents reported their schools did not do so at all.

Fluoridated tooth paste was stated as a fluoride source in schools by 39% of the respondents, fluoride varnish was mentioned by 30%, fluoride rinsing by 23%, fluoride tablets by 8% while 5% stated fluoridated milk. In regards to automatic fluoridation, 14% of the respondents stated that children benefited from water fluoridation and 8% from salt fluoridation. Significant differences were observed regarding the use of fluoridated tooth paste and fluoridated milk across geographic regions (Figure 5).

Table 3. Percentage of respondents stating certain oral health related activities through schools (n=108)

<i>Oral health activities</i>	<i>Percent</i>
Oral health education	86
Daily tooth brushing	61
Promotion and provision of nutritious food in school (e.g. low fat, low sugar)	61
Administration of fluoride	60
Tobacco ban	51
Alcohol ban	42
Improving access to water and sanitation	38
Ban on soft drinks and sweets sold at school	35
Other (sealants, waste segregation)	9

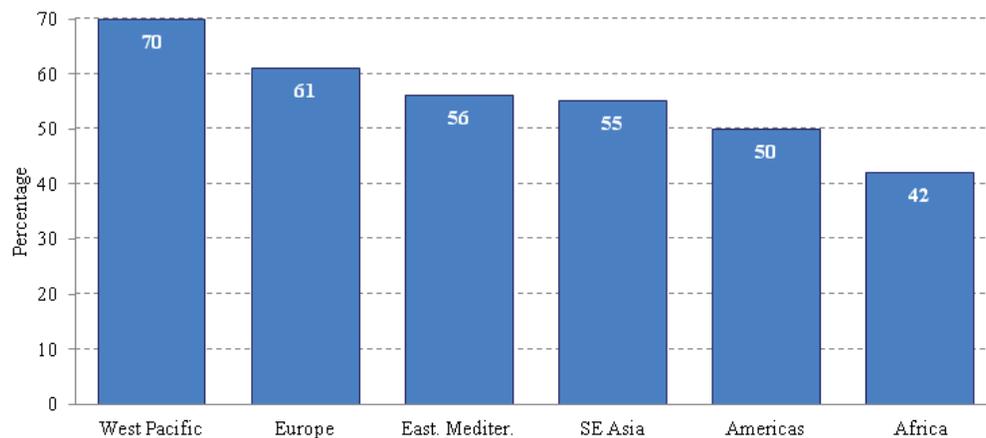


Figure 4. Percentage of respondents stating between 1 and 9 hours of oral health education annually by geographic region (n=108)

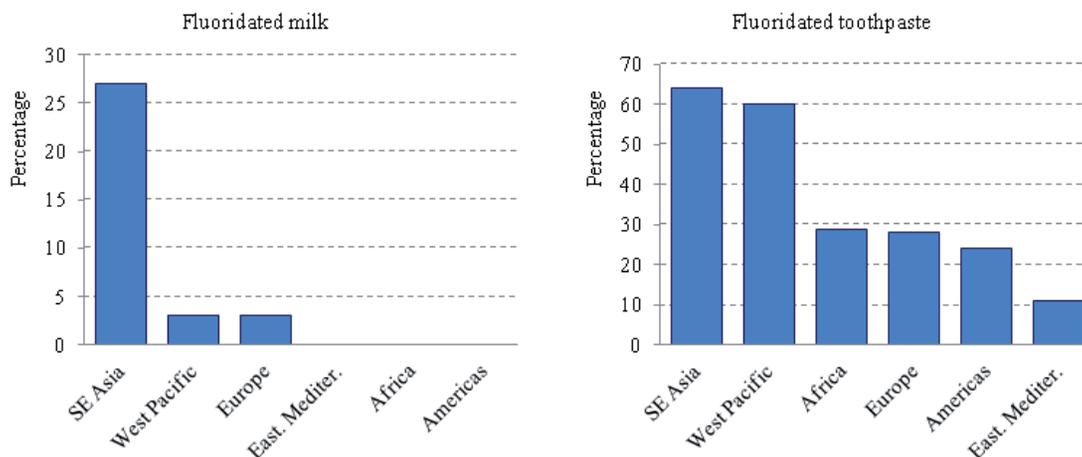
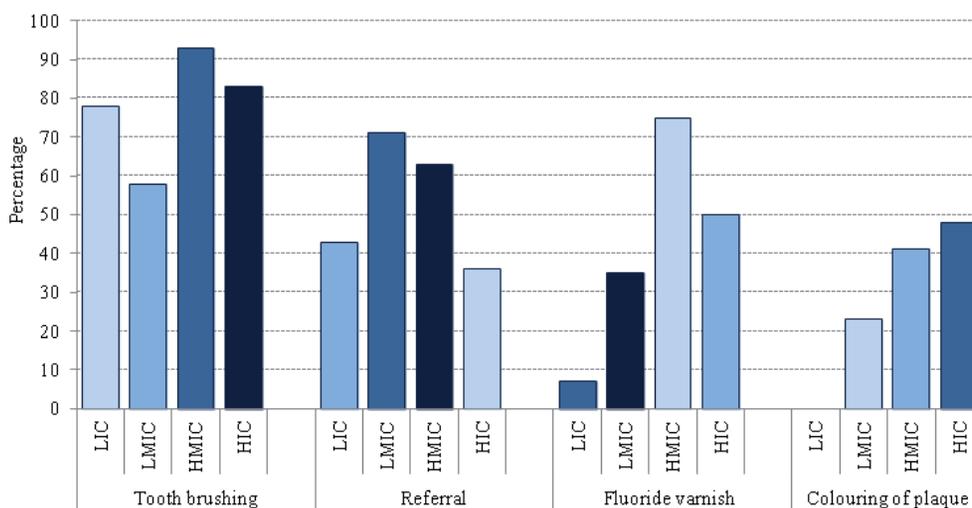


Figure 5. Percentage of respondents stating the use of fluoridated milk and fluoridated tooth paste in schools by geographic region (n=108)



Key: LIC, Low income countries; LMIC, Lower middle income countries; HMIC, Higher middle income countries; HIC, High income countries

Figure 6. Percentage of dental activities with significant differences across economic position (n=108)

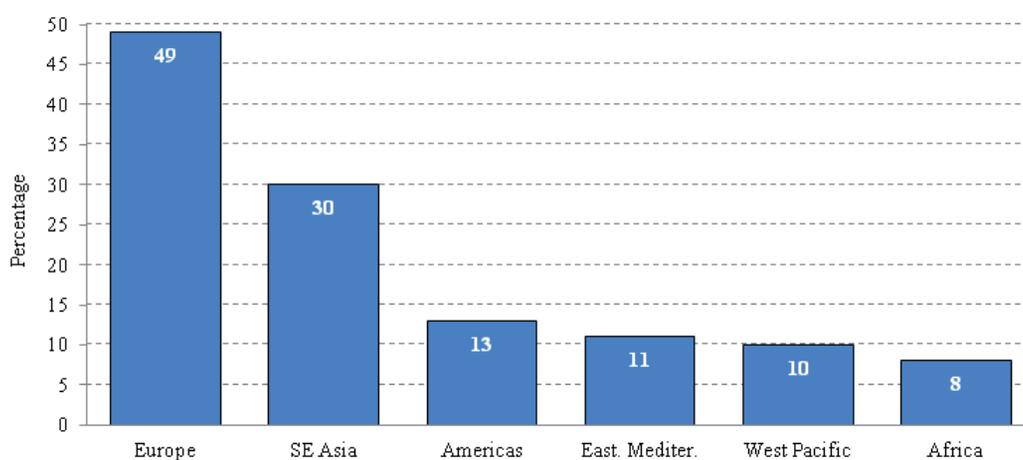


Figure 7. Percentage of respondents reporting the use of websites for dissemination of results by geographic region (n=108)

Most respondents reported that contacts existed between schoolchildren and local dental staff either regularly or irregularly. In total, 83% of the respondents stated that dental staff provided oral health education, 82% stated tooth brushing exercise, 78% screening for oral disease, and 61% referral for special care. Only 27% reported that there was provision of basic oral treatment. Significant differences were observed in a number of activities across countries with different economic positions (Figure 6).

As for dissemination of data, few of the respondents reported means directed towards the general population (local newspapers, 21%; radio and TV, 21%) while 44% reported communication directly to the participating schools and partners. The use of websites showed significant differences by geographic region (Figure 7). References to international publications were provided by only 9% of the respondents.

Monitoring

National authorities were noted by half the respondents as the authorities monitoring school-based oral health activities, while provincial and district authorities were each mentioned by roughly one third of the respondents. Only 17% of the respondents reported receiving regular monitoring site visits while more than half had regular monitoring of projects. Clinical surveys (48%), log books (41%) and knowledge, attitude, and practice surveys (40%) were the most frequently mentioned means of documentation. This was reflected in the indicators used most frequently being for dental caries (88%), gingival health (55%) and treatment needs (53%). Relatively few reported the use of socioeconomic indicators (20%) or discomfort (18%).

Sustainability

Participants were asked to point out factors essential for the sustainability of school oral health as well as factors which were perceived as barriers to implementation. The answers were grouped thematically. Tables 4 and 5 show the percentages of respondents reporting various positive and negative factors. The supportive factors mentioned most frequently were related to the capacity and availability of human resources. High level support and advocacy and the presence of a policy framework were also often cited. While the lack of human resources was seen as one of the main barriers for implementation the most frequently mentioned barrier was related to budget constraints. Other frequently mentioned barriers were related to the limited involvement and collaboration of local stakeholders.

For a number of perceived barriers there were significant differences observed across geographic regions (Figure 8). While 71% of respondents from Africa and 52% from Europe stated financial issues to be a barrier this was only reported by 9% of respondents from South East Asia. Issues related to collaboration at local level were stated as a problem by 64% of respondents from the American region while this was only reported by 11% of Eastern Mediterranean and 15% of European respondents. Lack of leadership and governance was seen as a problem by 55% of South East Asian respondents but only by 6% of Europeans.

Discussion

A survey like the present one has its limitations. There is always the risk of over-reporting of actions and interventions known to be appropriate for, in this case, school oral health. Likewise this survey cannot assess the comprehensiveness, quality and consistency of the actual implementation of programmes. Nevertheless, the

information provides a global overview of the type of activities carried out by school oral health programmes.

The data gathered by this survey reflects the diversity of school oral health programmes around the globe. The national economic situation, tradition and culture of dealing with oral health, oral health policies, organisation and financing of the public sector, nutritional and demographic transitions, and change of oral disease patterns are some of the many factors influencing how and to what extent national school oral health is approached. The survey has also identified significant differences across both geographic regions as well as across countries with different economic situations. This survey reveals that in many countries the education system provides a basic framework for oral health intervention being incorporated into schools. Meanwhile, several respondents affirm that a strong national school health policy, including oral health, will be instrumental to the consolidation of school programmes. This goes hand in hand with the call for stronger cooperation, commitment and support from authorities and decision makers and is also supported by evidence showing that school oral health policies can support the strive for better oral health of students (Moyses *et al.*, 2003).

Numerous strategies and activities are applied to improve oral health of children through schools. The study indicates that the majority of school oral health interventions are implemented in primary schools, which is in line with the idea of the Health Promoting School concept. Primary schools hold the highest enrolment rate globally and young children are in their most formative stage. If interventions are to meet the actual need of the child population it should be explored further how to reach children and their parents at an even earlier age since the current support of children in nurseries and kindergartens is rather limited. The school setting provides a unique platform for implementation of popula-

Table 4. Main factors regarded as supportive for the sustainability of school oral health activities (n=108)

<i>Factors regarded essential for school oral health</i>	<i>Percentage of respondents mentioning the factor (n=108)</i>
Capacity and availability of human resources	50
High level leadership and governance	34
Policies	33
Finances	32
Collaboration at local level	30
Provision of quality services	27
Attitude – support – awareness among local users	7

Table 5. Main factors seen by respondents as barriers for successful implementation of school-based oral health activities

<i>Factors regarded barriers for school oral health</i>	<i>Percentage of respondents mentioning the factor (n=108)</i>
Finance constraints	44
Inadequate capacity and availability of human resources	38
Lack of collaboration at local level	30
Inadequate policy framework	24
Lack of high level leadership and governance	23
Poor attitude – support – awareness among local users	23
Failure to provide quality services	11

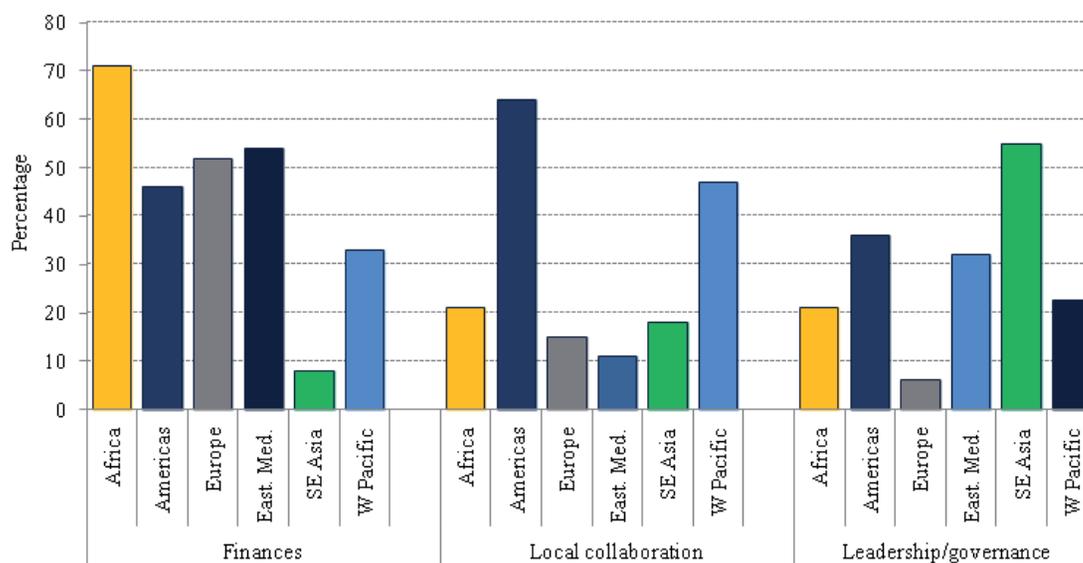


Figure 8. Percentage of respondents stating certain barriers for school oral health by geographic regions (n=108)

tion directed oral health intervention. However, in certain developing countries significant proportions of children do not attend school but the present information illustrates that efforts are being made in communities to include various disadvantaged child groups outside the normal school systems.

The focus of oral health activities seems primarily to be aiming at prevention and health education rather than on overall health promotion. This is also mirrored in the use of predominantly clinical indicators in evaluation. In general, it seems that interventions are concentrating on dental caries prevention and a strong emphasis on appropriate fluoride exposure. The administration of fluoride in schools is a population oriented approach and is a most beneficial activity as the dental caries preventive effect of community-based fluoride exposure is well documented (Bánóczy *et al.*, 2009; Levin *et al.*, 2009; Marinho *et al.*, 2003). The use of fluoridated toothpaste is recommended on a global scale though there are significant differences in the emphasis by schools in this activity across geographic regions. According to the survey, the current priority is high on the use of fluoridated toothpaste in countries of South East Asia and the Western Pacific. Moreover, a geographic variation in school-based administration of fluoride is observed for milk fluoridation as this activity is frequently reported being used in countries of South East Asia and a few countries of Western Pacific and Europe.

Oral health should not be reduced to questions about dental caries and fluoride exposure. A broader approach is needed if good oral health is to be attained not only during primary school but throughout life. Additionally, the possibility of combining oral health concerns with other health issues is important. The majority of respondents stated having implemented health education. Various kinds of health education programmes are organised for development of healthy lifestyles among children, for development of appropriate oral health knowledge, beliefs and attitudes, and ultimately the improvement of oral health status of children. Accordingly, many countries have reported implementation of oral health education,

tooth brushing exercises, diet and nutrition related activities, and prevention of the use of tobacco and alcohol.

Teachers are without doubt the most frequently mentioned personnel involved in such school oral health activities. According to respondents, the background of teachers is essential for them to become actively involved with oral health education while other respondents rate enthusiasm or engagement by teachers to be important. Fortunately, several respondents emphasised that in their country a number of training courses on health promotion are available for teachers and such courses can provide for capacity development in oral health. In many developing countries teachers face crowded classrooms and strict expectations to meet the academic requirements of the curriculum. At the same time specific tool kits on numerous extra-curricular topics are often presented to schools but with little or no training of staff (St Leger, 2004). Expecting the use of such tool kits to change behaviour or lead to improvement of health may seem rather overoptimistic.

Family and other “important others” are highly important for the development of self-care habits of children and young people. Involving the community beyond the students with appropriate communication, outreach actions and local community actions is critical in health promotion. Such actions are crucial to sustainability of healthy lifestyles and they are highly appreciated by participants of this survey.

Human resource constraints are considered vital factors for implementation of school-based oral health activities; in particular, limited availability of personnel and lack of know-how are stated as main barriers in relation to involvement of teachers, dental staff and administrators alike. In addition, supervision of school oral health activities and regular monitoring visits seem to be limited or to be less structured.

Budget constraints are mentioned as a significant barrier by many of the respondents. Restricted budgets for school health affects coverage, provision of services, training, availability and involvement of personnel, health education material and thus the overall quality of services

provided. While the survey indicates that ideas and plans for quality interventions exist, many respondents claim that the implementation of programmes is not always stable. Common comments on e.g. fluoride interventions are that activities are “implemented if funds/materials are available” or “stop of interventions due to budget cuts”. For many countries it is unlikely that public support for school oral health will increase and fortunately several

respondents state alternative funding sources outside the public sector. With limited funding it is even more important to focus on effective evidence-based interventions and to combine oral health with other areas of health to get the best benefit from of the resources invested.

It is unfortunate that documentation of school oral health programmes is limited. Apparently, only a few interventions are actually evaluated systematically and

Table 6. Oral health indicators suggested by FRESH (Focusing Resources on Effective School Health) for monitoring and evaluation of school oral health programmes (FRESH, 2013).

<i>Indicators</i>	<i>Data collection frequency</i>	<i>Data collection methods</i>
FRESH PILLARS		
Equitable School Health Policies		
1. Existence of a national policy recommending strategies to address oral health problems in schools.	Every 3 years	Policy review
2. Percentage of schools with a curriculum incorporating oral health.	Every 3 years	National- and school levels
Safe Learning Environment		
1. Percentage of schools where the provision of foods and drinks high in sugars is banned.	Every 3 years	School survey – questionnaire
2. Percentage of schools providing healthy drinks and fruits.	Every 3 years	School survey – questionnaire
3. Percentage of schools with appropriate sanitary facilities for personal and oral hygiene.	Every 3 years	School survey – questionnaire
Skills-Based Health Education		
1. Percentage of schools having established programmes for daily tooth brushing with fluoridated toothpaste.	Every 3 years	School survey – questionnaire
2. Percentage of schools providing oral health education focusing on healthy lifestyles, appropriate diet, and nutrition.	Every 3 to 5 years	School survey – questionnaire / Global SHPPS
School-Based Health and Nutrition Services		
1. Percentage of schools providing oral health protection activities, such as fluoride administration and fissure sealing.	Every 3 years	School survey – questionnaire
2. Percentage of schools having established oral health care services, or systems for screening/referral for dental care.	Every 3 years	School survey – questionnaire/ Global SHPPS
OUTCOMES		
Learning		
1. Percentage of students who know key ways to prevent oral disease.	Every 3 years	School survey – questionnaire
Behavioural		
1. Percentage of students who undertake daily tooth brushing with fluoridated toothpaste while at school.	Every 3 years	School survey – questionnaire
2. Percentage of students not consuming sugary items while at school.	Every 3 years	School survey – questionnaire
Impact		
1. Percentage of students at a certain age with no dental caries.	Every 5 years	School survey – clinical examination / WHO Oral Health Surveys
2. Percentage of students at a certain age with no bleeding gums (gingivitis).	Every 5 years	School survey – clinical examination / WHO Oral Health Surveys
3. Percentage of students with experience of pain/discomfort from the teeth or mouth within the past year.	Every 5 years	School survey – clinical examination / WHO Oral Health Surveys
4. Number of school days missed in the past year due to oral health problems.	Every 5 years	School survey – questionnaire

shared with the wider school health community. Local information sharing through formal or informal networks appears infrequent and the sharing of lessons-learned through international publications is rare.

Access to publications on evaluation of school health programmes is often difficult for scientists and programme officers in low-and middle income countries. The presence of Hinari, a WHO supported programme for access to databases in health science, should therefore be reiterated. Hinari provides free or very low cost online access to the major journals in biomedical and related social sciences to local, not-for-profit institutions in low-and middle income countries. A resource on evidence-based oral health promotion was recently published by the State Government of Victoria, Australia (State Government of Victoria, 2011). Although the focus is mainly related to the situation of a high income country it can still be inspirational for countries with an economic and cultural background different from Australia.

Monitoring and evaluation of school oral health

WHO recommends strongly that school oral health programmes are evaluated so that processes and outcomes of programmes may be documented and thereby help sharing of experiences within and across countries (WHO, 2003; Petersen and Kwan, 2004). Nevertheless, the present global survey shows that national school health evaluation is seldom performed and this report is a call for strengthening of monitoring and evaluation.

In 2000, international organizations such as WHO, UNESCO, UNICEF, the World Bank and Educational International launched a joint initiative – the so-called FRESH (Focusing Resources on Effective School Health) - to promote the implementation of school health worldwide. In 2013, the FRESH initiative published a monitoring and evaluation guide to assist countries in evaluation school health programmes (FRESH, 2013). School oral health is covered by this evaluation guide, who provides a set of key oral health indicators in relation to: 1) equitable school health policies; 2) safe learning environment; 3) skills-based health education; 4) school-based health and nutrition services; 5) and programme outcomes (learning, health behaviour, and impact). Table 6 lists the oral health indicators suggested for countries to apply for monitoring, evaluation and adjustment of school oral health programmes. This report is a call for countries to collect basic information for continuous evaluation of existing school oral health programmes. Some countries may have established information systems on existing policies, implementation and school health facilities while it may be needed regularly to assess the type of school activities based on school surveys, e.g. School Health Policies and Practices Study (SHPPS). The WHO manual “Oral Health Surveys – Basic Methods” (WHO, 2013) is an important tool for evaluation of the outcomes of school oral health programmes.

Conclusion

As emphasised by the Ottawa Charter for Health Promotion, schools can provide a supportive environment for promoting health of children. The ways to improve

oral health at individual, community and national levels are known (Kwan and Petersen, 2010) and this survey displays that a number of well-known strategies are applied in schools globally. However, the full range of health promoting actions is not being used widely. Sharing of information should be encouraged, especially information on how to improve oral health under given local circumstances with a focus on budget- and human-resource constraints. Emphasis should be placed on how schools can reorient from the mind-set of health education and narrow project- or disease-specific thinking, and towards health promotion and the creation of a school environment which located health in every aspect of daily school life. The specification of school health policies, implementation analysis, evaluation and health surveillance are all essential for sharing of experiences and the establishment of operational research. Furthermore, there is a need to explore ways to exchange experiences and locate best practices with the wider school health community especially in low-and middle income countries.

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References

- Al-Jundi, S.H., Hammad, M. and Alwaeli, H. (2006): The efficacy of a school-based caries preventive program: a 4-year study. *International Journal of Dental Hygiene* **4**, 30-34.
- Armfield, J.M. and Spencer, A.J. (2007): Community effectiveness of fissure sealants and the effect of fluoridated water consumption. *Community Dental Health* **24**, 4-11.
- Bánóczy, J., Petersen, P.E. and Rugg-Gunn, A.J. (2009): *Milk Fluoridation for the Prevention of Dental Caries*. Geneva: WHO.
- Bian, J.Y., Wang, W.H., Wang, W.J, Rong, W.S. and Lo, E.C.M. (2003): Effect of fluoridated milk on caries in primary teeth: 21-month results. *Community Dentistry and Oral Epidemiology* **31**, 241-245.
- Biesbrock, A.R., Walters, P.A. and Bartizek, R.D. (2004): Short-term impact of a national dental education program on children’s oral health knowledge. *Journal of Clinical Dentistry* **15**, 93-97.
- Centers for Disease Control and Prevention (2001): Recommendations for using fluoride to prevent and control dental caries in the United States. *Morbidity and Mortality Weekly Report (MMWR)* **50**(RR14):1-42. www.cdc.gov/mmwr/preview/mmwrhtml/rr5014a1.htm
- Christensen, L.B., Petersen, P.E. and Hede, B. (2010): Oral health in children in Denmark under different public dental health care schemes. *Community Dental Health* **27**, 94-101.
- Curnow, M.M., Pine, C.M., Burnside, G., Nicholson, J.A., Chesters, R.K. and Huntington, E. (2002): A randomised controlled trial of the efficacy of supervised toothbrushing in highcaries-risk children. *Caries Research* **36**, 294-300.
- Devlin, D. and Henshaw, M. (2011): Improving access to preventive dental services through a school-based dental sealant program. *Journal of Dental Hygiene* **85**, 211-219.

- Dorantes, C., Childers, N.K., Makhija, S.K., Elliott, R., Chafin, T. and Dasanayake, A.P. (2005): Assessment of retention rates and clinical benefits of a community sealant program. *Pediatric Dentistry* **27**, 212-216.
- Downer, M.C., Drugan, C.S. and Blinkhorn, A.S. (2005): Dental caries experience of British children in an international context. *Community Dental Health* **22**, 86-93.
- Freeman, R., Oliver, M., Bunting, G., Kirk, J. and Saunderson, W. (2001): Addressing children's oral health inequalities in Northern Ireland: a research-practice-community partnership initiative. *Public Health Reports*. **116**, 617-625.
- Frencken, J.E. and Holmgren C.J. (1999): *Atraumatic Restorative Treatment (ART) for dental caries*. Nijmegen, Netherlands: STI Book.
- Frencken, J.E., Borsum-Andersson, K., Makoni, F., Moyana, F., Mwashanyi, S. and Mulder, J. (2001): Effectiveness of an oral health education programme in primary schools in Zimbabwe after 3.5 years. *Community Dentistry and Oral Epidemiology* **29**, 253-259
- FRESH (2013): Focusing Resources on Effective School Health. www.freshschools.org/Pages/default.aspx, www.schoolsandhealth.org
- Friel, S., Hope, A., Kelleher, C., Comer, S. and Sadlier, D. (2002): Impact evaluation of an oral health intervention amongst primary school children in Ireland. *Health Promotion International* **17**, 119-126.
- Hawkins, R.J., Zanetti, D.L., Main, P.A., Jokovic, A., Dwyer, J.J. and Otchere, D.F. (2000): Oral hygiene knowledge of high-risk Grade One children: an evaluation of two methods of dental health education. *Community Dentistry and Oral Epidemiology* **28**, 336-343.
- Honkala, E. (1993): Oral health promotion with children and adolescents; In: *Oral Health Promotion*. Schou, L. and Blinkhorn, A.S., eds. New York: Oxford University Press.
- Jackson, R.J., Newman, H.N., Smart, G.J., Stokes, E., Hogan, J.I. and Brown, C. (2005): The effects of a supervised toothbrushing programme on the caries increment of primary school children, initially aged 5-6 years. *Caries Research* **39**, 108-115.
- Jones, S., Burt, B.A., Petersen, P.E. and Lennon, M.A. (2005): The effective use of fluorides in public health. *Bulletin of the World Health Organization* **83**, 670-676.
- Källestål, C., Wang, N.J., Petersen P.E., and Armatottir I.B. (1999): Caries-preventive methods used for children and adolescents in Denmark, Iceland, Norway and Sweden. *Community Dentistry and Oral Epidemiology* **27**, 144-151.
- Ketley, C.E., West, J.L. and Lennon, M.A. (2003): The use of school milk as a vehicle for fluoride in Knowsley, UK; an evaluation of effectiveness. *Community Dental Health* **20**, 83-88.
- Kwan, S. and Petersen, P.E. (2010): Oral health: equity and social determinants. In: *Equity, social determinants and public health programmes*. Eds: Blas, E. and Sivasankara Kurup, A. Geneva: WHO
- Kwan, S., Petersen, P.E., Pine, C. and Borutta, A. (2005): Health Promoting Schools: An opportunity for oral health promotion. *Bulletin of the World Health Organization* **83**, 677-685.
- Levin, K.A., Jones, C.M., Wight, C., Valentine, C., Topping, G.V. and Naysmith, R. (2009): Fluoride rinsing and dental health inequalities in 11-year-old children: an evaluation of a supervised school-based fluoride rinsing programme in Edinburgh. *Community Dentistry and Oral Epidemiology* **37**, 19-26.
- Lopez, N., Simpser-Rafalin, S. and Berthold, P. (2005): Atraumatic Restorative Treatment for Prevention and Treatment of Caries in an Underserved Community. *American Journal of Public Health* **95**, 1338-1339.
- MacNab, A. and Kasangaki, A. (2012): "Many voices, one song": a model for an oral health programme as a first step in establishing a health promoting school. *Health Promotion International* **27**, 63-73.
- MacNab, A.J., Radziminski, N., Budden, H., Kasangaki, A., Zavuga, R., Gagnon, F.A. and Mbabali, M. (2010): Brighter Smiles Africa – translation of a Canadian community-based health-promoting school program to Uganda. *Education for Health* **23**, 241.
- Marinho, V.C., Higgins, J.P., Logan, S. and Sheiham, A. (2003): Fluoride mouthrinses for preventing dental caries in children and adolescents, *Cochrane Database of Systematic Reviews* CD002284.
- Mariño, R., Villa, A. and Guerrero, S. (2001): A community trial of fluoridated powdered milk in Chile. *Community Dentistry and Oral Epidemiology* **29**: 435-442.
- Marthaler, T.M., O'Mullane, D.M. and Vrbic, V. (1996): The prevalence of dental caries in Europe 1990-1995. *Caries Research* **30**, 237-255.
- Ministry of Health, Kuwait (2011): *School oral health program 1982-2011, Kuwait – Forsyth*. Kuwait City: MOH Kuwait.
- Monse, B., Naliponquit, E., Belizario, V., Benzian, H. and van Heldeman, W.P. (2010): Essential health care package for children -the 'Fit for School' program in the Philippines. *International Dental Journal* **60**, 85-93.
- Motsei, S.M., Kroon, J. and Holtshousen, W.S. (2001): Evaluation of Atraumatic Restorative Treatment restorations and sealants under field conditions. *SADJ, Journal of the South African Dental Association* **56**, 309-315.
- Moynihan, P. and Petersen, P.E. (2004): Diet, nutrition and the prevention of dental diseases. *Public Health Nutrition* **7**, 201-226.
- Moyses, S.T., Moyses, S.J., Watt, R.G. and Sheiham, A. (2003): Associations between health promoting schools' policies and indicators of oral health in Brazil. *Health Promotion International* **18**, 209-218.
- Muller-Bolla, M., Lupi-Péguier L., Bardakjian H., and Velly A.M. (2013): Effectiveness of school-based dental sealant programs among children from low-income backgrounds in France: a pragmatic randomized clinical trial. *Community Dentistry and Oral Epidemiology* **41**, 232-241.
- NHS Scotland. *The Child-smile project*. www.child-smile.org.uk/index.aspx
- Ohara, S., Kawaguchi, Y., Shinada, K. and Sasaki, Y. (2000): Evaluation of school-based dental health activities including fluoride mouth-rinsing in Hiraizumi, Japan. *Journal of Medical and Dental Sciences* **47**, 133-141.
- Parnell C.A., O'Farrell M., Howell F., and Hegarty, M. (2003): Evaluation of a community fissure sealant programme in County Meath, Ireland. *Community Dental Health* **20**, 146-152.
- Petersen, P.E. (2003): 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 Dentistry and Oral Epidemiology* **31** Suppl 1, 3-23.
- Petersen, P.E. (2005): Sociobehavioral risk factors in dental caries – international perspectives. *Community Dentistry and Oral Epidemiology* **33**, 274-79.
- Petersen, P.E. (2006): Policy for prevention of oral manifestations in HIV/AIDS: the approach of the WHO Global Oral Health Program. *Advances in Dental Research* **19**, 17-20.
- Petersen, P.E. (2008): World Health Organization global policy for improvement of oral health -World Health Assembly 2007. *International Dental Journal* **58**, 115-121.
- Petersen, P.E. and Kwan, S. (2004): Evaluation of community-based oral health promotion and oral disease prevention--WHO recommendations for improved evidence in public health practice. *Community Dental Health* **21**(Suppl), 319-329.
- Petersen, P.E. and Kwan, S. (2010): The 7th WHO Global Conference on Health Promotion towards integration of oral health (Nairobi, Kenya, 2009): *Community Dental Health* 2010; 27 (Suppl 1): 129-136

- Petersen, P.E. and Lennon, M.A. (2004): Effective use of fluorides for the prevention of dental caries in the 21st century. *Community Dentistry and Oral Epidemiology* **32**, 319-321.
- Petersen, P.E. and Phantumvanit, P. (2012): Perspectives in the Effective Use of Fluoride in Asia. *Journal of Dental Research* **91**, 119-121.
- Petersen, P.E. and Torres, A.M. (1999): Preventive oral health care and health promotion provided for children and adolescents by the Municipal Dental Health Service in Denmark. *International Journal of Paediatric Dentistry* **9**, 81-91.
- Petersen, P.E., Baez, R.J. and Lennon M.A. (2012): Community-oriented Administration of Fluoride for the Prevention of Dental caries: a Summary of the Current Situation in Asia. *Advances in Dental Research* **24**, 5-10.
- Petersen, P.E., Bourgeois, D., Ogawa, H., Estupinan-Day, S. and Ndiaye, C. (2005): The global burden of oral diseases and risks to oral health. *Bulletin of the World Health Organization* **83**, 661-669.
- Petersen, P.E., Peng, B., Tai, B., Bian, Z. and Fan, M. (2004): Effect of a school-based oral health education programme in Wuhan City, Peoples Republic of China. *International Dental Journal* **54**, 33-41.
- Razanamihaja, N. and Petersen, P.E. (1998): [Planning and implementation of a health education program for students in preparatory classes in Madagascar]. *Journal des Santé Publications de Madagascar* **1**, 25-31.
- Riley, J.C., Klause, B.K., Manning, C.J., Davis, G.M., Graham, J. and Worthington, H.V. (2005): Milk fluoridation: a comparison of dental health in two school communities in England. *Community Dental Health* **22**, 141-145.
- Sheiham, A. (1984): Changing trends in dental caries. *International Journal of Epidemiology* **13**, 142-147.
- Sirichakwal, P.P. and Sranacharoenpong, K. (2008): Practical experience in development and promotion of food-based dietary guidelines in Thailand. Review Article. *Asian Pacific Journal of Clinical Nutrition* **17**(S1), 63-65.
- Sri Wendari, A.H., Lambri S.E. and van Palenstein, W.H. (2002): Effectiveness of primary school-based oral health education in West Java, Indonesia. *International Dental Journal* **52**, 137-143.
- St Leger, L.S. (2004): What's the place of schools in promoting health? Are we too optimistic? *Health Promotion International* **19**, 405-408.
- State Government of Victoria (2011): *Evidence-based oral health promotion resource*. Melbourne: Department of Health.
- Stokes, E., Pine, C.M. and Harris, R.V. (2009): The promotion of oral health within the Healthy School context in England: a qualitative research study. *BMC Oral Health* **9**, 3. www.biomedcentral.com/1472-6831/9/3
- Tai, B.J., Jiang, H., Du, M.Q. and Peng, B. (2009): Assessing the effectiveness of a school-based oral health promotion programme in Yichang City, China. *Community Dentistry and Oral Epidemiology* **37**, 391-398.
- United Nations Educational, Scientific and Cultural Organization (UNESCO) (2011): *UNESCO Institute for Statistics. Global Education Digest 2011*. Montreal: UNESCO.
- Vanobbergen, J., Declerck, D., Mwalili, S., Martens, L. (2004): The effectiveness of a 6-year oral health education programme for primary schoolchildren. *Community Dentistry and Oral Epidemiology* **32**, 173-182.
- Wang, N.J., Källestaal, C., Petersen, P.E., and Arnadottir, I.B. (1998): Caries preventive services for children and adolescents in Denmark, Iceland, Norway and Sweden: strategies and resource allocation. *Community Dentistry and Oral Epidemiology* **26**, 263-271.
- Whelton, H. and O'Mullane, D.M. (2007): Public Health Aspects of Oral Diseases and Disorders Dental Caries. In: Pine, C. and Harris, R., eds. *Community Oral Health, 2nd ed.* pp. 165-176. New Malden, Surrey, UK: Quintessence Publishing.
- Widström, E. and Eaton, K.A. (2004): Oral healthcare systems in the extended European Union. *Oral Health and Preventive Dentistry* **2**, 155-194.
- World Health Assembly (1969): Resolution WHA 22.30 Fluoridation and dental health. In: *Twenty-second World Health Assembly, Geneva*. Geneva: WHO.
- World Health Assembly (1975): Resolution WHA 28.64 Fluoridation and dental health. In: *Twenty-eighth World Health Assembly, Geneva*. Geneva: WHO.
- World Health Assembly (1978): Resolution WHA 31.50 Fluorides and the prevention of dental caries. In: *Thirty-first World Health Assembly, Geneva*. Geneva: WHO.
- World Health Assembly (2007): Resolution WHA 60.17 Oral health: action plan for promotion and integrated disease prevention. In: *Sixtieth World Health Assembly, Geneva*. Geneva: WHO.
- World Health Organization (1986): *Ottawa Charter for Health Promotion*. www.who.int/healthpromotion/conferences/previous/ottawa/en/
- World Health Organization (1995): *School and youth health: Global school health initiative*. Geneva: WHO. www.who.int/school_youth_health/gshi/hps/en/
- World Health Organization (1997a): *Jakarta Declaration on Leading Health Promotion into the 21st Century*. www.who.int/healthpromotion/conferences/previous/jakarta/declaration/en
- World Health Organization (1997b): *Promoting health through schools. WHO Technical Report Series 870*. Geneva: WHO. whqlibdoc.who.int/trs/WHO_TRS_870.pdf
- World Health Organization (1998): *WHO Information Series on School Health. Healthy nutrition: An essential element of a Health Promoting School. Document 4*. Geneva: WHO.
- World Health Organization (1999): *WHO Information Series on School Health. Tobacco use prevention: An important entry point for the development of Health-Promoting Schools. Document 5*. Geneva: WHO.
- World Health Organization (2000): *WHO Information Series on School Health. Local action, creating Promoting Schools*. Geneva: WHO.
- World Health Organization (2002a): *WHO Information Series on School Health. Teacher's Exercise Book for HIV Prevention. Document 6.1*. Geneva: WHO.
- World Health Organization (2002b): *WHO Information Series on School Health. Skills for Health. Document 9*. Geneva: WHO.
- World Health Organization (2003): *WHO Information Series on School Health – Document 11 – Oral Health Promotion: An Essential Element of a Health-Promoting School*. Geneva: WHO. www.who.int/oral_health/media/en/orh_school_doc11.pdf
- World Health Organization (2008): *School Policy Framework. Implementation of the WHO global strategy on diet, physical activity and health*. Geneva: WHO.
- World Health Organization (2012): *Global School-based Student Health Survey (GSHS). Technical report: Results of the global survey on oral health through schools – September 2012*. www.who.int/chp/gshs/methodology/en/index.html
- World Health Organization (2013a): *Oral Health Surveys – Basic Methods*. Geneva: WHO.
- World Health Organization (2013b): *The Oral Health Country Area Profile Project*. www.mah.se/CAPP/Country-Oral-Health-Profiles
- Worthington, H.V., Hill, K.B., Mooney, J., Hamilton, F.A. and Blinkhorn, A.S. (2001): A cluster randomized controlled trial of a dental health education program for 10-year-old children. *Journal of Public Health Dentistry* **61**, 22-27.
- Zero, D.T., Marinho, V.C. and Phantumvanit, P. (2012): Effective Use of Self-care Fluoride Administration in Asia. *Advances in Dental Research* **24**, 16-21.

