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Oral Health Promotion: Evidences and Strategies

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Abstract

Oral health promotion is for upliftment of oral health of community rather than an individual and has long-term impact. Since Ottawa Charter for health promotion is implemented, significant advancements have happened in oral health promotion. Under comprehensive health programs, India has been running oral health promotion programs, and these evidences are shared here. Such examples are apt learning and execution to any part of world having similarities. The chapter put forward the strategic view points to consider further oral health promotion aspects and based on the needs. The authors have gathered various examples from national programs implemented in India. The authors discuss how these programs are linked to the Oral health promotion concept. For example, National tobacco control program which currently running across many states in India, how the banning on tobacco products near school premises helped to reduce the incidence is discussed. The worldwide literature and evidences of oral health promotion strategies are explained. The evidences and strategies mentioned can be significant for another region of world. Unless published, many programs remain hidden and are loss of valuable evidences to oral health science.

Keywords: oral health, oral health promotion, fluorosis, school health, dental health

1. Introduction

The twentieth century was noteworthy in dentistry for many epidemiologic advances that occurred in the study of oral diseases and conditions. These combined efforts of optimum personal, social, biological, behavioral and environmental factors contributed to better oral health. Hence, oral health promotion is a planned effort to build public policies, create supportive environments, strengthen community action, develop personal skills or reorient

health services pertaining to influence above factors. Following are enlisted examples of effective oral health promotion:

- Promotion of healthy eating
- Training of relevant oral hygiene methods
- Access to preventive oral health services at the earliest
- Promotion of topical fluoride application [1].

Ottawa Charter principles form a sound base for oral health promotion. This suggests that individuals alone are not at risk but the entire population, which needs to be involved in directing action towards the causes of ill health. Importantly, three principles, that is, partnership, participation and protection, are taken into consideration while planning a public health program or intervention. Empowerment than compelling is the key for successful Oral health promotion while achieving good oral health [2].

The purpose of this article is threefold. First, it reviews the relevance of need of oral health promotion particularly through the public health surveillance of oral disease burden. Second, it puts forward the evidences from the various examples of oral health promotion programs integrated into general health promotion carried across the India. Finally, the authors briefly discuss the strategies for expanding frame of oral health promotion.

2. Oral health promotion through Ottawa Charter

Health promotion programs achieve success through actions that influence the social, physical, economic and political determinants of health. Health promotion irrefutably acknowledges the broader health determinants and focuses on risk reduction via sensitive policies and actions. Ideally, promotion of health in a day-to-day life setting having people live, work, learn and play is credible for efficacious and cost-effective way of improving oral health and indeed the quality of life. Imperatively, actions that address the determinants of health should not be progressed in isolation. Research evidences suggests that isolated activities can have limited impact, particularly over the long term. For this reason, we suggest using the logic model based on Ottawa Charter to develop a comprehensive oral health promotion program, involving a range of interventions.

The Ottawa Charter was developed by the World Health Organization¹ (WHO) as a framework for constructing health promotion programs that address the wider determinants of health. The charter suggests that programs be built around the following five action areas:

- Building healthy public policy
- Creating supportive environments

¹WHO = World Health Organization.

- Strengthening community action
- Developing personal skills
- Reorientating health services [2].

3. Need for oral health promotion

The remarkable improvements in oral health over the past half century reflect the strong science base for prevention of oral diseases that has been developed and applied in the community, in clinical practice and in the home. Yet, despite the remarkable achievements in recent decades, millions of people worldwide have been excluded from the benefits of socio-economic development and the scientific advances that have improved health care and quality of life. Social and cultural determinants comprising poverty, lack of education, unsupportive traditions, cultures and beliefs increase the relative risk of oral disease and conditions. For instance, lack of safe water and sanitary facilities are the environmental risk factors for both oral and general health. While, access to high sugar containing foods and unhealthy dietary habits may lead to higher risk of dental caries in certain communities. Improvement in availability, accessibility and feasibility of oral health services can definitely cure and control oral diseases. However, strong evidences suggest that limiting the risks to disease is best possible when health services are primary care and prevention oriented. Clinically, oral health status is measured in terms of causal factors, that is, tobacco, sugar, micro-flora, which have negative impact on quality of life. Emphasizing the risk behavior modifications, such as curbing use of tobacco and alcohol; restraining sugar intake in terms of quantity, intake frequency and nature; proper oral hygiene practices, is equally important incongruent to social and cultural determinants [3].

The Global Burden of Disease (GBD) 2010 Study produced comparable estimates of the burden of 291 diseases and injuries in 1990, 2005 and 2010. Pertaining to oral health, dental caries, aggressive periodontitis and tooth loss are considered as global burden, which compared from 1990 to 2010. Criteria used were disability adjusted life-years (DALYs) and years lived with disability (YLDs) metrics to quantify burden. These oral diseases/conditions encroached 3.9 billion. Among all, prevalence of dental caries in permanent teeth was among the highest prevalent condition evaluated for the entire GBD 2010 study (global prevalence of 35% for all ages combined). Among the top 100 ranking as causes of DALYs, oral diseases also secured a ranking after some serious diseases. Oral diseases altogether affected 15 million DALYs globally with the breakdown as 1.9% of all YLDs; 0.6% of all DALYs. Statistical calculations imply that could be average health loss of 224 years *per* 100,000 populations. While there was reduction observed for other diseases from 1990 to 2010, DALYs due to oral conditions increased by 20.8%. This was due to population overgrowth and aging. DALYs due to aggressive periodontitis and dental caries increased, however due to extensive tooth loss has decreased. While DALYs differed by age groups and regions, those not by genders. The report revealed the challenging scenario of diversified oral health needs across the globe, with alarming needs in developing countries. Further, the burden of oral diseases has unevenly risen in the past 20 years.

As the noted prevalence of oral diseases is very high and has association with disability, it accounted for a substantial number of DALYs. Dental caries without any treatment was the most prevalent condition among all 291 conditions. Moreover, the disability weight in connection with extensive tooth loss (0.073) was marginally neared to those reported for moderate heart failure (0.068) and moderate consequences of stroke (0.074). Oral diseases received ranking of 31st, 34th and 35th of health outcomes causing YLDs in the category of non-fatal outcomes. Compared to other non-communicable diseases/conditions, such as maternal conditions, hypertensive heart disease, schizophrenia, hemoglobinopathies and hemolytic anemias, oral diseases/conditions were ranked higher. While oral conditions scored high index for more YLDs than 25 of 28 categories of cancer, shows its significance in terms of affecting individuals equal to lethal diseases. The other organ cancers, such as stomach, liver and trachea, and bronchus and lung cancers ranked higher than oral diseases [4].

The global burden of oral conditions is shifting from extensive tooth loss toward aggressive periodontitis and untreated dental caries. Tooth loss is a final common pathway when preventive or conservative treatments to alleviate pain fail or are unavailable. The social, economic, political and cultural determinants of health are significant, and it may be argued that better health can be achieved by reducing poverty. Poverty, poor education and inequality not only result in poor oral health but also affect the way in which people think about their oral health. In spite of excellent oral health care, oral diseases are prevalent. This suggests that improving healthcare services merely will not address the issue, oral health promotion is mandatory. Hence, health policymakers should be made aware of these evidences and directs themselves to restructure the policy framework. Health promotion policy acknowledges complimentary measures such as legislation, fiscal measures, taxation and organizational change altogether. These are best example of a coordinated effort towards creating supportive environments and strengthening community action. Ottawa Charter implementation for health promotion through establishing concrete and effective community actions in setting priorities, making decisions, planning strategies leads to achieve better health. Communities facilitate themselves with self-help, social support, participation and ownership for development and empowerment. They are the best possible existing human and material resources of community and for community.

Oral health promotion through sensitive health policies and actions which already exist in some parts of world can address the global burden of oral diseases, essentially to improve oral health and quality of life.

4. Evidences: country examples from India

Identifying a significant health issue on the basis of prevalence, incidence, severity, cost, or impact on quality of life is preliminary step to design prevention programs. A combination of community, professional and individual strategies is the cost-effective and creative methods for oral disease prevention. Incorporating public, practitioners and policymakers into strategic development of oral disease prevention and health promotion intervention is necessary. They should be liable to create a healthy setting, limit risk factors, inform target

groups, generate knowledge and thus improve behaviors. This section includes a discussion of knowledge and practices of the public and healthcare providers regarding the oral health promotion. The purpose of this discussion is not to outline specific health promotion strategies to enhance knowledge and practices but to indicate the opportunities and needs for both broad-based and targeted health promotion programs and activities.

4.1. Oral health promotion in health promoting schools (HPS)

Oral health education has been considered as one of the fundamentals in oral health promotion [5, 6]. With education, a child receives training and encouragement especially to stimulate development of skills, aptitude formation and creation of values, which lead to act positively in relation to his oral health and other people's oral health on a daily basis. High caries risk, change in dentition, ability to change bad habits and facilities to learn make oral health promotion for children a priority. The importance of oral health education programs in schools is significantly reported predominantly in the form of positive learning and behavior in children [5–11].

One-fifth of the world's population is adolescent, defined by WHO as a person between 10 and 19 years of age. The oral health promotion programs should primarily focus on this age group who become easy victims of excessive consumption of sweets, sugary beverages, tobacco and alcohol. Commonly, their main association is with home, school and community organizations. These three along with oral health professionals can form an effective alliance to control risks to oral diseases and form oral health promotion programs for young people [12]. Prevalence of dental caries and gingivitis is high in human populations throughout the world, and over 80% of schoolchildren are affected in some parts of the world. Dental erosion due to excessive carbonated beverages consumption is on rise, which was earlier noticed only among the late adulthood. Enamel defects due to malnourishments, dental trauma due to negligence and safety barriers are some of the increasing evidences in children. Moreover, youth became the easy targets of tobacco-containing products. Eventually and unknowingly, early start of tobacco consumption manifolds risks of oral precancerous lesions and cancer in life ahead [8, 10, 13].

Strong arguments for oral health promotion through schools include the following:

- Personal and social education aimed at developing life skills—Pupils and students can be accessed during their formative years, from childhood to adolescence. Students develop lifelong oral health-related behavior, as well as beliefs and attitudes are being developed.
- Schools can provide a supportive environment for promoting oral health. Access to safe water, for example, may allow for general and oral hygiene programs. Also, provision of mouth guards—accessible and affordable sports protection, a safe physical environment and school policy on bullying and violence between students reduce the risk of dental trauma.
- The burden of oral disease in children is significant. Most established oral diseases are irreversible, will last for a lifetime and have an impact on quality of life and general health.
- School policies on control of risk behaviors, such as intake of sugary foods and drinks, tobacco use and alcohol consumption.

- Schools can provide a platform for the provision of oral health care, that is, preventive and curative services [14–18].
- Common risk factor approach-based oral health promotion policies in schools can lead to improvement in oral health and reduce oral health inequality [10, 16].

The need to set up oral health promotion programs in schools is evident, and it can easily be integrated into general health promotion, school curricula and activities. One of the proposed examples has been shown in **Figure 1** [13].

Using the structures and systems already in place as a competent setting for the installation of vital facilities such as safe water and sanitation can instigate oral health promotion in schools. The HPS strategies are effective, leading to potential long-term cost savings. For instance, Each key components of an HPS, that is, *healthy school environment, school health education, school health services, nutrition and food services, physical exercise and leisure activities, mental health and well-being, health promotion for staff and community relationships and collaboration*, incorporate equal opportunities oral health promotion as well as general health promotion. While oral health issue is specifically addressed, it can be admixed in general health promotion strategy. It is well illustrated in following examples of school health policies as shown in **Table 1** [13].

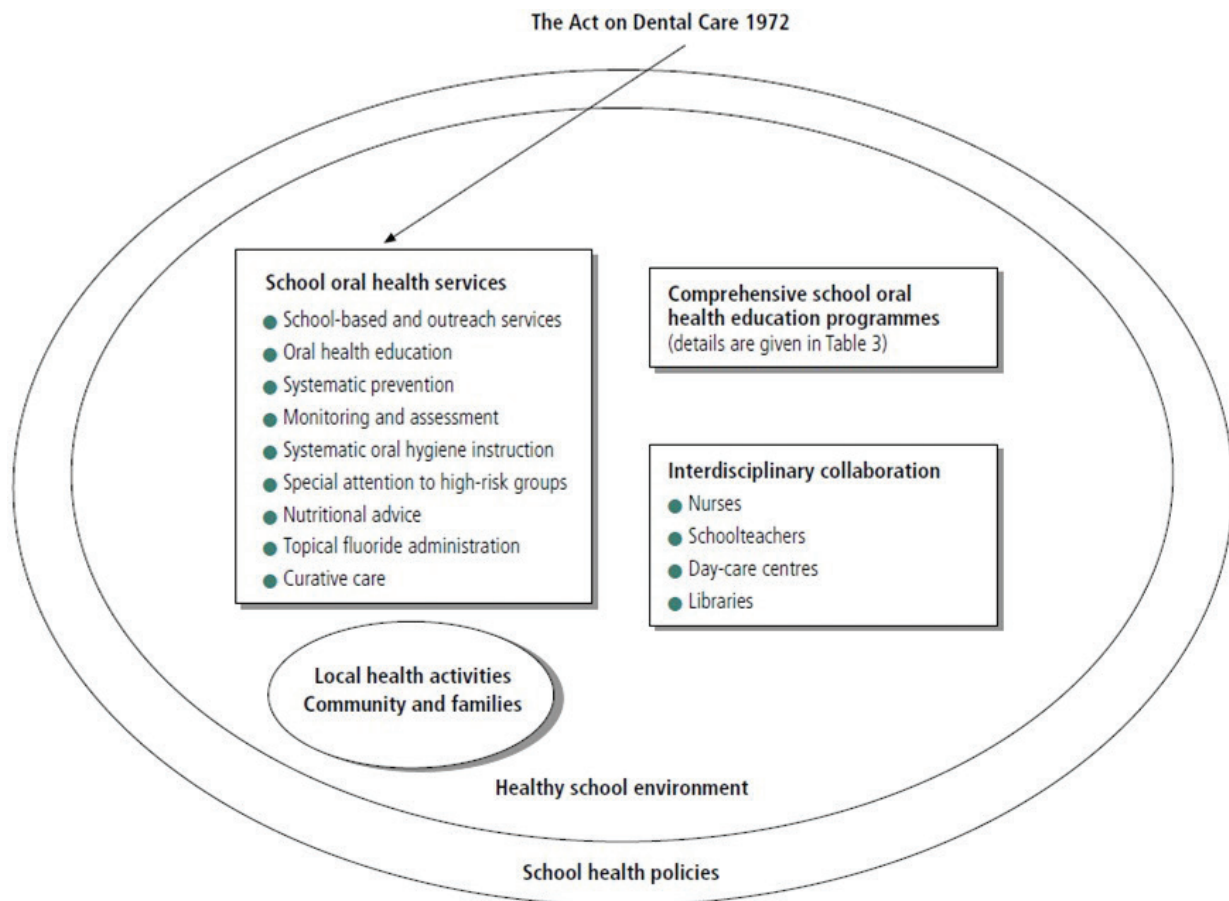


Figure 1. Integration of oral health in health-promoting schools: an example from Denmark.

| Areas | Cause | Health promoting school measures |
|-----------------------------------|---|---|
| Trauma | Sports injury, violence/fights and unsafe playgrounds | <p><i>Healthy school environment</i></p> <ul style="list-style-type: none"> • Safe and well-designed school buildings and playgrounds to prevent injuries and avoid "sick building syndrome" • A caring and respectful psychosocial environment • A protocol for dealing with bullying and violent behavior, as well as interpersonal conflicts <p><i>Oral injury</i></p> <ul style="list-style-type: none"> • Accident prevention • Clear protocol of vital actions to be taken without delay • Monitoring incidence of oral trauma • A protocol on safe sport, for example, use of mouth guards |
| Dental caries/periodontal disease | Sugary diet, lack of oral hygiene | <p><i>No sugar</i></p> <ul style="list-style-type: none"> • A ban on sugary foods and drinks on the school premises <p>Policy developmen</p> <ul style="list-style-type: none"> • The role of school in supporting local health issues, for example, water fluoridation <p><i>Oral health education</i></p> <ul style="list-style-type: none"> • Oral health education should form part of all subjects in the school curriculum • Daily supervised tooth brushing drills • Training for parents about good oral health and encouragement for them to take part in health promotion activities at school • Training for school staff |
| Areas | Cause | Health promoting school measures |
| Nutritional deficiency/infections | Malnutrition, lack of adequate food/knowledge | <p><i>Healthy eating</i></p> <ul style="list-style-type: none"> • Healthy foods must be made available in the school canteen, tuck shop, kiosks and vending machines • Only nutritious meals are served in the school canteen • Promotion of 5-a-day (fruit and vegetables) • Drinking water fountains throughout the school • Training for cooks and food providers • Assessment and surveillance of nutritional status • Support for school- or community-based health promotion activities such as breakfast clubs <p><i>Control of cross-infection</i></p> <ul style="list-style-type: none"> • Clear guidelines on how to control cross-infection • Training for school staff |

| Areas | Cause | Health promoting school measures |
|-------------------------|---|--|
| Areas | Cause | Health promoting school measures |
| General and oral health | Lack of knowledge, habits, social environment | <p><i>Oral health service</i></p> <ul style="list-style-type: none"> • Working closely with central or local oral health service providers • Dealing with dental emergencies • Role of teachers in oral health surveillance, screening and basic treatment, for example, ART • Monitoring of oral health-related complaints and absenteeism. • Training for school staff <p><i>Physical exercise</i></p> <ul style="list-style-type: none"> • Commitment to provide safe facilities for training in sport and leisure activities • Exercise and physical education are a compulsory part of the school curriculum |

Table 1. Examples of oral health-related school health policies to be promoted in HPS.

There is an association of socio-economic, geographic factors and type of schools with school based health promoting activities. On an average, students attending private schools belong to more advantaged backgrounds than their counterparts in public schools. Privately managed schools achieve greater efficiency or academic value-added than publicly-managed schools [18]. According to one study, ten out of eleven participated countries (including India) had the large socio-economic gap between private and public school pupils except Chile [19]. Moreover, students going to city/town schools generally belonged to more privileged backgrounds than their counterparts in village schools. All the school headmasters in this study reported that primary school student's absenteeism rate decreased when the students received support in the form of school uniforms, textbooks, meals and various financial assistance schemes. For example, urban schools tend to have greater resources than those in rural. Also, students in private schools had higher levels of positive behavior than those in public schools, and these results were statistically significant for most countries [19]. Public and private school differ from each other in many ways as better amenities in school, extra-curricular activities, outdoor and indoor sports, etc. The private school allots more fees from students for such activities/facilities. Consequently, children from upper and high middle socioeconomic status prefer private schools, while children with low socioeconomic strata attend public schools [20]. Students gain more attention when the student to teacher ratio is higher. Bruneforth et al. [19] also reported inferior pupil-teacher ratios in village schools than in city/town schools in India. The children who do not have adult supervision after school are more vulnerable to indulge them into health hazarding habits like smoking, drugs and substance abuse and behavioral problems. The schools providing self care activities after school were found more effective in reducing the prevalence of smoking among ninth-grade students in Los Angeles and San Diego Counties [21]. Smoking and chewing tobacco are systematically associated with socioeconomic markers [20].

4.2. Healthy food at school: Mid Day Meal Scheme of India

The whole school approach with availability of healthy food in school canteen, tuck shops, instructing parents for healthy food and school staff involved in planning for food and curriculum has amplified student's knowledge. However, it has not led to change in behavior [22, 23].

Providing healthy food in schools can meet the nutritional requirement of students and also guide the parents to deal with healthy diet chart for their children. In UK, campaigns like the ones conducted by famous chef, Jamie Oliver, are one example of actions in this area.

In India, Mid Day Meal Scheme in school started in 1925 from a single city, Madras (now Chennai) and now spread to all States. From April 1st, 2008, the program covers all children studying in Government, Local Body and Government-aided primary and upper primary schools across the country. The Mid Day Meal Scheme is the world's largest school feeding program reaching out to 0.84 billion primary students and 0.33 billion upper primary Students, in total about 1.2 billion children in over 9.50 ten thousands schools across the country during 2009–2010 [24].

Unhealthy eating habits and sedentary lifestyles are closely bound not only to various socio-economic indicators such as the parent's education levels, financial resources and professional situations, but also to living in economically deprived areas. This suggests significant contributions of gender, age and religion belief to the eating habit. Therefore, Schools should introduce healthy food policy and activity after consulting with school authority, nutrition expert and parents so as to maintain good eating habits among students [25].

4.3. National tobacco control program of India

Tobacco consumption either in smoke form or smokeless form has deleterious effect general and oral health. Tobacco abuse is the leading preventable cause of death and disease so far. Long list of diseases caused by tobacco abuse includes different cancers – lung cancer, oral cancer, cardiovascular disease, stroke and chronic lung disease. Pertaining to oral health, it causes aggressive periodontitis, tooth loss, wound healing complications and mainly pre-cancerous or cancerous lesion leading to disfigurement of face. Risk of oral cancer is 10-fold in smokers than no-smokers and 11-fold risk in smokeless tobacco users than non-users. One can expect a normal life expectancy with early acknowledgement of tobacco health hazards and culminating tobacco use especially below 35 years. Prevention is the prime key factors, and at initial stage, most of the adverse effects of tobacco are reversible. This fact can be used to motivate tobacco using people to curb the use of tobacco [26].

India is the second largest consumer and producer of tobacco. India accounts for 10% of the world tobacco area and 9% of the production. 30% of cancer deaths, majority of cardiovascular and lung disorders; 40% of tuberculosis and other related diseases are attributed to tobacco consumption. Over 80% of oral cancers are caused due to tobacco use. As per the WHO Global Report on "Tobacco Attributable Mortality" 2012, 7% of all deaths (for ages 30 and over) in India are attributable to tobacco. Ministry of Health and Family Welfare

(MoHFW), Government of India inaugurated *The National Tobacco Control Program (NTCP)* in 2007–2008, as included in 11th five year plan. The program includes objectives as:

- Nationwide awareness regarding tobacco use harms and following tobacco control laws.
- Necessary actions for strong implementation of the Tobacco Control Laws.
 - Effective primordial and primary level prevention strategies are planned under the *National Tobacco Control Program (NTCP)*.

The prime areas under the NTCP as targets are:

- Training of trainers, that is, health and social workers, NGOs, school teachers and enforcement officers.
- Information, Education and Communication (IEC) activities.
- School Programs.
- Monitoring tobacco control laws.
- Co-ordination at village level activities.
- Medicinal treatment facility for cessation at district level.

Indian government implemented Cigarette and Other Tobacco Products Act (COTPA; addressing tobacco use in public places, tobacco advertising and sale and packaging regulations) since 2003 with comprehensive action in 2005 following the Framework Convention of Tobacco Control (FCTC). Following laws through the lobbying of anti-tobacco advocates were successfully established by Indian judiciary.

- *Section 4: Prohibition of smoking in public places.*
- *Section 5: Prohibition of direct and indirect advertisement, promotion and sponsorship of cigarette and other tobacco products.*
- *Section 6a: Prohibition of sale of cigarette and other tobacco products to a person below the age of 18 years.*
- *Section 6b: Prohibition of sale of tobacco products within a radius of 100 yards of educational institutions.*
- *Section 7: Mandatory depiction of statutory warnings (including pictorial warnings) on tobacco packs.)*
- *Section 7(5): Display of tar and nicotine contents on tobacco packs [27].*

The achievements of this national program are examples of apt implementation. Increase in taxation had led to a reduction in self-reported tobacco sales and consumption at the short-term end-point. The GATS data (2009) indicate that 54.7 and 62.9% are aware of health warnings on cigarette and smokeless tobacco packaging, respectively. Trials of school-based education interventions demonstrated a positive impact on knowledge, advocacy skills and tobacco use. Teaching about the risks of tobacco use for health professional trainees

appeared more widespread, but may have reduced slightly post-FCTC. Community-based education interventions and education interventions for adult tobacco users appeared beneficial. Moreover, the secondary outcomes of tobacco control programs observed as cleaner streets and air quality, preservation of forests, increased performance at school/work, reduction in fire hazards, healthy mother and infants and indeed a better quality of life. Tobacco-use outcomes could be improved by school/community-based and adult education interventions and cessation assistance that are facilitated by training for health professionals and schoolteachers [28].

4.4. National fluorosis prevention program

Fluoride is an essential mineral for human health. It widely exists in natural water and in foods such as tea, fish and beer. The twentieth century documented association among reduced level of dental caries with communal fluoridated water consumption. Soon, fluoride has become an effective preventive measure for dental caries. Easy incorporation into toothpaste has improved oral health in some parts of world, particularly in developing countries [26].

However, the other part of world suffers from excessive fluoride in natural environment. Fluorosis, a public health problem, is caused by excess intake of fluoride through drinking water/food products/industrial emission over a long period. Moderate-level chronic exposure (above 1.5 mg/liter of water—the WHO guideline value for fluoride in water) is more common. Acute high-level exposure to fluoride is rare and usually due to accidental contamination of drinking-water or due to fires or explosions. It results in major health disorders like dental fluorosis, skeletal fluorosis and non-skeletal fluorosis. The late stages of skeletal and dental fluorosis are permanent and irreversible in nature and are detrimental to the health of an individual and the community, which in turn has adverse effects on growth, development & economy of the country. There is no treatment for severe cases of skeletal fluorosis, only efforts can be made towards reducing the disability which has occurred. However, the disease is easily preventable if diagnosed early and steps are taken to prevent intake of excess fluorosis through provision of safe drinking water, promote nutrition and avoid foods with high fluoride content.

Fluorosis is worldwide in distribution and endemic at least in 25 countries. It has been reported from fluoride belts: one that stretches from Syria through Jordan, Egypt, Libya, Algeria, Sudan and Kenya, and another that stretches from Turkey through Iraq, Iran, Afghanistan, India, northern Thailand and China. There are similar belts in the Americas and Japan. In India, fluorosis is mainly due to excessive fluoride in water except in parts of Gujarat and Uttar Pradesh where industrial fluorosis is also seen. The desirable limit of fluoride as per Bureau of Indian Standards (BIS) is 1 ppm (parts per million or 1 mg per liter). High levels of Fluoride were reported in 230 districts of 20 States of India (after bifurcation of Andhra Pradesh in 2014). The population at risk as per population in habitations with high fluoride is 11.7 million as on 1.4.2014. Rajasthan, Gujarat and Andhra Pradesh are worst affected states. Punjab, Haryana, Madhya Pradesh and Maharashtra are moderately affected states, while Tamil Nadu, West Bengal, Uttar Pradesh, Bihar and Assam are mildly affected states.

Understanding the clinical manifestations of fluorosis

- *Dental fluorosis*: It is categorized into mild, moderate and severe dental fluorosis depending on the extent of staining and pitting on the teeth. In severe dental fluorosis, unaesthetic & brittle enamel is found. Vitamins A and D deficiency or a low protein-energy diet are also linked to enamel defects. Ingestion of fluoride after 6 years of age will not cause dental fluorosis. The teeth could be chalky white and may have white, yellow, brown or black spots or streaks on the enamel surface. Discoloration is away from the gums and bilaterally symmetrical.
- *Skeletal fluorosis*: The early symptoms of skeletal fluorosis include stiffness and pain in the joints. In severe cases, the bone structure may change and ligaments may calcify, with resulting impairment of muscles and pain. Constriction of vertebral canal and intervertebral foramen exerts pressure on nerves, blood vessels leading to paralysis and pain.
- *Nonskeletal fluorosis/Effects of fluorosis on soft tissues/systems*:
 - Gastrointestinal symptoms: Abdominal pain, excessive saliva, nausea and vomiting are seen after acute high-level exposure to fluoride.
 - Neurological manifestation: Nervousness and depression, tingling sensation in fingers and toes, excessive thirst and tendency to urinate.
 - Muscular manifestations: Muscle weakness and stiffness, pain in the muscle and loss of muscle power, inability to carry out normal routine activities.
 - Allergic manifestation: Skin rashes, perivascular inflammation—pinkish red or bluish red spot, round or oval shape on the skin that fade and clear up within 7–10 days.
 - Effects on fetus: Fluoride can also damage a fetus, if the mother consumes water/food with high concentrations of fluoride during pregnancy/breast feeding. Abortions, still births and children with birth defects are common in endemic areas.
 - Low hemoglobin levels: Fluoride accumulates on the erythrocyte (red blood cells) membrane, which in turn loses calcium content. The membrane which is deficient in calcium content is pliable and is thrown into folds. The shape of erythrocytes is changed. Such RBCs are called echinocytes and found in circulation. The echinocytes undergo phagocytosis (eaten-up by macrophages) and are eliminated from circulation. This would lead to low hemoglobin levels in patients chronically ill due to fluoride toxicity.
 - Kidney manifestations: Low volume, dark yellow to red color of urine is seen.
 - Calcification of ligaments and blood vessel: Forms unique feature of the disease helps in differential diagnosis.

With an aim to prevent and control fluorosis cases, Government of India initiated the National Program for Prevention and Control of Fluorosis (NPPCF) as a new health initiative in 2008–09. During the 11th Plan, 100 districts from 17 States were identified for program implementation. During the 12th 5-Year Plan period, it is proposed to add another 95 districts for prevention and control of fluorosis. In the 12th Plan, the program has been brought under the Non-Communicable Disease Flexi-pool of National Health Mission (NHM).

4.4.1. Goal and objectives

- To collect, assess and use the baseline survey data of fluorosis of Ministry of Drinking Water Supply for starting the project.
- Comprehensive management of fluorosis in the selected areas.
- Capacity building for prevention, diagnosis and management of fluorosis cases.

4.4.2. Strategy

- a. *Surveillance* of fluorosis in the community and school children.
- b. *Capacity building* at different level of healthcare delivery system for early detection, management and rehabilitation of fluorosis cases.
- c. *Diagnostic facilities* in the form of laboratory support and equipment including ion meter to monitor the fluoride content in water and urinary levels at district/hospital/medical college for early detection and confirmation of fluorosis cases.
- d. *Health education* for prevention and control of fluorosis: (a) Creating awareness about fluorosis disease, drinking water (safe/unsafe), diet editing and diet counseling through interpersonal communication, group discussions, media, posters and wall paintings. (b) Create awareness and skills among the medical as well as paramedical health workers to detect the disease in the community. (c) Provision of safe drinking water, water harvesting (rain water) and other measures in collaboration with Public Health Engineering Department.
- e. *Management* Efforts are aimed to reduce the fluorosis induced disability and to improve quality of life of affected patients. Medical treatment is mainly supplementation of Vitamins C & D, Calcium, antioxidants and treatment of malnutrition. Treatment of deformity includes physiotherapy, corrective plasters and orthoses (appropriate appliances).

4.4.3. Expected outcome

The expected outcome of the National Program for Prevention & Control of Fluorosis in the districts will be:

- a. Number of fluorosis cases managed and rehabilitated in the program districts.
- b. Capacity for laboratory testing for fluoride in water, urine to be developed.
- c. Trained health sector manpower in Government set up for measuring fluoride in urine and water.
- d. Improve information base for the community and all concerned in the program districts [29].

Likewise, fluoride is double edge sword, that is, its deficiency and excess both affect the oral health. Hence, science based on effectiveness, safety and benefits should be implemented at different needs at different part of the world.

5. Strategies for oral health promotion

5.1. Generation of strategies based on evidences

WHO aim at building healthy populations involving all communities by combating every possible illness. The organization has recommended strategic framework which focuses and guide on oral health promotion activities/programs.

- *Reduction in oral disease/condition burden and disability, especially in poor and marginalized populations.*
- *Promoting healthy lifestyles and reducing risk factors to oral health that arise from environmental, economic, social and behavioral causes.*
- *Developing oral health systems that equitably improve oral health outcomes, respond to people's legitimate demands and are financially fair.*
- *Framing policies in oral health, based on integration of oral health into national and community health programs, and promoting oral health as an effective dimension for development policy of society [7].*

Program goals are broad statements on the overall purpose of a program. For instance, “to eliminate racial disparities in oral cancer survival rates,” “to improve the oral health of nursing home residents” or “to improve the oral health of country's children under 5 years. Program objectives are more specific statements of desired endpoints of program.

Objectives of oral health programs should meet SMART criteria:

Specific—they should describe an observable action, behavior or achievement.

Measurable—they are systems, methods or procedures to track to record the action upon which objective is focused.

Achievable—the objective is realistic, based on current environment and resources.

Relevant—the objective is important to the program and is under the control of program.

Time based—there are clearly defined deadlines for achieving the objective [3].

Designing an oral health promotion program: step by step can be studied as shown in **Figure 2** [1]:

Best practices in oral health promotion and prevention can take various forms, be it education, health promotion, integrating oral health promotion into general health promotion programs, policy changes which promote better oral health, the provision of care services, or programs specifically designed at addressing oral health inequalities. It is interesting to learn how oral

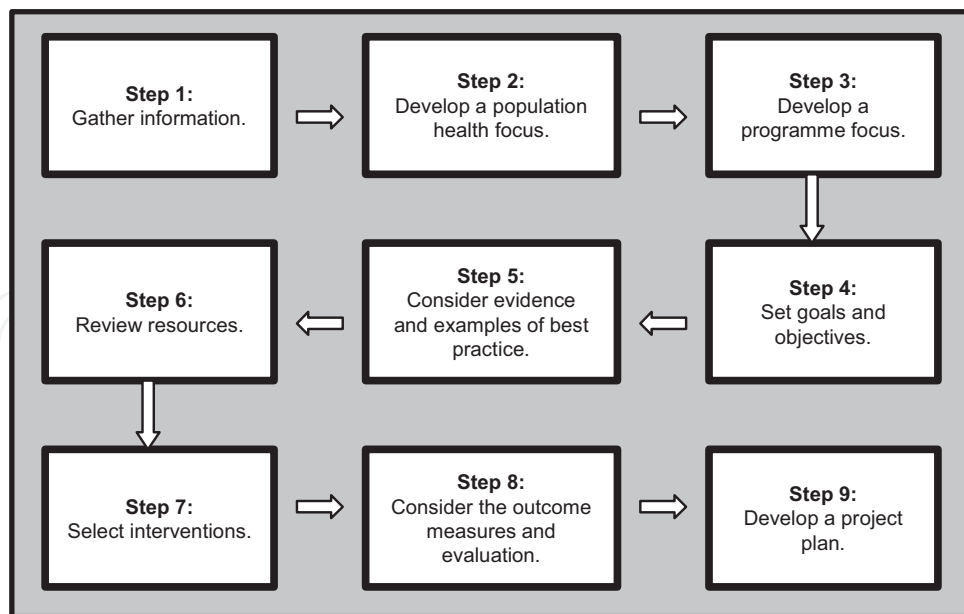


Figure 2. A step-by-step design of an oral health promotion program (based on Ministry of Health, New Zealand, 2006).

health promotion and practices are implemented in through various interventions applying the Ottawa Charter guidelines.

5.1.1. Building healthy public policy

Establishing healthy policies is integral in improving oral health. Based on the needs, evidences and situation analysis, National Government, health ministry, local governments, organizations, communities, schools, primary healthcare settings and local stakeholders forms or reforms the healthy policy. Health promotion advocates hold key responsibility to convey appropriate health needs of the population.

Examples of interventions that build healthy public policy

- Campaigning to extend the coverage of optimal water fluoridation or water de-fluoridation based on needs.
- Supporting early childhood centers and school boards in developing healthy food and nutrition policies.
- Working on policy options that eliminate the advertising of harmful food and beverages to children.
- Working with organizations to promote injury prevention policies, for example, mouthguards in sport or safe play equipment.
- Industrial approach to limit the marketing of carbonated & sugar-containing drinks to children.
- Working to study and develop standards for marketed harmful products to children.
- Developing and implementing smoke free environment policies.

5.1.2. *Creating supportive environments*

Making the healthy choice easy choice is the aim of health promotion. This can be achieved by creating supportive social, physical, biological and cultural environments. These determinants of health directly and indirectly affect the oral health with or without general health consequences. Hence, the needs of local population should be considered in order to design and implementation of health promotion actions. Health promotion practitioners play a lead role in creating supportive environments along with public health units, government agencies, health organizations, NGOs, professional Dental Association, industry organizations and print and digital media.

Interventions that harness creating healthy supportive environments for oral health

- Provision of fluoridated toothpastes at subsidized cost that low income group can also avail.
- Reforming supermarket's marketing policies for instance replacing sugary products like chocolates.
- Encouragement for usage of smoke-free environment advertisements and sponsorship for oral health promotion.
- Media coverage of healthy food choices which enhance oral health.
- Oral health awareness and promotion through social marketing campaigns.
- Promoting safe water supply at all the public events.

5.1.3. *Strengthening community action*

Communities are a powerful force for achieving actions for any health promotion program where the key success factors are: *partnership, participation and engagement*. Encompassing all the communities for united efforts to understand their own oral health needs and ascertain to improve the oral health outcomes of their community. These health promotion programs may differ with age, society, culture and environment. Among the five actions themes of Ottawa Charter, community action is unique as concentrate on how particular health actions to be carried out. It eventually may turn out to be effective examples to be followed. Important factor for communities to have equitable access to resources to support the control they must have over their own health and development. Hence, strengthening community action is about providing and facilitating access to sufficient and appropriate resources.

Examples of interventions that strengthen community action for oral health

- Engaging the community to support water fluoridation/de-fluoridation and encourage safe water supply.
- Engaging communities to participate in school oral health programs through leadership activities.

- Empowering communities for healthy eating programs that enhance oral health.
- Specific target-oriented oral health improvement programs based on community cultures.
- Community and school collaboration for establishing playgrounds with safe play equipment, barricades for children safety.

5.1.4. Developing personal skills

Personal skills can help individual to take control of his own health. Empowering people with appropriate knowledge and skills to improve and maintain their oral health is essential. Oral health literacy is the way that provides information, education and skills for oral health improvement. Such things help increases the resources available to people to exercise more control over their own health and environments. Health promotion programs needs to be updated that go collateral with changing environment and culture. Hence, continuum for health education, particularly for oral health, throughout life is necessary. Here, comes the role of oral health professionals who forms the bridge between health promotion advocates and health promotion program communities. At community level or at individual level, they create support system to ingress healthy personal skills to improve and maintain oral health. Oral health professionals fulfill this role of trainer by providing information, resources and training.

Interventions that help developing personal skills

- Oral health promotion though guided tooth brushing using fluoridated toothpaste as self-care habits.
- Smoking cessation actions under the guidance of Oral health professionals.
- Nutritional and dietary education programs which include oral health message.
- Encouraging sports authorities for safe environment at sports events such as making sportsmen to put on mouth guards compulsory when required.

5.1.5. Reorientating health services

Health services carry the burden of all diseases by providing three tier cares. With advancing burden of new diseases and population explosion challenges, reorientation of health services is inevitable. The global burden of oral diseases had led to integrate oral health into general health. Indeed, it is giving a new direction for oral health services and recognizing that oral health is not merely a biomedical process. Health services should be reformed such that they not only treat the diseases but also find suitable solutions for health promotion. Strengthening of health services to analyze needs, to understand the socioeconomic determinants of health of the population is required. Such reformation which reduces oral health inequalities and improves oral health-related quality of life is all about reorienting health services. While prime focus is on primary healthcare services, prevention, allocation, access and cost-beneficial health services are obligatory to achieve this.

Interventions for reorientating health services

- Establishing community-led oral healthcare providers.
- Extensive collaboration with NGOs and social services for oral health promotion, so the curative burden from Government is reduced.
- Linking general health services and children oral health care under primary health centers.
- Training the trainers, that is, training all health professionals about preventive and social components of oral health promotion.
- Facilitating and building knowledge for diagnosing early caries detection programs by primary healthcare professionals.
- Health care led healthy policies supporting access to oral health care.
- Provision of professional fluoride lack and excess treatment facilities delivered by primary healthcare professionals and community [1].

Oral health should be an important agenda on the country's health policy. The above international policy examples envision the challenges and opportunities for better identification, prioritization and integration of oral health services. Collaborative planning and organization may accelerate the process to arrest the global burden of oral diseases and pioneer the oral health promotion. Relevant international developments suggest that some other health promotion frameworks exist that are parallel to Ottawa Charter framework. Although their principles are same, the implementation may differ according to the needs and socio-cultural environment of the region. One can develop or reform a different model based on above evidences for oral health promotion programs at their region.

5.2. Country examples for oral health promotion program

Investment in simple preventive programs is cost-effective for prevention of oral diseases and promotion of good oral health which is already proven in Europe. Twenty eight examples of good practice are presented from across Europe as shown in **Figure 3**. These cover all areas of oral health promotion across the life course and include programs aimed at pregnant mothers, children and adolescents, the elderly and disadvantaged groups. To solve the problem of poor oral health in other parts of world a thorough evaluation of existing successful policies and programs, identification of evidence-based interventions can be learned from these programs.

These programs outline a number of successful initiatives that can help prevent oral diseases, which reduce the social burden and in turn reduce existing inequalities. This is done with various measures, for instance: prevention programs in communities; limiting social, economic, cultural and environmental risk factors for non-communicable diseases, oral hygiene promotion, oral health literacy and an appropriate access to oral health care [30].

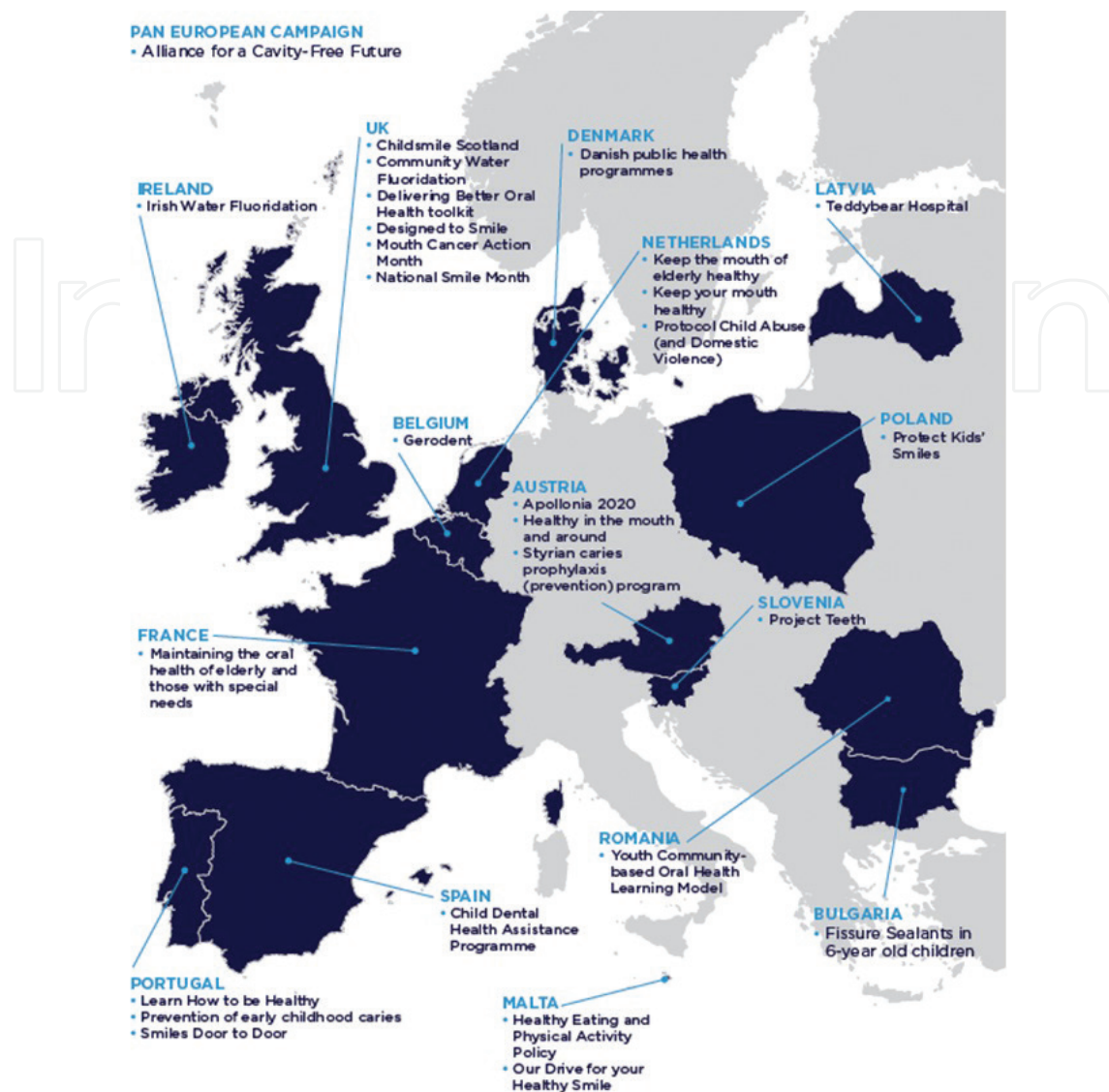


Figure 3. Examples of good practices in oral health promotion programs existing across the Europe.

6. Conclusion

Gradient shift to rural population to urban area, issues of migrants, urbanization, socio, cultural and environmental changes alienate health promotion. Isolated intervention may not be successful at such circumstances. Oral health promotion actions with different approaches can only improve. Health for all is certainly efficient way than the target specific behaviors. It is evident that an effective and sustainable intervention combines health, society and individual through organization, policy and laws to create healthy living conditions which promotes better quality lifestyle.

WHO is considered as an accountable and reliable organization which provide necessary technical and policy support. Their evidence based guidance enable countries to integrate oral health promotion programs into the general health promotion. The organization has different

expertise at Collaboration Centers across globe that is resourceful for oral health promotion guidance. However, most of the developed and developing countries utilize own resources and develop their own action program for health promotion. It is based upon local experiences and strengths, active communities to contribute participation facilitate community empowerment by creating sustainable supporting environment. WHO has given a vision to oral health promotion programs, that is, “think globally – act locally.” To conclude the chapter, an oral health promotion program should focus on following aspects:

- Recognition of health determinants, capacity building for designing and implementing interventions to promote oral health.
- Community led and based oral health promotion programs, having equal opportunity for marginalized segments of population.
- Planning, monitoring and evaluation strategies to be implemented strictly for national oral health promotion activities/programs.
- Methods and methodological development to analyze the processes and outcomes of national oral health promotion interventions.
- Collaboration with strong of networks and alliances that strengthen local, national and international activities for oral health promotion. Every experience, whether success or failure should be counted and shared to acknowledge the cost-effective and cost-beneficial experience that yield to improve oral health quality of life.

Oral health promotion is one practice that involves strategic planning, integrative activities, evidence-based concepts, evaluation, policy making and other related multifactor. Knowledge generation for oral health promotion through evidence-based concepts is the goal of this chapter.

Abbreviations

| | |
|-------|--|
| WHO | World Health Organization |
| GBD | Global burden of disease |
| DALYs | Disability adjusted life-years |
| YLDs | Years lived with disability |
| HPS | Health promoting school |
| NTCP | National tobacco control program |
| MoHFW | Ministry of Health and Family Welfare |
| COTPA | Cigarette and Other Tobacco Products Act |
| GATS | Global Adult Tobacco Survey |
| NPPCF | National Program for Prevention and Control of Fluorosis |
| NGOs | Non-government organizations |

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