

**IMPLEMENTATION AND EVALUATION OF SCHOOL-BASED
DENTAL CARIES PREVENTIVE PROGRAM: Proposal**

Master of Public Health Integrating Experience Project Utilizing Project Implementation
Framework

Varuzhan E. Ghazaryan
MPH Candidate

College of Health Sciences
American University of Armenia

Primary Advisor: Robert Bagramian, DDS, DrPH
Secondary Advisor: Varduhi Petrosyan, MS, PhD

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Executive summary

The oral health in Armenia is far from being satisfactory. For example, in 2000, the DMFT index among 12-year-old children was estimated to be 4-5 on average. At the age of 35, the DMFT index was approximately 14 and at the age of 60 there were only 5-6 teeth in the oral cavity. The recent studies conducted in this field showed that the knowledge level of children about the importance of oral health was poor.

The proposed program seeks to educate the children aged 6-8 years about appropriate dental care and oral disorders. Children aged 6-8 years have been chosen as target population, because it is easier to change their habits and to teach them to use oral hygiene measures. Moreover, once they get accustomed to these habits they will hopefully keep them throughout their lives and keep natural teeth for their lifetime. The objectives of the proposed program are: to train children in the classrooms to promote healthy behaviors regarding dental care and to increase the knowledge level and change behaviors of children regarding oral hygiene by 20% in one month.

For the implementation of the educational program two classes from 2nd and 3rd grades of 3 Yerevan schools will be chosen for the intervention group. Besides the 3 intervention schools, 2 classes will be chosen as a comparison group from 3 schools where the program is not conducted. A total of 360 schoolchildren will be recruited for the evaluation study, these includes 180 in the intervention group and 180 children in the comparison group (age range 6 to 8 years, each class has approximately 30 children).

School-based dental health educational program will include presentations, lectures by health educators and instructions about proper ways of brushing and flossing teeth, with illustrations and video demonstrations. In the beginning of the program each child will receive a toothbrush and floss.

The evaluation team will perform clinical examinations at baseline and after the intervention – in one month with special emphasis on oral hygiene status by applying the following parameter – plaque control record (PCR). The comparative analysis of these data will make it possible to evaluate the effectiveness of the program.

Short, school-based educational program among 6-8 years old children in a school about importance of oral hygiene and its proper maintenance could significantly improve children's dental hygiene practices. Increase of knowledge about dental care will help children to avoid future oral diseases.

1. Situational Analysis

Dental caries is the most common chronic disease of children aged 5 to 17 years - five times more common than asthma [1]. Many studies suggest that magnitude and severity of dental caries in primary and permanent teeth continue to be a major problem and should receive special attention [2].

Poor oral health is detrimental for children because it affects their nutrition, growth and development [3]. Childhood oral disease, if untreated, can lead to pain, development of dentofacial anomalies and other serious health problems, like severe toothache, oral abscess, destruction of bone, and spread of infection via the bloodstream [4]. Poor children have nearly 12 times more restricted activity days because of dental – related illness than children from higher-income families. Dental caries may affect a child's eating habits and nutritional intake, potentially influencing growth and early childhood development and school readiness [5]. Pain and infection caused by dental caries can lead to poor school attendance and problems in eating, speaking, and learning.

Tooth decay or early loss of teeth may lead to malnutrition and other health problems. Caries and its complications affect the quality of life, both physically and physiologically [6]. The premature loss of primary teeth may result in a variety of adverse consequences, such as gastrointestinal disorders, esthetic and psychological problems. Besides, early childhood caries dramatically increases a child's risk for future dental caries [6].

Scientific research continues to make progress in identification of best practices for diagnosing, treating, and preventing dental caries. Traditional approaches for treating carious lesions in a surgical manner are being replaced by newer strategies that emphasize disease prevention and conservation of tooth structure.

Despite the marked declines in caries in the past 30 years, dental caries in pre-school children remains a major dental public health problem in most European Union (EU) countries and is a

serious public health problem in disadvantaged communities in both developing and industrialized countries [7]. For example, a national survey in Britain indicated that 50% of children in Scotland aged 3.5 to 4.5 had experienced caries and 30% of children with active decay had decay which extended into the dental pulp [7].

In most high-income countries, 60-90% of schoolchildren have dental caries [3]. Statistics indicate that at least 25% of five to six-year-old children experience tooth decay and this figure is above 90% in some low-income countries and countries with economics in transition [7].

National averages in Denmark, Finland, Italy, the Netherlands, Norway and England are below 2.0. Higher levels of decay were reported in Portugal (4.4), Lithuania (4.4), Hungary (3.7) and Scotland (3.0) [7]. In some countries the percentage of untreated caries was 71% (UK). In the former Soviet Union the lowest level of DMFT score was below 1.1 [8].

Dental caries is also common in 12-year-olds. In countries with relatively low DMFT scores, 65% of children had experienced dental caries in their permanent teeth. The DMFT index for 12-year-old children is 3.0 in the American and 2.6 in the European regions and 4.5 in Armenia [3, 9].

Fortunately, most oral health problems can be prevented or effectively treated if found in their early stages of development. In the USA recent data show an increase in the percentage of children who have untreated cavities and a decrease in the percentage of children who visit a dentist before kindergarten [4].

Recent data concerning oral health in Armenia are rare. In 2000, the DMFT index among 12-year-old children was estimated at 4.5 on average. At the age of 35, the DMFT index is approximately 14 and at the age of 60 there are only 5-6 teeth in the oral cavity [9]. The norms of this index vary from country to country and only comparison between them can be made. As for Armenia the DMFT index shows that the situation is similar to the other NIS countries, but it is worse than in western European countries.

During the last decade the Armenian health care system has significantly been changed.

Reforms were especially implemented in the direction of decentralization of dental services and developing of new forms of financing, planning and management.

Dentistry is privatized in Armenia. In the case of some clinics preference is shown for remaining within the state sector as the clinic can continue to get government support. Dentistry is free for children up to the age of 7 in dental “offices” attached to standard polyclinics. The dental “offices” attached to standard polyclinics will remain in the public sector in the short term although they are now part of self-financing autonomous enterprises and will charge for most of their services. Dental care, as a part of all health care is covered for some groups with low socio-economic status, such as children in families with four or more siblings (until the age of 18), children up to 18 years old with disabilities and children living at orphanages [10].

In Armenia there are now several programs aimed at improving the oral health of vulnerable populations. For example, the Armenia Dental society of California operates several special programs [11]. It owns a mobile clinic and periodically organizes trips to schools throughout Armenia. The student council of the Yerevan State Medical University has also organized health programs which included dental care [12]. In 2003, the United Methodist Committee on Relief (UMCOR) implemented Dental Care program in some regions of Armenia, during which dentists examined the schoolchildren and provided them with a treatment if needed. The program revealed that the prevalence of dental caries among Armenian schoolchildren was 80% [13].

However, these programs are mainly directed to treatment of caries.

Regular dental checkups and cleanings, fluoridation and other treatments, and classes on oral hygiene can significantly reduce the incidence of dental caries. The earliest opportunity for intervention occurs during prenatal counseling, when the mother can be given information about diet, oral hygiene practices, appropriate uses of fluoride, and the transmission of bacteria from parents to child [14]. Other opportunities include informing families during dental visits about

the benefits of early, routine dental care encouraging the use of fluoridated water and educating families about the benefits of dental sealants [14, 15, 16].

2. Strategy Appraisal

The four most accepted measures for prevention of dental caries and its complications are: oral hygiene, dietary counseling, fluoride, and fissure sealant. The first two measures do not require much expenditure. They can be implemented in any place via an educational program. Good hygiene and diet can prevent periodontal disease and dental caries [8, 16, 17]. Many studies provided evidence of strong association between caries development and poor hygiene [18].

Almost all preventive programs usually include oral hygiene instructions or educational part of oral hygiene.

The most important means of maintaining oral hygiene is using a toothbrush. Tooth brushing at least twice daily with a small headed, medium hardness brush will help to reduce caries if fluoride toothpaste is used [19]. However, tooth brushing removes plaque only from smooth dental surfaces and not from the depths of contact areas, pits and fissures; more effective interdental removal requires regular flossing (some flosses also contain fluoride) [19].

Diet also plays an important role in preventing caries [17, 20]. Sugars, particularly non-milk sugars, in items other than fresh fruits and vegetables, are the major dietary causes of caries [21].

Frequency of intake is more important than the amount because the risk is approximately the same for small or big portions of food [6, 20, 21]. For reducing the risk of developing caries, it is better to have a meal a few times per day than to eat many times in small portions. For older children and adults snack foods and especially drinks should be free of sugar. Because of the risk of erosion as well as of caries, frequent consumption of carbonated and cola type drinks should be discouraged. Water, milk, and sugar-free fruit juices are preferred options for children [6, 21].

Both, children and adults suffer from the dental problems. Ideally, oral health programs should be carried out for the entire population. However, in case of limited time and resources children are the preferred target. First, it is easier to change their habits and to teach them to use oral hygiene measure. Second, once they get accustomed to these habits they will hopefully keep them throughout their lives and keep natural teeth for their lifetime [17]. Adults have mostly problems that require treatment rather than prevention. This does not decrease the importance of prevention for older people, but shows that working with children can have more significant impact [17].

There are surprisingly few well-studied strategies available to clinicians to prevent and control high rates of caries in the primary dentition [22]. Effective strategies to reduce risk by modifying the diet of children are not readily applicable to dental practice, nor are they typically effective without significant effort. For example, the use of xylitol is particularly attractive because its action is not dependent upon reducing the amount of other sugars in the diet [23]. Thus, a clinician can recommend adding xylitol to the diet without asking patients to make additional alterations to their dietary patterns. Xylitol-containing products have the potential to improve success in controlling the problem of rampant decay in the primary dentition [23].

A number of studies conducted among schoolchildren of various ages have shown that consumption of gum containing xylitol reduces the rates of dental decay in the treatment groups (relative risks ranging from 0.27 to 0.56) [24]. Increasing use and higher doses lead to greater reductions. One study conducted among schoolchildren in Belize with very high rates of dentine caries showed that consumption of xylitol gum was associated with arrest of carious lesions and, as expected, that the highest dose of xylitol had the greatest effect [24]. The number of lesions that re-hardened ranged from 9 percent to 27 percent in all groups and from 12 percent to 27 percent in the 100 percent xylitol group [24]. A major limitation in extending this approach is

that chewing gum is not considered safe for very small children and is actively discouraged in schools.

3. Allocation of Resources

The socio-economic difficulties and limited public awareness of the importance of preventive dental care make it difficult to improve oral health of the Armenian population, especially in rural areas. Most people do not visit a dentist for regular check-ups and even ignore mild toothache; they visit a dentist only when they have severe symptoms, e. g. unbearable pain [13]. Moreover, the lack of knowledge about appropriate dental care results in a high prevalence of oral diseases among both children and adult population.

Despite the fact that there are several programs aimed at improving oral health, education and prevention are still lacking in Armenia. The last studies conducted in this field showed that the knowledge level of children about the importance of oral health is poor [13, 25], so there is a strong need to develop educational programs for the target population and to affect children's oral health promotion significantly.

Educational programs aimed to increase the knowledge level among children will lead to a better attitude and result in a healthy behavior, and do not need many resources, so they are easy to implement and are of high effectiveness [17, 26, 27]. For example, a clinical study implemented among 4-6-age children showed that a short (15 minutes), school-based oral hygiene educational intervention during a four week period may significantly influence children's oral health promotion [27].

Conducting a short educational program among children of 6-8 years old in a school setting does not require significant financial and human resources, and would be feasible to conduct. The project team will identify a donor organization interested in dental health to submit the proposal about this project.

4. Programming

The proposed program seeks to educate the children aged 6-8 years about appropriate dental care and oral disorders. During the educational program dental care related lectures will be presented [27].

Implementation of the program will increase awareness of the target population regarding the problems of oral hygiene, followed by a significant promotion of oral health of school children. The goal of the program is to prevent potential dental health problems through improving the quality of personal dental care and oral hygiene.

The objectives of the proposed program are:

1. To train children in the classrooms to promote healthy behaviors regarding dental care
2. To increase the knowledge and behaviors of children regarding oral hygiene by 20% in one month.

The project team will inform the administration of schools and parents in advance about the goals and objectives of the educational program.

The project team will consist of administrative staff and field staff. The administrative staff will be responsible for the overall project design and implementation. They will conduct data entry and data cleaning, and prepare the final report.

Continuous collaboration between administrative staff and field staff will be maintained throughout the project.

The administrative staff will conduct orientation and training of the field staff. The project is estimated to take approximately three months for planning, training, collecting data, providing interventions, analyzing data and preparing final report (see Table 1 for details).

5. Budgeting

The budget of the proposed project will sum up to US \$7,994. It consists of personnel cost, operating cost, and project materials cost.

The project team consulted with managers in the area of health promotion in Armenia to calculate personnel cost. The differences between salaries depend on the number of hours required to fulfill the duties of each position.

The project team considered the market prices when calculating the operating cost (Table 2 presents the details of the budget).

The project team will identify a donor organization interested in dental health to submit the proposal about this project.

6. Implementation

The target population of this program is children aged 6-8 years (2nd and 3rd school grades). The project team will choose 3 schools from Yerevan for the implementation of the educational program. The schools for the educational program implementation will be chosen from three different communities of Yerevan. From all communities of Yerevan three communities will be randomly chosen.

From the lists of schools in each community one intervention and one comparison schools will be randomly selected. The selection of classes within a school will be done by the convenience approach.

Inclusion criteria will be the presence of appropriate video devices, as well as relevant number of children aged 6-8 years in classes. Exclusion criteria will be the readiness of schools administration to cooperate.

It is planned to conduct the educational program in 3 schools. In each school two classes will be chosen as intervention groups from 2nd and 3rd grades. A total of 180 schoolchildren will be recruited for the dental health educational program (age range 6 to 8 years of age, each class has approximately 30 children).

The parents of all children and their teachers will be invited to a meeting during which information on the goals of the educational program and the evaluation study will be presented.

The project team will obtain written informed consent from the parents.

The program implementation personnel will consist of hired educators who will be selected from the students of the Dental Department of the Yerevan State Medical University. The project team will provide a training course for the educators. A qualified specialist in the field of dental health education will conduct the training. Besides the educators, the project team will include a program manager and a program assistant.

The project team will adapt the educational program developed by Ramseier et al (2007) for pre-schools children. Before the educational program implementation trained students of the Dental Department of the Yerevan State Medical University will conduct the baseline examination in both intervention and comparison groups. The next examination will be done in a month, after the end of intervention. During the educational program a 15-30 minute presentation about the importance of oral hygiene and common dental health problems will be shown.

The children from the intervention groups will be informed of the necessity of tooth brushing and flossing. Besides the general information, given through lectures, children will receive specific tooth brushing and flossing instructions.

School-based dental health educational program will include presentations, lectures by health educators and instructions about proper ways of brushing and flossing teeth, with illustrations

and video demonstrations. In the beginning of the program each child will receive a toothbrush and floss (see the details of educational program in Appendix 1).

7. Evaluation

A total of 360 schoolchildren will be recruited for the evaluation study, these includes 180 in the intervention group and 180 children in the comparison group.

Besides the 3 intervention schools, 2 classes will be chosen as comparison groups from 3 schools where the program is not conducted. Having schools not participating in the intervention as the comparison group will control for the effect of peer-to-peer dissemination of knowledge, which is possible in schools where the program is conducted.

At baseline, a clinical examination will be performed with special emphasis on oral hygiene status by applying the following parameter – plaque control record (PCR) [28] (see Appendix 2).

Following the application of a plaque disclosing agent, the oral hygiene will be assessed using the dichotomous method of presence or absence of disclosed plaque on four surfaces of all teeth present [28]. The presence of plaque is evaluated visually without the use of a dental explorer or compressed air. The percentage of plaque -covered surfaces will be calculated for each child to define the subject's individual mean Plaque Control Record Percentage (PCR %).

Following the baseline examination, the intervention will start.

The follow-up data collection will be done one month after the intervention. The comparative analysis of these data will make possible to evaluate the effectiveness of the program.

A quasi-experimental non- equivalent comparison group design (see Appendix 3) will be applied for the proposed evaluation [29]. According to this design, the baseline data will be compared with post intervention data collected right after the implementation (in one month) in both comparison and intervention groups. The important condition here is that pre-test and post-test

clinical examinations will be conducted with the same people in both comparison and intervention groups.

7.1 Limitations

Among the limitations of the project can be mentioned low generalizability, as the project is conducted in a few Yerevan schools. The other limitation is that participants are not randomly assigned to the intervention and comparison groups.

The knowledge of children about their participation in the study can affect their behavior, for example, they may clean their teeth more often during the study period.

7.2 Ethical Considerations

Before the implementation the project will be approved by the Institutional Review Board (IRB) of Committee on Human Research of the American University of Armenia.

The project will pose minimal risk on participants. It will not affect children physically. The refusal from the participation in the project will not influence on children's study process.

The children from the comparison groups will be provided with toothbrushes, flosses and printed educational materials.

8. Conclusion

It is easy to influence children of an early age and change their habits. Short, school-based educational program among 6-8 years old children in a school about importance of oral hygiene and proper maintenance of it could significantly improve children's dental hygiene practices.

Increase of knowledge about dental care will help children to avoid future oral diseases.

Certainly, parents give some amount of information to their children about the necessity and importance of dental care, but it is not sufficient. So, teachers are encouraged to conduct educational programs of this kind. Besides, it should also be mentioned that this educational program does not require significant financial and human resources, and would be feasible to conduct.

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Table 1. Project Timelines

	1st month	2nd month	3rd month
Office and equipment rendering	X		
Hiring staff	X		
Schools and groups selection	X		
Training of health educators	X		
Preparing educational materials	X		
Education classes		X	
Data collection, entry, analysis		X	X
Writing the final report			X

Table 2. Budget

	per month	1 st month	2 nd month	3 rd month	Total
Personnel					
Project manager (1)	500*	500	500	500	1,500
Project assistant (1)	300	300	300	300	900
Health educator trainer (1)	200	200			200
Health educators (3)	100		300		300
Total personnel					2,900
Operating cost					
Office rent (1) with equipment (computer (1), laser printer (1))	400	400	400	400	1,200
Office supplies (pen, paper, etc.)	30	30	30	30	90
communication	90	90	90	90	180
Total operating cost					1,470
Project materials					
Video tapes (3)	8				24
Toothbrush (360)	3				1,080
Floss (360)	4				1,440
Educational Materials (360)	3				1,080
Total Project Materials					3,624
TOTAL					7,994

* All figures are given in US\$

Appendix 1

Program Curriculum

Goal: Upon completing this course, schoolchildren will be able to maintain proper dental hygiene

Student population: 6-8 years old 180 children

Teachers: 3 trained educators - students of Dental Department of the Yerevan State Medical University

Time: once a week of 45 minutes duration

Setting: three classrooms with appropriate devices

Topic	Teacher activities	Student activities	Time	Setting	Resources
First meeting					
Importance of oral hygiene	Educator delivers a lecture, initiates a discussion	Children listen and ask questions	½ hour	Classroom	Lecture notes
	Educator makes a presentation		¼ hour	Classroom	Materials prepared for presentation
Second meeting					
Dental care	Educator delivers a lecture, initiates a discussion	Children listen and ask questions	¼ hour	Classroom	Lecture notes
	Educators shows a video film	Children discuss the film	¼ hour	Classroom	Device, videotape
	Educator distributes toothbrushes and flosses	Children are developing skills of correct use of toothbrush and floss	¼ hour	Classroom	Toothbrushes, flosses
Third meeting					
Oral diseases: dental caries	Educator delivers a lecture, initiates a discussion	Children listen and ask questions	¼ hour	Classroom	Lecture notes
	Educators shows a video film Educator divides class into groups, gives in class group assignment, helps groups	Children discuss the film Children divide into groups preparing for the group assignment	¼ hour ¼ hour	Classroom Classroom	Device, videotape
Forth meeting					
Prevention of oral health problems	Educator delivers a lecture, initiates a discussion	Children listen, make a discussion	½ hour	Classroom	Lecture notes
	Educator makes a conclusion	Children listen and ask questions	¼ hour	Classroom	

Appendix 2

WHO Oral Health Country/Area Profile Programme
Department of Noncommunicable Diseases Surveillance/Oral Health
WHO Collaborating Centre, Malmö University, Sweden
<http://www.whocollab.od.mah.se/expl/ohileary72.html>

- The Plaque Control Record - (O' Leary T, Drake R, Naylor, 1972)

Guest editor: Kaban Moslehzaheh

The Plaque Control Record was developed to give the therapist, hygienist, or dental educator a simple method of recording the presence of the plaque on individual tooth surfaces. These surfaces are:

? Mesial
? Distal
? Buccal
?
Lingual

At the control appointment a suitable disclosing solution such as Bismarck Brown, Diaplac or similar is painted on all exposed tooth surfaces. After the patient has rinsed, the operator (using an explorer or a tip of a probe) examines each stained surface for soft accumulations at the dentogingival junction. When found, they are recorded by making a dash/red colour in the appropriate spaces on the record form. Those surfaces, which do not have soft accumulations at the dentogingival junction, are not recorded.

After all teeth are examined and scored, the index is calculated by dividing the number of plaque containing surfaces by the total number of available surfaces.

CALCULATION EXAMPLE:

Assume a patient with the following plaque accumulation:

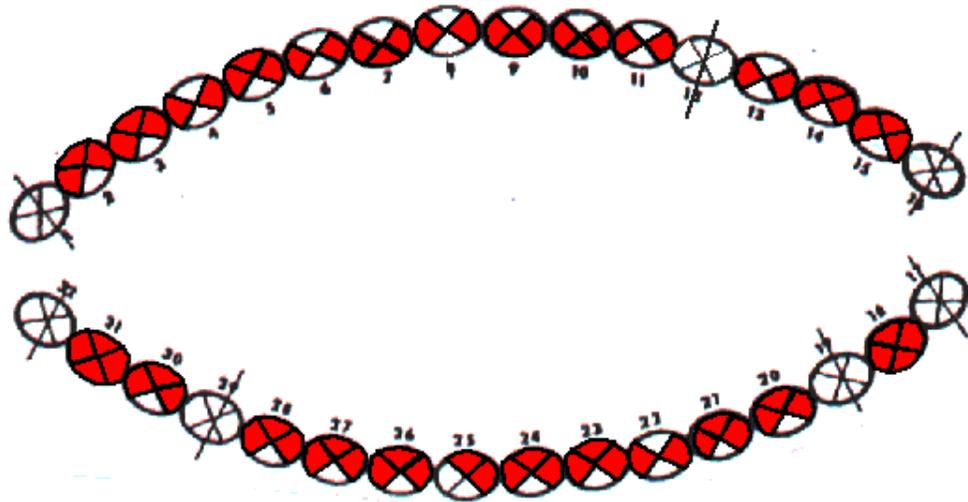
? **Upper jaw:** 34 plaque containing surfaces
? **Lower jaw:** 36 plaque containing surfaces

The total available surfaces for upper and lower jaw were, in this example, 52 and 48 respectively.

Plaque Index	=	(The number of plaque containing surfaces) / (The total number of available surfaces)
		$(34 + 36) / (52 + 48) = 70 / 100 = 0.70$

Meaning the plaque index for this patient is 70% at initial control appointment.

Plaque Control Record



Appendix 3

Nonequivalent control group design [29]

O	X	O
O		O