

PREVENTION OF DENTAL CARIES THROUGH DENTAL HEALTH EDUCATION AND UTILIZATION OF MARINE PRODUCTS AT ELEMENTARY SCHOOL MUHAMMADIYAH 9 SURABAYA

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Abstract

Muhammadiyah 9 Elementary School, Surabaya, is geographically located on the coast, so it is often referred to as Bahari Muhammadiyah 9 Elementary School. Based on preliminary survey results, Muhammadiyah 9 Elementary School students frequently consume cariogenic foods, resulting in a high caries index of 4.6. From an educational perspective, the learning method is still relatively conventional and does not align with the "Merdeka Belajar" curriculum, resulting in hampered learning and a lack of student knowledge about maintaining health, especially dental and oral health. Furthermore, the implementation of school dental health activities has not been optimal. Community service methods are carried out through several stages: outreach, training, mentoring and evaluation, and a desire program. The participation of the university community in helping solve the problems facing the community in such environments is essential by providing education and regular dental and oral health checks to reduce the caries index, as well as providing snacks such as sea cucumber jelly candy and anchovy cookies made from seafood, which have anti-cariosis properties. The use of seafood as an alternative to prevent dental caries shows very promising potential. Program Pengabdian kepada Masyarakat Bima 2025: This program has succeeded in raising student awareness of the importance of maintaining dental hygiene and introducing innovative and natural ways to prevent caries.

Keywords: Caries Index, Education, Sea Cucumber Jelly Candy, Anchovy Cookies, Seafood

INTRODUCTION

Muhammadiyah 9 Elementary School Surabaya was established on June 28, 1956, in the Kenjeran Beach fishing village. The canteen is located directly adjacent to the beach. The canteen is called "Angkringan Matahari". This open-air canteen often produces unpleasant odors and disrupts circulation. This canteen is a key factor in the school's hygiene and sanitation. In addition to the canteen's lack of cleanliness, students are also free to purchase food or snacks outside the school grounds. These snacks, which contain cariogenic and high levels of sucrose, cause dental caries. This community service initiative was also based on the selection of the chairperson of the proposal to receive a grant from the 2025 Bima Dikti Community Partnership Program with fully funded "Direktorat Penelitian dan Pengabdian

kepada Masyarakat, Direktorat Jenderal Riset dan Pengembangan, Kementerian Pendidikan Tinggi, Sains, dan Teknologi".

The results of a preliminary survey on 10 students at Muhammadiyah 9 Elementary School in Surabaya showed a caries index of 4.6, categorized as high caries. Some students even had large cavities in their first permanent molars, requiring immediate treatment. Interviews with students revealed that 5 girls and 5 boys consumed chocolate and instant foods daily. Despite living on the coast, students at Muhammadiyah 9 Elementary School in Surabaya consumed more sweet, soft, sticky (cariogenic) foods, and attractively shaped foods. The high rate of caries and other oral health problems can be attributed to a lack of public awareness of the importance of maintaining oral health. A subsequent interview with the Principal also revealed that the School Dental Health Program (UKGS) had never been conducted by the local Community Health Center, and that dental and oral examinations to determine the severity of dental caries had never been conducted.

From an educational perspective, Muhammadiyah 9 Elementary School in Surabaya still uses conventional learning methods. This is an obstacle in implementing the P5 project in the Merdeka curriculum, which requires students to develop their knowledge and skills. This also presents a challenge for Muhammadiyah 9 Elementary School in Surabaya to adapt learning methods by changing students' new habits to maintain health, especially dental and oral health. The challenge for parents and teachers is to change the mindset of students so they are not afraid to brush their teeth. The lack of understanding of the importance of brushing in children is also influenced by their immediate environment, namely parents. The participation of the university community in helping solve problems faced by the community in such environments is very necessary.

IMPLEMENTATION METHOD

The implementation method in an effort to provide solutions to problems in Muhammadiyah 9 Elementary School Surabaya is through stages including socialization, training, mentoring and evaluation, and program sustainability.

The socialization of dental caries prevention began with a direct introduction of the program to the Principal of Muhammadiyah 9 Surabaya Elementary School in early July 2025. This was then followed by a socialization of 13 teachers. The socialization included the name of the program, the program's objectives, the implementation date at the main event on July 29-30, 2025, and continued with an evaluation of the program. On July 27, 2025, the head of the proposer reminded the Principal of Muhammadiyah 9 Surabaya Elementary School that in 2 days there would be dental and oral health education activities, an introduction to healthy snacks, joint toothbrushing, and dental check-ups through a message on the WhatsApp application and provided a message in the form of a twibbon image so that parents and students were ready to participate in a series of activities. This also served as a request for permission from parents. Twibbon can be accessed at the link <https://twibbo.nz/edukasikesehatangigi2025>.

Direct training for students of Muhammadiyah 9 Elementary School Surabaya was conducted for two days, namely on July 29-30, 2025 with participants from grades 1-3, namely 50 students in grade 1, 41 students in grade 2, and 60 students in grade 3. On the first day, dental health education was carried out using powerpoint media and leaflets, material regarding basic

education techniques or how to brush teeth correctly, use of dental floss, how to choose healthy and nutritious foods for dental and oral health, and check-ups with the dentist regularly every six months. The material in the powerpoint and educational leaflets was the same. Before the education was carried out, students were asked to fill out a pre-test and post-test containing knowledge of dental and oral health. After that, the first day ended with the provision of anchovy cookies and sea cucumber jelly candy. These healthy snacks were a diversion for students to change the bad habit of consuming cariogenic snacks, and several students were asked to provide reviews of these healthy snacks. On the second day, July 30, 2025, education was conducted on how to brush teeth properly using a tooth model to demonstrate the brushing technique with a combination technique, and the technique of cleaning between teeth using dental floss. This tooth model is the most effective educational media in conveying the correct way to brush teeth. After that, the students gathered in the field to brush their teeth together, guided by academic and professional students. All students were given toothbrushes, toothpaste, and mineral water for rinsing. The students were very enthusiastic and learned how to brush their teeth properly. The second day ended with dental examinations in each class. The examinations were carried out to record the presence of cavities, missing teeth, teeth that had been filled, tartar, and other oral soft tissue diseases. Recording was done on an odontogram, then a report was made on the condition of each student's teeth and oral cavity. The recording with the odontogram was also given to the school as a record of the students' dental health.

Table 1. Pretest and Posttest Questions for Students of Muhammadiyah 9 Elementary School Surabaya in 2025

No.	Questions	Multiple Choice
1.	What is the purpose of brushing your teeth?	a) To make teeth shine b) Smile becomes beautiful c) Cleaning up food scraps d) Chewing the food
2.	How many times do you brush your teeth a day?	a) 1x b) 2x c) 3x d) > 3x
3.	In your opinion, what is the correct way to brush your teeth?	a) Brush your teeth with toothpaste b) Brush your teeth without toothpaste c) Just gargle the water d) Only with toothpaste
4.	What ingredients should the toothpaste you use contain?	a) Fluoride b) Mint c) Charcoal d) Calsium
5.	What foods can damage teeth?	a) Candy b) Vegetables c) Fruits d) Meat

Mentoring and evaluation. Following the oral health education and introduction of healthy snacks, partners monitored and oversaw the benefits of the education and ensured the continued continuation of the healthy snacks at Muhammadiyah 9 Elementary School in

Surabaya, replacing the cariogenic snacks currently available at the school. A successful program is measured through evaluation. These evaluations included the effectiveness of the educational media and students' understanding of the educational material. These evaluations focused on both teachers and students. The media's effectiveness in supporting the oral health learning process was assessed. The evaluation assessed students' understanding of the educational material by creating questions before and after the education, which were then compared to determine whether there was an increase in students' knowledge.

RESULTS AND DISCUSSION

Based on the community service carried out, the characteristics of the respondents are as follows:

Tabel 2. Frequency Distribution of Respondents of Muhammadiyah 9 Elementary School Students in Surabaya in 2025

No.	Characteristic	Total	
		n	%
1	Age		
	7-8 y.o.	98	64,9
	9-10 y.o.	53	35,1
	Total	151	100
2	Gender		
	Man	71	47,1
	Woman	80	52,9
	Total	151	100
3	Class		
	1	50	33,1
	2	41	27,2
	3	60	39,7
	Total	151	100

Source: Primary Data, 2025

Tabel 3. Frequency Distribution of Students' Dental and Oral Health Knowledge at Muhammadiyah 9 Elementary School Surabaya in 2025

Variable	Criteria	Intervention			
		Pre Test		Post Test	
		n	%	n	%
Knowledge	Good	59	39,1	128	84,7
	Poor	92	60,9	23	15,3
	Total	151	100,0	151	100,0

Source: Primary Data, 2025

Based on table 2, it is known that the majority of students who participated in the activity were aged 7-8 years (grade 1) at 64.9%, female at 52.9%. Based on table 3, it is known that the level of knowledge of children about maintaining dental and oral health at elementary school age in Muhammadiyah 9 Surabaya Elementary School students in 2025 before being given

treatment in the form of educational media (pre-test) was mostly in the poor category at 39.1%, as well as in the good category at 60.9%. The distribution of students based on knowledge after being given treatment in the form of educational media (post-test) was mostly in the good category at 84.7%, as well as in the poor category at 15.3%.

Tabel 4. Test Results of the Effect of Education Through Leaflets on Students' Knowledge of Dental and Oral Health at Muhammadiyah 9 Elementary School, Surabaya in 2025

Sarabaya in 2018							
Pre Test Knowledge	Post Test Knowledge				Total		p value
	Good		Poor				
	n	%	n	%	n	%	
Good	84	100,0	0	0,0	84	100,0	0,025
Poor	0	0,0	67	100,0	67	100,0	
Total	84	55.6	67	44,3	151	100	

Source: Primary Data, 2025

The test was conducted using a simple linear regression statistical analysis where the simple linear regression analysis test is a probabilistic model that states a linear relationship between two variables where one variable is considered to influence the other variable. Based on table 4, the measuring instrument used in the Dependent Variable / Variable Y (Knowledge) is a questionnaire measuring instrument with a total of 10 questions. The nominal measurement scale used in obtaining scores in the Dependent Variable / Variable Y (Knowledge) in this study is an objective criterion categorized into 2 (two) types including; Good, if the score obtained by the respondent is $\geq 50\%$ of the highest score while less, if the score obtained by the respondent is $<50\%$ of the highest score. Based on the results of the simple linear regression test, the p value is 0.025 ($p < 0.05$), this means that H_0 is rejected and H_a is accepted. Thus, it can be concluded that there is an influence of the variable of providing dental and oral health education with the innovation of introducing healthy snacks to students of Muhammadiyah 9 Elementary School, Surabaya. The table also explains the magnitude of the correlation / relationship value (R) which is 0.108. From the output, the coefficient of determination (R square) is 0.033, which means that the independent variable has an effect on the dependent variable of 3.3%.

The results of the study showed that the salivary flow rate increased after chewing food. The salivary flow rate can be influenced by mechanical stimulation when chewing jelly candy, consistency, and its contents. Chewing sea cucumber jelly will be recognized by mechanoreceptors in the oral mucosa and transmitted to the central nervous system, then stimulates the parasympathetic nervous system which then triggers the production of large amounts of saliva. The results of this study indicate that sea cucumber jelly increases salivary pH. In this study, fructose syrup is also used as a natural sweetener, so sea cucumber jelly with natural sweeteners is a healthy jelly candy and good for health. Sea cucumber jelly can be made easily in everyday life using affordable and easily obtained ingredients.⁸ Sea cucumbers are one of the fishery commodities with high economic value because they contain various complete nutritional contents, including 9 types of carbohydrates, 59 types of fatty acids, 19 types of amino acids, 25 vitamin components, 10 types of minerals, and 5 sterols. The content of various nutrients such as vitamin A, vitamin B1 (thiamine), B2 (riboflavin), and vitamin B3

(niacin), as well as various minerals, such as iron, zinc, magnesium, and calcium, allows sea cucumbers to be a food source that is beneficial for health.^{10,11} Sea cucumbers are rich in active substances that are beneficial for oral health, so further research is needed on sea cucumber jelly in maintaining oral health and needs to be developed so that in the future it can be used by the wider community as an alternative candy that can improve dental and oral health.



Figure 1. Introducing Healthy Snacks to Students of Muhammadiyah 9 Elementary School, Surabaya



Figure 2. Dental Examination as Early Detection of Caries in Students of Muhammadiyah 9 Elementary School, Surabaya



Figure 3. Head of the Bima Dikti Grant Proposal and Members 2025



Figure 4. Sea Cucumber Jelly Candy Packaging Design to Attract Students of Muhammadiyah 9 Elementary School, Surabaya



Figure 5. Anchovy Cookie Packaging Design to Attract Students of Muhammadiyah 9 Elementary School, Surabaya

CONCLUSION

Based on the results of community service activities and program implementation at Muhammadiyah 9 Elementary School in Surabaya, it can be concluded that utilizing seafood as an alternative method for preventing dental caries shows very promising potential. This program has successfully increased students' knowledge and awareness of the importance of maintaining dental hygiene and introduced innovative and natural methods for preventing caries.

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