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RESEARCH

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Improving Dental Health and Nutrition Awareness through the "SEGIGIKU" School Health Program

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Abstract

Indonesia faces serious challenges in dental and oral health and nutrition, with dental caries, stunting, and obesity remaining major public health problems among children. Schools play a crucial role in shaping children's health behaviors through structured health education and interventions. The School Health Program model "SEGIGIKU" was developed to enhance the involvement of teachers, peers, and parents in improving oral health behavior and nutrition awareness as preventive measures against dental caries, stunting, and obesity in preschool children. This study aimed to develop and evaluate the "SEGIGIKU" School Health Program model as an effort to improve oral health behavior and nutrition awareness among preschool children. This research employed a research and development (R&D) design, consisting of stages of information gathering, program design, expert validation, product testing, and final product development. The results showed a consistent weekly increase in students' weight and height. Statistical analysis using the Wilcoxon test demonstrated a highly significant improvement in dental hygiene, as indicated by the PPHM score ($p = 0.000$), and a significant reduction in dental caries, as reflected by the decay score ($p = 0.002$). In conclusion, the "SEGIGIKU" School Health Program model effectively improves oral health behavior and nutrition awareness, which are closely interconnected, and contributes to the prevention of dental caries, stunting, and obesity in preschool children.

Keywords: Pre-School, Dental Health, School Health Program.

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1. INTRODUCTION

Dental and oral health is essential for good health and cannot be separated from the overall health of the body. The most common dental and oral health problem affecting almost all population groups in the world is tooth decay, which has a significant negative impact on a person's quality of life (Marludia et al., 2021). However, there are still many people who neglect their health, including dental health. Based on the results of a study conducted by WHO, it is known that dental caries is a major public health problem worldwide and the most common non-communicable disease (NCD) (World Health Organization, 2017). In the Global Burden of Disease Study in 2015, a total of 2.3 billion people suffered from dental caries which ranked 1st and at 12th place as many as 560 million children suffered from dental caries (Kassebaum et al., 2017).

In the Southeast Asian Region, dental and oral diseases are the most widely spread diseases and one of the most common non-communicable diseases found. The burden of the disease shows wide disparities, with higher prevalence and severity among poor and disadvantaged populations, who generally lack access to prevention, treatment, and rehabilitation of oral health care and services (The Lancet Regional Health-Southeast Asia, 2024). Based on data written in the Action Plan for oral health in Southeast Asia 2022–2030, in 2019 there were more than 900 million cases of untreated caries, acute periodontitis, and edentulism (World Health Organization, 2022). The prevalence of untreated pediatric dental caries in children aged 1-9 years is estimated to reach 43.8 percent, with about 135 million cases in eleven ASEAN member countries. The estimated prevalence of untreated caries in permanent teeth over 5 years of age is 526 million cases or 28.7%. In addition, it is known that in 2016 40% of people in South Asia were stunting and 50% of Japanese people were obese (Hasan et al., 2024).

In Indonesia, based on the 2018 Basic Health Research (RISKESDAS), the largest proportion of dental and oral problems are damaged/cavities/diseased teeth.5 Dental caries problems in Central Java Province according to RISKESDAS 2018 data are known to have a very high prevalence of dental caries at 43.45%. In the age group of 5-9 years (67.3%), but only 14.6% have received treatment by dental health workers. In addition, it is known that the nutritional status is below normal in the age group of 5-12 years by 8.55%, and above normal by 20.14% (Badan Penelitian dan Pengembangan Kesehatan, 2019).

Central Java Province has 35 cities, one of which is the city of Semarang with a caries prevalence of 37.20%. However, it is very unfortunate that in the age group of 5-9 years it is still quite high, namely 53.51% (Badan Penelitian dan Pengembangan Kesehatan, 2019). This is an indication of the need for special treatment for children in this age group and children of this age are very susceptible to dental and oral diseases and are at risk of developing caries. One of the causes of the high prevalence of dental caries is due to the lack of optimal dental health maintenance behavior. As many as 90.7% of Indonesians brush their teeth, but only 12.6% brush their teeth after breakfast and 28.7% before going to bed at night. Indonesians brush their teeth an average of 1.27 times per day with an average time of 57.29 seconds (Kementerian Kesehatan Republik Indonesia, 2012). In addition, the percentage of children with nutritional status below normal in the age group of 5-12 years is still above the average of the province of Central Java, which is 10.72% and above normal by 27.87%. This is a reference that special handling is needed to solve existing problems.

Efforts made on pre-school children through the School Health Program (UKS) program in improving the health status of school children to support the highest learning achievement of school-age children (Nugraheni, Sunarjo, & Wiyatini, 2018; Sirat, Senjaya, & Sumerti, 2019). However, the success rate of the implementation of the UKS program in each province is 13.6%16, this shows that the presentation of achievement is still low because it is caused by several obstacles, including human resources, funding sources and inadequate UKS infrastructure. In addition, various prevention programs have been carried out to contain the

rate of development, reduce the prevalence and incidence of dental and oral diseases. In Indonesia, efforts are made through the School Dental Health Program (UKGS). In the international world, efforts are made through the WHO resolution in The 60th World Health Assembly (WHA) in 2007, namely developing and implementing dental and oral health promotion and prevention of dental and oral diseases as part of health promotion activities in schools. In 2010, WHO launched the Global Oral Health Programme (GOHP) 2020, advising countries around the world to develop policies to prevent dental and oral diseases and promote dental health specifically for schoolchildren and adolescents ([Kementerian Kesehatan Republik Indonesia, 2012](#)).

The UKGS program and the dental and oral health service program launched by the Indonesian government and the international world have not yielded results, it is proven that no country is free from dental caries. The results of RISKESDAS in 2018 show that as many as 57.6% have dental and oral health problems, and only 10.2% receive services from medical personnel, 21 provinces have figures above the national average. The largest gap is in the province of Central Sulawesi where 73.5% of the population admits to having dental and oral health problems, and only 8.2% receive services from dental medical personnel. The number of dental health problems in Central Java Province is below the basic threshold of 57.6%. The proportion of dental health problems in Indonesia is far from the hope to achieve the Ministry of Health's long-term target, namely 2020: dental caries-free rate (mixed teeth) age 6 years 50%, dental caries-free rate class 6 by 70%, DMF-T age 12 years ≤ 1 , PTI by 50% and dentally fit rate class 6 by 85% and by 2030 Indonesia is caries-free ([Badan Penelitian dan Pengembangan Kesehatan, 2019](#)).

Poor health services result in the non-monitoring and handling of existing dental and oral problems. If this continues, the dental and oral health status will be poor and children will be disturbed in carrying out their learning activities at school. UKGS is an effort that must be implemented, an effort to improve the status of dental and oral health by instilling dental health education from an early age ([Abdullah, 2018](#)). In addition, teachers have an important role as facilitators in schools in the optimal implementation of UKS ([Wicaksono, Mahirawatie, & Hidayati, 2021](#)). One of the implementation of dental and oral health services is dental and oral health referrals to health service facilities (Puskesmas) if emergency conditions or complaints are found in school children so that the risk of getting sick can be avoided.

The existence of small doctors as a motivation generator for the peer environment, and UKS as a health service facility in schools. The presence of small doctors as role models in schools has a role in increasing the actions of peers in maintaining dental and oral hygiene ([Sirat et al., 2019](#)). If the teeth and mouth are clean, the risk of caries in the teeth due to plaque buildup can be avoided. Schools through UKS support the implementation of positive attitudes towards healthy living and the improvement of students' skills including dental and oral health education ([Nugraheni et al., 2018](#)). The availability of adequate UKS or optimal UKS is an effort in providing dental and oral health care services for children. Preschool-age children are vulnerable to exposure to dental and oral diseases. The condition of the teeth that are mixed during the growth period should be given intense attention. Through dental health education carried out by UKS, it can be an effort to skill students in maintaining their dental and oral health. The implementation of UKGS is important to be carried out including promotive, preventive, and curative activities as an effort to cut the chain of caries ([Ramadhani et al., 2022](#)).

Comprehensive health services have been established in Pakistan in the form of a healthy school curriculum in the form of activities that include training screening students to determine the health of the eyes, nose and throat (ENT), oral health, skin and general physical health, and refer them to the nearest medical facility. The purpose of this study is to produce the School

Health Program Model "SEGIGIKU" as an effort to improve dental health behavior and nutrition awareness to prevent caries, stunting, and obesity in preschool children.

2. RESEARCH METHOD

This research combines a type of descriptive and analytical research called R&D to develop a new product output with the stages of information collection, design, expert validation, product testing and product results. The information collection stage is carried out to be able to identify problems related to dental health behavior and nutrition awareness in preschool children. The implementation of information collection was carried out by observation and interviews as well as through literature review. Observations and interviews were used to see problems directly in the field carried out to the health office, education office, head of health center, school principal, general health officer, dental and oral therapist and nutritionist. Meanwhile, the literature review is used to support the data or information obtained. The data from the information collection was used to design the "SEGIGIKU" School Health Program model for preschool children. Expert validation is carried out on nutritionists, health offices and dental and oral therapists.

The product test was carried out on 44 pre-school children of Mashitoh 1 Kindergarten in Parakan District consisting of family planning children, Group A and Group B as well as parents of students. Data collection was carried out using a questionnaire of parental behavior regarding nutritional awareness and maintenance of dental and oral health in children. In addition, many weight measurements, PHPM (Personal Hygiene Performance Modified) and decay scores were carried out in pre-school children.

3. RESULTS AND DISCUSSION

Initial data collection was carried out to measure parental knowledge, attitudes and actions related to awareness of child nutrition, fulfillment and maintenance of dental health. In addition, the status of the debris index score for pre-school elementary school children was measured.

The implementation of providing lunch and snack intake was carried out for 21 days. This is done to help increase children's appetite and aims to help increase students' weight. The preparation of food menus and snacks has been consulted with nutritionists at the relevant health centers. This aims to ensure that the nutrition obtained by students is in accordance with their nutritional needs. The preparation of lunch and snack menus for students has been carried out by involving nutritionists from the health center, which is an important step to ensure that their nutritional intake is in accordance with their needs. The involvement of nutritionists in this process aims to design a menu that not only meets the caloric needs, but also contains the macronutrients and micronutrients necessary for the optimal growth and development of the child.

The nutritional needs of school-age children are very specific and vary depending on their age and activity level. At this age, children experience rapid growth and have a high level of physical activity, so they require more energy compared to previous ages. In addition, they also need a variety of vitamins and minerals such as calcium, iron, and vitamin D to support the development of bones and the immune system. Therefore, it is important to plan a balanced menu by including a variety of nutrient-rich food sources.

The designed menu includes a variety of foods from all food groups. The menu of meals and snacks given to students included vegetable chicken nuggets, chicken egg rolls, chicken filet stew, bacem eggs, flying fried catfish, boiled quail eggs, lilit satay, shrimp rolade, cheese milk banana nuggets and chicken sempol. In addition, students were given healthy snacks, namely fruits, namely papaya, bananas, melons and oranges.

The variety of menus chosen not only meets nutritional needs, but also helps develop students' habits to eat healthy food from an early age. The following is the results of weight measurements during the period of providing nutritional intake for students:

Table 1. Weight of students measurement results.

Variable	Statistics		
	Pre-Test	Post Test	<i>p-value</i> *
Students weight			
a. Mean+SD	15.0 + 1.7	15.7 + 2.0	0.00
b. Min-Max	11.0-18.0	11.5-20.0	

**Wilcoxon test*

Based on the table, the results of the Wilcoxon test show a significant effect of providing additional nutritional intake on children's weight ($p\text{-value} = 0.00$). There was an increase in average body weight from 15.0 kg before the intervention to 15.7 kg after the intervention. This shows that fulfilling nutritional needs through a variety of food menus can have a positive impact on children's physical growth. Based on the data in the table above, there is an increase in student weight. The provision of additional intake that meets the value of children's nutritional needs shows an effect on the increase in children's weight. A variety of food menus that do not make children bored and make them more interested in increasing the nutritional intake they need (Santanu et al., 2025).

Weight gain in children, especially during the growth period, is an important indicator of their nutritional status and health (Shehzad et al., 2022). During this period, children experience rapid growth, both in terms of physical and cognitive development. According to the World Health Organization (WHO), an ideal weight is closely related to healthy growth and can affect various aspects of health, including the immune system and learning ability (World Health Organization, 2018). Children of the appropriate weight tend to have enough energy to be optimally active, which is crucial for their motor and social development.

Healthy weight gain is essential to prevent growth and development disorders, such as stunting and wasting (Saleh et al., 2021). Stunting, which results from chronic malnutrition, can inhibit a child's height growth and brain development, while wasting, which results from acute malnutrition, can result in significant weight loss (Soliman et al., 2021). Research shows that children who are malnourished at an early age have a higher risk of developing long-term health problems, including metabolic diseases and impaired cognitive development (Handina, 2024). Therefore, regular monitoring of children's growth through weight and height measurements is essential for early identification of nutritional problems. Adequate nutritional intake is a key factor in achieving healthy weight gain. Balanced nutrition includes carbohydrates, proteins, healthy fats, vitamins, and minerals that are necessary to support various physiological processes in the body (Nomira, 2024). Nutritious foods such as green vegetables, fruits, animal and plant protein sources, and complex carbohydrates should be an integral part of a child's diet. Research shows that variations in food menus not only increase children's interest in healthy foods but also ensure that they get the spectrum of nutrients necessary for optimal growth (Willemsen, Wiggins, & Cromdal, 2023).

Healthy weight gain in children has a wide impact, not only in the physical and health context, but also in psychological and social aspects. Children with ideal weight tend to experience increased self-confidence, which contributes to better social interaction (Shaluhya & Dimiyati, 2022). This confidence is closely related to how children perceive themselves and how they are perceived by others. Children who feel comfortable with their appearance are more likely to engage in social activities and have positive relationships with their peers. In contrast, children who are overweight or underweight often face social stigma, which can result

in isolation and difficulty in building healthy interpersonal relationships. Children's social interactions are also affected by their weight status (Green, 2015). Children with ideal weight tend to be more active in group activities and get along more easily with their friends. They feel more confident to participate in sports or other extracurricular activities, which can strengthen social skills and increase a sense of belonging within the group. On the other hand, children with weight problems may avoid certain social situations due to embarrassment or discomfort with their appearance. This can lead to a reduction in opportunities to build important social skills during their growth

Cavities, or caries, occur when bacteria in the mouth produce acids that damage the tooth tissue (Afrinis, Indrawati, & Farizah, 2020). If left untreated, this damage can progress to more serious infections, such as dental abscesses. This infection is not only limited to the oral cavity; The bacteria can enter the bloodstream and spread to other parts of the body, causing more serious complications. Early symptoms of this infection often include pain, swelling, and redness in the area of the infected tooth. When the infection spreads, the body responds by raising body temperature, which can lead to fever. This fever is often accompanied by a decrease in appetite, which can interfere with the intake of essential nutrients. If this condition persists, the body may have difficulty absorbing the nutrients necessary for health and recovery. The results of PHPM's pre-test and post-test data collection were obtained as follows:

Table 2. PHPM Measurement.

Categories	PHPM Score				p-value
	Pre-Test		Post Test		
Excellent	2	4.5%	10	22.7%	0.000
Good	8	18.2%	15	34.1%	
Medium	9	43.2%	11	25.0%	
Bath	15	34.1%	8	18.2%	

**Wilcoxon Test*

Based on the table above, there was an increase in PHPM scores in children after being given an intervention in brushing their teeth together. In the good category, there was an increase in PHPM score from 18.2% to 34.1%. This shows that children have the motivation to carry out toothbrushing activities with the correct technique. The interventions carried out not only focus on teaching correct brushing techniques, but also aim to increase children's awareness of the importance of maintaining healthy teeth and mouth. Thus, this increase in score is an indicator of success in building healthy habits among children.

Based on the results of the statistical test on the PHPM score analysis table, it was found that the significance value or *p-value* was 0.000. Since this value is much smaller than the standard significance $\alpha = 0.05$, it can be concluded that there is a very real and significant difference between the PHPM score before and after the intervention is performed. These findings show that interventions in the form of teaching correct brushing techniques have succeeded in increasing children's awareness and skills in maintaining effective dental and oral hygiene. This increase in score is an indicator of success in building healthy living behaviors among children through the programs carried out.

Plaque is the main etiological factor that causes caries and periodontal disease; so with a decrease in PHPM score, the risk of enamel demineralization and gum inflammation (gingivitis) is also drastically reduced (Waleed, Abdulwahab, & Mahdi, 2025). This decrease not only reflects an improvement in the child's gross motor skills in holding a toothbrush, but also an increase in precision in duration and pressure when brushing. The success of lowering the PHPM rate to a lower level shows that participatory and demonstrative intervention methods are very effective in changing oral hygiene status from "poor" or "moderate" to "good" (Shirahmadi et al., 2024).

The success of this score improvement is a strong indicator that teaching proper brushing techniques has succeeded in transforming children's motor skills in maintaining oral hygiene (Sisca et al., 2025). The intervention was able to bridge the gap between theoretical understanding and real practice, so that children were not only aware of the importance of dental health, but also able to apply effective cleaning techniques independently. Thus, this program has achieved its goal of building the foundation of clean and healthy living behaviors, which is expected to be internalized into a permanent habit to prevent the risk of dental problems in the future.

Motivation for children to brush their teeth with the right technique is a crucial aspect in forming healthy living habits from an early age (De Jong-Lenters et al., 2019). Through brushing their teeth together, children not only gain knowledge about proper cleaning techniques, but also feel more excited to do it regularly. This collective activity effectively improves children's discipline in maintaining personal hygiene (Sari, Fazrin, & Saputro, 2017).

Joint brushing interventions create an interactive and fun learning atmosphere, where children can learn through play methods (Zulfan et al. 2024). This positive environment makes dental care activities no longer feel boring for them. In addition, programs like this open up great opportunities for parents and teachers to play an active role in monitoring and supporting children's dental health directly (Liu et al., 2025).

The active involvement of parents and teachers is essential to ensure that the techniques learned are applied consistently, both in the home and school environments. The presence of an adult as a supervisor provides the moral support and guidance needed to keep children consistent (DePasquale, 2021). With a supportive environment and ongoing supervision, children will find it easier to maintain a routine of maintaining oral hygiene in the long term.

In addition, decay measurements were carried out on children after the intervention. The results of pre-test and post-test decay data collection were obtained as follows:

Table 3. Decay Score.

Categories	Decay Score				p-value
	Pre-Test		Post Test		
0-3	2	7%	5	19%	0.002
4-6	7	26%	8	30%	
7-9	10	37%	9	32%	
>9	8	30%	5	19%	

*Wilcoxon Test

The categories in the table above show the amount of decay (dental caries) that children have. Based on the table above, it shows that there was a decrease in decay scores in categories 7-9 and >9. This shows that there are treatment actions taken to reduce the incidence of caries in children. The treatment measures carried out are in the form of fillings and tooth extraction which is carried out as an effort to prevent more severe dental disease infections. The results of the pre-test are given to parents in the form of a letter of recommendation for treatment that must be carried out. The letter contains information about the child's dental health condition, weight, height and BMI as well as steps that need to be taken to maintain dental health and prevent the development of more serious dental problems in their children.

Based on the table of analysis results, it was found that *the Decay* score variable had a significance value or *p-value* of 0.002. Since the value was smaller than the set significant level ($\alpha = 0.05$), it can be concluded that there was a statistically significant difference in the degree of tooth decay of respondents between before and after the intervention was performed. These results show that the intervention program has a real impact on the dental health

condition of the study subjects, which indicates an improvement or effectiveness of actions in reducing the parameters of tooth decay during the observation period.

Scientifically, the success of this intervention is driven by the function of letters of recommendation as a formal communication medium that increases parents' perception of risk and awareness of caries problems in their children. The letter acts as a "cue to action" that encourages parents to seek professional care immediately to prevent further tooth decay. This strong statistical significance proves that written documentation of children's clinical conditions is much more effective in lowering *decay* scores than oral education alone, as it provides clear and concrete guidance for families to take curative and preventive measures in health care facilities.

4. CONCLUSION

This study concluded that a 21-day nutritional intake intervention program developed with a nutritionist, combined with dental health education, was proven to be effective in significantly improving children's nutritional status and health. Providing varied lunches and snacks has succeeded in increasing students' weight through increasing appetite and meeting the needs of macronutrients and micronutrients that are crucial to prevent stunting and wasting. In parallel, joint toothbrush interventions and the provision of medical recommendation letters to parents had a significant impact on oral health, which was statistically proven through a decrease in tooth decay scores and improved children's oral hygiene. These successes show that a holistic approach that integrates nutritional improvement with dental health care, supported by formal communication to parents as a cue to action, is highly effective in building healthy living habits and supporting the physical growth and social-psychological development of children optimally.

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