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Health Education: Raising Awareness Among Children About Cleanliness and the Dangers of Synthetic Food Coloring in the Kenosis Community, Surabaya

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ABSTRACT Elementary school children in the Kenosis tutoring center, Sidoyoso, Surabaya, face significant health challenges stemming from inadequate hygiene practices and limited awareness of food safety. These children regularly consume unhealthy snacks containing potentially harmful synthetic additives, demonstrate poor dental hygiene habits, and exhibit insufficient handwashing practices. Such behaviors substantially increase their vulnerability to dental caries, infectious diseases, and adverse health effects from consuming food products containing prohibited additives, including rhodamine B, metanil yellow, borax, and formalin. This community service program aimed to enhance elementary school children's knowledge and awareness regarding three critical health domains: the identification and avoidance of harmful food additives in snacks, proper tooth brushing techniques, and correct handwashing procedures. A comprehensive health education intervention was conducted on January 9, 2025, involving 35 elementary school children at the Kenosis tutoring center. The program was delivered by a collaborative team comprising 21 lecturers and 11 students from Poltekkes Kemenkes Surabaya. Educational strategies included interactive multimedia presentations utilizing videos, songs, and games, complemented by hands-on demonstrations and supervised practice sessions. Pre-test and post-test assessments were administered to measure knowledge acquisition across all three health topics. The intervention demonstrated significant improvements in children's health knowledge. Average scores for understanding harmful food additives increased from 60.2 (pre-test) to 70.5 (post-test). Knowledge regarding proper tooth brushing techniques improved from 60.0 to 75.0, while comprehension of correct handwashing practices similarly increased from 60.0 to 75.0. The health education program successfully enhanced children's knowledge across all targeted health domains. These findings underscore the effectiveness of interactive, demonstration-based educational approaches in promoting health awareness among elementary school children in community tutoring settings.

INDEX TERMS Health education, food additives, dental hygiene, hand washing, elementary school children.

I. INTRODUCTION

Elementary school age represents a critical developmental period wherein foundational academic competencies, character formation, and health behaviors are established [1], [2]. During this formative phase, children require comprehensive support extending beyond formal classroom instruction to encompass supplementary educational environments, including community-based tutoring programs

[3]. These alternative learning spaces play an instrumental role in addressing academic deficiencies while simultaneously serving as strategic platforms for health promotion interventions [4], [5].

Contemporary research has demonstrated that elementary school children face multifaceted health challenges, particularly in underserved communities [6]. A significant concern involves the consumption of street food and snacks

containing hazardous synthetic additives, including textile dyes such as rhodamine B, chemical preservatives like formalin, and industrial compounds, including borax [7], [8]. These substances, prohibited for food use by regulatory authorities, pose substantial health risks ranging from acute toxicity to long-term carcinogenic effects [9]. Compounding this issue, children in low-income communities often lack adequate knowledge regarding food safety, making them particularly vulnerable to these health hazards [10], [11].

Parallel to nutritional concerns, poor oral hygiene practices among school-aged children constitute another pressing public health challenge [12]. Studies indicate that approximately 90% of dental caries cases in children could be prevented through proper brushing techniques and regular oral care [13]. However, insufficient awareness of correct tooth brushing methods, combined with irregular dental hygiene habits, contributes to high prevalence rates of dental problems in this population [14], [15]. Similarly, inadequate hand hygiene practices represent a critical factor in the transmission of infectious diseases, including diarrheal illnesses and respiratory infections [16], [17].

Current state-of-the-art approaches to pediatric health education emphasize interactive, multi-sensory learning methodologies [18]. These include the utilization of multimedia educational materials, gamification strategies, and hands-on demonstration techniques that have proven effective in enhancing knowledge retention and behavioral change among children [19], [20]. The integration of visual aids, participatory activities, and peer learning has shown promising results in various school-based health intervention programs [21], [22].

Despite extensive research on school-based health education, a significant gap exists in implementing comprehensive, multi-topic health interventions within community tutoring settings [23]. Most existing studies focus on single health issues within formal school environments, overlooking the potential of community learning centers as venues for integrated health promotion [24], [25]. Furthermore, limited research has examined the effectiveness of collaborative, interdisciplinary approaches involving multiple health disciplines in delivering holistic health education to children in informal educational settings [26].

The Kenosis tutoring center in Sidoyoso, Surabaya, established in 2016 by GKA Gloria, exemplifies a community-initiated educational support system serving elementary school children from economically disadvantaged backgrounds. This program presents an ideal context for implementing integrated health education interventions targeting multiple behavioral risk factors simultaneously. Therefore, this community service initiative aims to enhance children's knowledge and awareness regarding three interconnected health domains: identification and avoidance of harmful food additives, proper tooth brushing techniques, and correct handwashing procedures. The primary contributions of this work are threefold:

1. It demonstrates the feasibility and effectiveness of implementing comprehensive, multi-topic health education within community tutoring settings, thereby

expanding the scope of health promotion beyond traditional school environments.

2. It provides empirical evidence regarding the efficacy of interactive, demonstration-based educational methodologies in improving health knowledge among elementary school children in resource-limited communities.
3. It establishes a replicable model for interdisciplinary collaboration between academic health institutions and community organizations in delivering integrated health interventions to vulnerable pediatric populations.

This article is organized as follows: Section II describes the methodology employed in designing and implementing the health education intervention. Section III presents the results of pre-test and post-test assessments across all three health education domains. Section IV discusses the findings and their implications, while Section V concludes the study and acknowledges contributing parties.

II. METHOD

This community service initiative employed a quasi-experimental pre-test post-test design to evaluate the effectiveness of a health education intervention [27]. The study was conducted on January 9, 2025, at the Kenosis tutoring center, located in Sidoyoso, Surabaya, East Java, Indonesia. The Kenosis Center, established in 2016 by GKA Gloria region Sidoyoso, operates as a community-based educational facility providing free tutoring services to elementary school children from low-income families [28].

A. STUDY POPULATION AND SAMPLE

The study population comprised all elementary school children actively enrolled in the Kenosis tutoring program. A total of 35 children participated in the intervention, selected through convenience sampling based on their presence during the scheduled session. The inclusion criteria required participants to be: enrolled in elementary school (grades 1-6), regular attendees of the Kenosis tutoring center, and willing to participate with parental consent. Children with cognitive or physical impairments that would prevent participation in interactive activities were excluded. No randomization was performed due to the nature of the community service program and the relatively small population size [29].

B. IMPLEMENTATION TEAM

The intervention was delivered by an interdisciplinary team consisting of 21 faculty members and 11 students from Poltekkes Kemenkes Surabaya (Health Polytechnic, Ministry of Health, Surabaya). The team comprised professionals from five departments: Laboratory Technology, Nursing, Midwifery, Nutrition, and Environmental Health. This multi-disciplinary composition enabled comprehensive coverage of the three health education topics [30].

C. EDUCATIONAL MATERIALS AND RESOURCES

The intervention utilized multiple educational modalities designed to enhance engagement and knowledge retention among elementary school-aged children. Materials included:

audiovisual presentations featuring animated videos demonstrating proper handwashing and tooth brushing techniques, educational songs with health-related lyrics to facilitate memorization, interactive games and quizzes to assess real-time comprehension, physical demonstration tools including enlarged tooth models, toothbrushes, and handwashing stations, and sample food products displaying various artificial colorants for identification exercises [31], [32].

D. INTERVENTION PROTOCOL

The health education intervention was structured into three sequential modules, each lasting approximately 40-45 minutes:

1. MODULE 1: HARMFUL FOOD ADDITIVES AND HEALTHY SNACK SELECTION.

This module addressed knowledge gaps regarding synthetic food colorants and preservatives prohibited in food products, specifically rhodamine B, metanil yellow, borax, and formalin. The educational approach incorporated: interactive multimedia presentations explaining the sources, health hazards, and identification characteristics of each additive, practical demonstrations using actual food samples to illustrate visual and textural indicators of contamination, and guided exercises where children practiced identifying potentially hazardous products based on learned criteria [33].

2. MODULE 2: PROPER TOOTH BRUSHING TECHNIQUES.

This module focused on establishing correct oral hygiene practices through: theoretical instruction on the importance of dental care and optimal brushing frequency (twice daily), step-by-step demonstrations using enlarged dental models to illustrate proper brushing angles (45 degrees toward gums), appropriate pressure, and comprehensive coverage of all tooth surfaces, and supervised practice sessions where each child received a toothbrush and toothpaste to perform the techniques under facilitator guidance [34].

3. MODULE 3: CORRECT HANDWASHING PROCEDURES.

This module emphasized infection prevention through proper hand hygiene by: explaining critical times for handwashing (before meals, after toilet use, after playing, and after contact with potentially contaminated surfaces), demonstrating the six-step handwashing technique recommended by the World Health Organization, including adequate duration (40-60 seconds), and hands-on practice at designated handwashing stations with soap and running water [35].

E. DATA COLLECTION INSTRUMENTS

Knowledge assessment was conducted using structured questionnaires developed specifically for this intervention. Three separate instruments were designed, each containing 10 multiple-choice questions corresponding to one of the three educational modules. Questions assessed factual knowledge, comprehension of procedures, and ability to identify safe

versus hazardous practices or products. The questionnaires were pilot-tested with five children of a similar age group to ensure age-appropriate language and clarity of items [36].

F. DATA COLLECTION PROCEDURE

A pre-test was administered immediately before the intervention to establish baseline knowledge levels across all three domains. Following completion of the three educational modules, a post-test using identical questionnaires was administered to measure knowledge gains. Both assessments were conducted in a classroom setting under standardized conditions. Facilitators read questions aloud to accommodate varying literacy levels, and children marked their responses on provided answer sheets. The testing duration was approximately 15 minutes for each assessment period.

G. DATA ANALYSIS

Quantitative data from pre-test and post-test questionnaires were analyzed using descriptive statistics. Individual scores were calculated as percentages of correct responses, and mean scores were computed for each educational module. Knowledge improvement was determined by calculating the difference between post-test and pre-test mean scores. Data entry and analysis were performed using Microsoft Excel 2019. Given the descriptive nature of this community service evaluation and the absence of a control group, inferential statistical testing was not conducted [27].

H. ETHICAL CONSIDERATIONS

Prior to implementation, institutional approval was obtained from Poltekkes Kemenkes Surabaya, and permission was secured from the Kenosis tutoring center administration and GKA Gloria region Sidoyoso. Verbal parental consent was obtained through the tutoring center coordinators, who informed parents about the educational activities. Child assent was obtained on the day of intervention. Participation was voluntary, and children could withdraw at any time without consequences. All data were collected anonymously with no personally identifiable information recorded.

III. RESULT

A. UNDERSTANDING THE SELECTION OF HEALTHY SNACKS WITH KNOWLEDGE OF HARMFUL FOOD ADDITIVES

Understanding the selection of healthy snacks with knowledge of harmful food additives (prohibited by the government in food) aims to raise children's awareness about the dangers of harmful food additives, which is done by:

1. Education through interactive media such as videos, songs, and games ([FIGURE 1](#)).
2. Education through discussion ([FIGURE 2](#)).
3. Direct approach with demonstrations and joint practice ([FIGURE 3](#)).

Food additives are substances added to food to enhance its flavor, color, texture, or shelf life. However, the use of harmful food additives, such as rhodamine B, metanil yellow, borax, and Formalin, is prohibited by the government because they can pose health risks. Rhodamine B is a synthetic dye used in

the textile and cosmetic industries, not for food, often found in foods such as crackers, sauces, or brightly colored snacks (pink or red). The health hazards due to the consumption of rhodamine B include causing skin, eye, and respiratory tract irritation, as well as increasing the risk of cancer (carcinogenic) if consumed over a long period. Characteristics of Food Containing Rhodamine B: bright red color that is unnatural, tends not to dissolve completely in water, leaving color stains on hands or mouth.



FIGURE 1. Education Through Interactive Media Such as Videos, Songs, and Games.



FIGURE 2. Education Through Discussion.



FIGURE 3. Direct Approach with Demonstrations and Joint Practice.

Metanil yellow is a synthetic yellow dye used in the textile and paper industries, not for food, and is often found in tofu, crackers, or brightly colored yellow cakes. The health hazards from consuming metanil Yellow include disrupting liver and kidney function, gastrointestinal irritation, and potential cancer risk. Characteristics of Food Containing Metanil Yellow: bright and unnatural yellow color, unstable when soaked in hot water.

Borax is a chemical compound used in wood preservatives, detergents, and cleaning industries, often found in meatballs, noodles, or crackers to provide a chewy texture or longer shelf life. Danger: The health issues caused by borax consumption include digestive tract disturbances (nausea, vomiting, diarrhea), liver and kidney function disorders, as well as the risk of acute or chronic poisoning. Characteristics of food containing borax are an extremely chewy and unnatural texture (for example, meatballs or noodles), not

easily crumbled even when squeezed, and if thrown on the floor, it will bounce high.

Formalin is a solution of formaldehyde used to preserve corpses and laboratory materials, often illegally used to preserve tofu, fish, or wet noodles. The health hazards of consuming formalin include skin, eye, and respiratory tract irritation; liver, kidney, and nerve function disorders; and cancer risk if consumed continuously. Characteristics of food containing formalin are that it does not easily spoil even when stored for a long time, the texture of the food is too hard or chewy, and it has a pungent chemical-like smell. Avoid harmful additives is Buy from a trusted seller: make sure the food comes from a clear source and its safety is guaranteed.

- Check the food label: verify the distribution permit from BPOM or the halal certification.
- Avoid brightly colored foods: choose foods with natural colors.
- Conduct a simple test at home:
- Rhodamine B is soaked in water; observe if there is any striking color.
- Borax, the chewiness test for meatballs or noodles. Formalin, check the food's shelf life; if it lasts too long without proper preservation, beware of formalin.

B. UNDERSTANDING THE PROPER WAY TO BRUSH TEETH

This activity aims to raise awareness among school-aged children about the importance of brushing teeth properly to maintain dental and oral health, as dental and oral diseases, such as cavities and gum disease, often occur due to incorrect or irregular brushing habits. As shown in [FIGURE 4](#), the facilitators demonstrated correct brushing techniques to children using visual aids and direct practice to enhance comprehension and engagement. Data shows that 90% of dental problems can be prevented with proper dental care. The benefits of diligently brushing teeth include preventing cavities, as regular brushing cleans plaque and food residues; avoiding bad breath because brushing reduces bacteria that cause unpleasant odors; preventing gum disease that leads to gingivitis; and maintaining overall body health since oral infections can affect body health, such as increasing the risk of heart disease. The right time to brush your teeth is twice a day, namely in the morning after breakfast and at night before bed, with a duration of at least 2 minutes each time brushing.

Washing hands is a simple yet very important step to prevent the spread of germs and diseases. As shown in [FIGURE 5](#), the facilitators conducted a counseling and



FIGURE 4. Health Education Session Demonstrating Correct Tooth Brushing Techniques for Elementary School Children at The Kenosis Tutoring Center, Surabaya.

demonstration session on proper handwashing techniques, allowing children to practice the six recommended steps under supervision. Proper handwashing habits can protect oneself and others from infections such as diarrhea, influenza, and COVID-19. The importance of washing hands is:

- It is to reduce the spread of disease because hands can be the main medium for germ transmission.
- Prevent infections by regularly washing hands; you can reduce the risk of respiratory and digestive tract infections.
- Protecting those around you because the germs on your hands can transfer to other objects or people through touch.



FIGURE 5. Counseling On Hand Washing

TABLE 1.

Results of Evaluating the Understanding of Tutoring Students at Kenosis GKA Gloria Region, Sidoyoso.

Activities	Average Pre Test	Average Post Test	Conclusion
Understanding the selection of healthy snacks with knowledge of harmful food additives	60,2	70,5	Increase in knowledge
Understanding the Proper Way to Brush Teeth	60,0	75	Increase in knowledge
Understanding Good and Proper Handwashing Habits	60,0	75	Increase in knowledge

Based on the results of the questionnaire in TABLE 1, which was carried out by the service team for GKA kenosis tutoring children before and after the counseling, the results showed that there was an increase in knowledge about the selection of healthy snacks, with knowledge of harmful food additives, the Proper Way to Brush Teeth, and Good and Proper Handwashing Habits.

IV. DISCUSSION

The findings from this community-based health education intervention demonstrate substantial improvements in children's knowledge across all three targeted health domains. The observed increase in mean scores from pre-test to post-test assessments provides empirical evidence supporting the effectiveness of interactive, demonstration-based educational approaches in enhancing health literacy among elementary school children in community tutoring settings.

Regarding knowledge of harmful food additives, the improvement from a mean score of 60.2 to 70.5 represents a 17.1% increase in correct responses. This finding suggests that children successfully acquired foundational knowledge about synthetic colorants and preservatives prohibited in food products, including rhodamine B, metanil yellow, borax, and

formalin. The magnitude of this improvement is particularly noteworthy given the complexity of the subject matter and the limited baseline awareness typical among this age group [37]. The integration of visual demonstrations using actual food samples appeared especially effective in helping children develop practical identification skills, moving beyond mere theoretical knowledge to applied competency. This hands-on approach enabled participants to recognize visual cues (abnormal coloration), textural characteristics (excessive chewiness), and other indicators of potential contamination that they can utilize in real-world food selection scenarios [38].

The substantial improvement in tooth brushing knowledge, from 60.0 to 75.0 (representing a 25% increase), indicates strong intervention effectiveness in the oral hygiene education component. This enhancement suggests that children not only learned the theoretical importance of dental care but also comprehended the technical aspects of proper brushing techniques, including appropriate brush positioning, adequate duration, and systematic coverage of all dental surfaces. The use of enlarged tooth models proved instrumental in clarifying concepts that might otherwise remain abstract to young learners [39]. The consistency of this improvement across participants suggests that the demonstration-based methodology successfully addressed diverse learning styles and baseline knowledge levels within the group. Similarly, the improvement in handwashing knowledge from 60.0 to 75.0 demonstrates effective transmission of infection prevention principles and procedural competency. This 25% increase indicates that children successfully internalized both the situational triggers requiring hand hygiene (before meals, after toilet use, after playing) and the technical execution of the six-step WHO handwashing protocol [40]. The hands-on practice component, wherein children performed the procedures under supervision with soap and water, likely contributed significantly to knowledge retention by engaging kinesthetic learning modalities in addition to visual and auditory channels.

The comparable magnitude of improvement across tooth brushing and handwashing domains (both 25%) may reflect the procedural similarity of these skills both involve learning sequential steps that can be physically practiced. In contrast, the somewhat lower improvement in food additive knowledge (17.1%) may be attributed to the more cognitively demanding nature of this content, which requires not only memorization but also analytical skills for product evaluation and risk assessment [41].

The outcomes of this intervention align with findings from similar community-based health education programs while also revealing some distinctive patterns. A study by Rahman et al. [42] examining food safety education among primary school children in Bangladesh reported a 15.3% improvement in knowledge scores following a multimedia-based intervention, slightly lower than the 17.1% improvement observed in the current study. This difference may be attributable to the inclusion of hands-on product examination in the present intervention, which provided tactile and visual reinforcement beyond purely multimedia approaches. Concerning oral hygiene education, the 25% knowledge

improvement documented in this study compares favorably with findings from a school-based dental health program in India, which reported a 22% improvement using similar demonstration techniques with tooth models [43]. However, a more intensive intervention in Japan involving weekly sessions over three months achieved a 38% improvement [44], suggesting that sustained, repeated exposure may yield greater knowledge gains than single-session interventions. The present study's achievement of substantial improvement within a single session demonstrates the efficiency of concentrated, interactive educational delivery, though it raises questions about long-term retention that warrant follow-up assessment.

The handwashing education component's effectiveness (25% improvement) is consistent with results from a systematic review of school-based hand hygiene interventions, which found average knowledge improvements ranging from 20-30% following interactive educational programs [45]. However, the review also highlighted a critical distinction between knowledge acquisition and sustained behavioral change, a limitation applicable to the current study as well. Research by Singh et al. [46] demonstrated that while knowledge improvements from hand hygiene education often persist for several months, actual handwashing behavior tends to decline more rapidly without environmental supports and regular reinforcement. An important distinction between this intervention and many reported in the literature concerns the setting. While most pediatric health education research focuses on formal school environments with dedicated health education infrastructure, this study was conducted in a community tutoring center with limited resources [47]. The successful implementation and positive outcomes in this less-structured setting suggest that community-based educational facilities represent viable and potentially underutilized venues for health promotion initiatives, particularly for reaching children from economically disadvantaged backgrounds who may have limited access to comprehensive school health programs.

The interdisciplinary composition of the implementation team in this study represents another distinguishing feature. The collaboration among faculty from five health disciplines (Laboratory Technology, Nursing, Midwifery, Nutrition, and Environmental Health) enabled comprehensive content coverage and diverse pedagogical approaches. This model contrasts with many single-discipline interventions and may have contributed to the program's effectiveness, though the specific contribution of interdisciplinarity requires further investigation [48].

Several methodological limitations must be acknowledged when interpreting these findings. First, the quasi-experimental design without a control group precludes definitive causal attributions. While the observed pre-post improvements suggest intervention effectiveness, the absence of a comparison group means that alternative explanations such as concurrent exposures, maturation effects, or testing effects cannot be definitively ruled out [49]. Future research would benefit from randomized controlled designs, though such

approaches may be logistically challenging in community service contexts.

Second, the reliance on immediate post-test assessment captures only short-term knowledge acquisition rather than long-term retention or behavioral change. Research consistently demonstrates that knowledge gains do not necessarily translate into sustained behavior modification, particularly in the absence of environmental supports and ongoing reinforcement [50]. The lack of follow-up assessment represents a significant limitation, as the ultimate goal of health education extends beyond knowledge acquisition to encompass lasting behavioral change and health outcomes improvement.

Third, the use of self-reported questionnaire data introduces potential response bias. Children may have provided socially desirable responses or may have guessed correct answers without genuine understanding. Direct observation of behaviors (tooth brushing technique, handwashing procedure, food selection) would provide more valid assessment of competency, though such evaluation was beyond the scope of this community service initiative.

Fourth, the convenience sampling approach and relatively small sample size ($n=35$) limit generalizability of findings. The participants, drawn from a single community tutoring center serving low-income families in one urban neighborhood, may not be representative of elementary school children more broadly. Replication across diverse settings and populations is necessary to establish external validity.

Fifth, the inability to disaggregate results by individual characteristics (age, grade level, prior health knowledge, socioeconomic factors) prevents identification of subgroups who may benefit most from specific educational approaches. Such analysis could inform more targeted and efficient intervention delivery in future programs.

Despite these limitations, the findings carry important implications for health promotion practice and policy. First, the demonstrated feasibility and effectiveness of implementing comprehensive health education in community tutoring settings suggest that these venues represent valuable platforms for reaching vulnerable pediatric populations who may have limited access to school-based health services. Policymakers and public health practitioners should consider strategic partnerships with community-based educational organizations as a means of extending health education reach beyond formal school systems.

Second, the success of the interactive, multi-modal educational approach combining multimedia presentations, demonstrations, and hands-on practice provides practical guidance for health educators working with elementary school children. The specific elements that proved effective (visual demonstrations with actual products, enlarged models for procedural training, supervised practice opportunities) can be replicated in similar contexts with appropriate adaptation to local resources and cultural considerations.

Third, the interdisciplinary team model employed in this intervention offers a potentially valuable framework for comprehensive health education delivery. The collaboration among professionals from diverse health disciplines enabled

holistic content coverage and may serve as a model for academic-community partnerships in health promotion.

Finally, these findings underscore the need for longitudinal research examining both knowledge retention and behavioral change following community-based health education interventions. While the immediate knowledge improvements documented here are encouraging, understanding the durability of these effects and their translation into actual health behaviors represents a critical research priority for maximizing intervention impact and return on investment of educational resources.

V. CONCLUSION

This community-based health education intervention was designed and implemented with the primary objective of enhancing elementary school children's knowledge and awareness regarding three critical health domains: the identification and avoidance of harmful synthetic food additives in snacks, proper tooth brushing techniques for oral hygiene maintenance, and correct handwashing procedures for infection prevention. The intervention, conducted at the Kenosis tutoring center in Sidoyoso, Surabaya, demonstrated measurable improvements across all targeted knowledge areas. Specifically, children's understanding of harmful food additives, including rhodamine B, metanil yellow, borax, and formalin, increased from a mean pre-test score of 60.2 to a post-test score of 70.5, representing a 17.1% improvement. Knowledge of proper tooth brushing techniques exhibited substantial enhancement, with mean scores rising from 60.0 to 75.0, corresponding to a 25% increase. Similarly, comprehension of correct handwashing habits demonstrated equivalent improvement, advancing from a mean score of 60.0 to 75.0, also representing a 25% gain. These quantitative outcomes provide empirical evidence supporting the effectiveness of interactive, demonstration-based educational methodologies in improving health literacy among elementary school-aged children in community tutoring settings. The successful implementation of this multi-topic intervention through interdisciplinary collaboration among faculty and students from five health disciplines demonstrates the feasibility and value of academic-community partnerships in delivering comprehensive health education to vulnerable pediatric populations. However, several directions for future research and program development warrant consideration. Longitudinal follow-up studies are essential to assess the durability of knowledge gains and, more critically, to evaluate whether acquired knowledge translates into sustained behavioral changes in daily food selection, oral hygiene practices, and hand hygiene habits. Future interventions should incorporate repeated educational sessions and environmental modifications to reinforce learned behaviors and facilitate their integration into routine practices. Additionally, controlled experimental designs with comparison groups would strengthen causal inferences regarding intervention effectiveness. Expansion of such programs to additional community-based educational settings, coupled with systematic evaluation of implementation processes and cost-effectiveness, would inform evidence-

based scaling strategies. Finally, investigation of optimal strategies for engaging parents and community stakeholders in reinforcing health education messages could enhance intervention impact and sustainability, ultimately contributing to improved health outcomes among children in underserved communities.

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DATA AVAILABILITY

No datasets were generated or analyzed during the current study.

AUTHOR CONTRIBUTION

Juliana Christyaningsih, Suliati, Lully Hani Endarini, Museyaro, and Evy Diah Woelansari (Department of Laboratory Technology) contributed to the conceptualization, design of the food additive education module, and data analysis. Yuni Ginarsih, Kiaonarni O.W., Teresia Retna P., Lembunai Tat Alberta, and Yohanes Kambaru W (Department of Nursing) designed and delivered the handwashing education module. Kasiati, Rahayu Sumaningsih, Evi Yunita Nugrahini, Teta Puji Rahayu, Nurwening TW, Hery Sumasto, Ira Puspita Sari, and Ira Rahayu Tiyyar (Department of Midwifery) developed and implemented the tooth brushing education module. Mujayanto and Nuning Marina Pengge (Department of Nutrition) provided expertise in food safety content development. Pratiwi Hermiyanti (Department of Environmental Health) contributed to intervention planning and health promotion strategies. All authors participated in data collection, reviewed and approved the final manuscript, and agreed to be accountable for all aspects of the work.

DECLARATIONS

ETHICAL APPROVAL

Ethical approval is not available.

CONSENT FOR PUBLICATION PARTICIPANTS.

Consent for publication was given by all participants

COMPETING INTERESTS

The authors declare no competing interests.

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