

DENTAL HEALTH EDUCATION AND RECOGNITION OF RADIATION RISK AMONG CHILDREN OF FOREIGN WORKERS IN MALAYSIA

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ABSTRACT

Introduction: Education and healthcare are two areas where foreign workers in Malaysia frequently encounter obstacles, particularly when it comes to their children. Health issues that can be avoided can result from a lack of awareness about mouth hygiene and the dangers of radiation exposure from dental imaging procedures. Children of migrant workers in Malaysia are being educated about radiation safety and the significance of good dental hygiene through community-based oral health education initiatives that have been applied worldwide. **Purpose:** The community of migrant workers' children was the target of this program, which sought to promote preventative measures and address oral health inequities. **Research Methods:** The program comprised interactive lectures, demonstrations of correct toothbrushing techniques, and educational sessions on the safe application of dental radiography. Participant comprehension was assessed via a written survey employing a pre- and post-intervention design, lacking a control group, to evaluate the educational program's influence on participants' understanding of dental health and the hazards associated with radiation exposure. **Results:** Illustrated a greater comprehension of radiation hazards and good behavioral modifications pertaining to maintaining tooth health. **Conclusion:** For vulnerable populations, interactive dental health education programs can be a useful strategy for enhancing both general and dental health outcomes.

Keywords: Oral Health Education, Radiation Safety Awareness, Children Of Migrant Laborers

1. INTRODUCTION

Health represents the most vital aspect of human existence, encompassing both physical and mental well-being. Health considerations extend beyond overall bodily well-being to encompass dental and oral health. According to estimates from the World Health Organization (WHO), around 3.5 billion individuals worldwide—roughly 50% of the population—have one or more oral diseases, including periodontal disease, caries in milk and permanent teeth, tongue cancer, growth and development abnormalities, and dental trauma. The Southeast Asia region exhibits the

greatest prevalence of oral disease cases (WHO, 2022).

Oral and dental diseases impact not only the maxillofacial region but also an individual's systemic health. The widespread incidence of oral diseases, affecting all age demographics, has also resulted in detrimental health consequences, including physical ailments, sleep disturbances, discomfort, apprehension, anxiety, and functional impairments. Oral diseases are largely preventable or necessitate only minimal intervention for recovery when diagnosed and treated in their early stages. Ideally, oral health professionals should emphasize delivering preventive care and minimally invasive interventions, assist patients in adopting effective self-care practices, and serve as policy advocates to enhance oral health. However, significant challenges persist concerning the coverage, accessibility, availability, appropriateness, and affordability of oral health care globally (Kunwar and Varghese, 2020).

Malaysia is one of the most preferred destination countries for Indonesian migrant workers (PMI) pursuing employment opportunities and enhanced living standards. Annually, the circumstances pertaining to illegal migrant workers in Malaysia deteriorate further. In 2021, it is estimated that approximately half of Malaysia's 2.7 million migrant workers will be undocumented. Then, compared to the previous year, there will be a 146% increase in illegal migrant workers departing for Malaysia in 2022 (3). In 2023, almost 9 million Indonesians will work as TKIs abroad. However, approximately 4,686,190 TKIs adhere to the law, while the remaining 4.5 million operate unlawfully or outside the legal framework. Undocumented migrant laborers employ adaptive strategies, encompassing both conduct and practical measures, to navigate the challenges inherent in their environment and ensure their survival. Individuals or groups utilize survival strategies to contend with physical or psychological circumstances that are unstable or approaching instability. This phenomenon presents additional challenges, particularly hindering their access to education due to their inability to register for school, lack of a residence permit (visa), absence of a birth certificate, and consequently, limited access to educational services for migrant children (Alabshar, Giyarsih and Pitoyo, 2020; Nguyen, 2020).

Several factors contribute to the difficulty that PMI children have when trying to enter education. Initially, the Malaysian government maintains domestic policies that constrain, and at times impede, the educational opportunities within government-operated institutions for the offspring of foreign nationals. Secondly, the number of educators is limited, and establishing schools initiated by the Indonesian government poses challenges due to regulatory constraints. Third, the limited awareness among migrant workers regarding the fulfilment of their children's educational requirements (Id *et al.*, 2022).

The Government of Indonesia offers educational services via the Indonesian School in Kuala Lumpur (SIKL). The implementation of educational initiatives remains insufficient in the area of literacy, particularly concerning dental and oral health as well as the associated risks of radiation. Oral and dental health are integral to overall well-being; compromising the integrity of dentition can adversely affect systemic health, consequently impeding the performance of daily activities. The underlying cause of dental health issues stems from behavioural factors or attitudes that neglect oral hygiene, primarily resulting from a deficiency in

knowledge regarding dental health and its proper care (Martadewi *et al.*, 2025).

Dental health education and awareness of radiation hazards are essential preventative measures prior to the onset of disease; consequently, it is crucial to initiate education for children at the earliest opportunity to decrease the incidence of dental and oral conditions. Delivering health education to students can significantly influence their comprehension. Students acquire knowledge that facilitates a paradigm transition from ignorance to awareness, from lack of understanding to comprehension. These promotional initiatives seek to enhance the well-being of children of Indonesian migrant laborers.

2. PROBLEMS AND PROBLEMS SOLUTION

The priority concerns identified by the Learning Centre and Partner Universities for resolution through educational programs utilising interactive methodologies and digital media include:

Aspects of Dental and Oral Health Education

Children of Indonesian migrant laborers in Malaysia may encounter conditions that differ from those of other children, as they frequently reside in environments that are less safe and less sanitary. They may lack adequate access to quality healthcare facilities. Migrant children require education on dentistry and oral health to sustain their oral hygiene and avert disease. This will facilitate the integration of migrant children as healthy and productive members of society in the future (Id *et al.*, 2022).



Figure 1. Map Of Malaysia

Aspects of radiation hazards

The understanding of radiation hazards among children of Indonesian migrant laborers remains relatively limited. Radiation is an electromagnetic phenomenon that propagates without the need for an intermediary medium. Radiation cannot be observed, perceived, or directly detected. In fact, there is a significant presence of radiation in the encircling environment, including at home, in the workplace, and in public areas. All types of radiation have the potential to expose humans by emitting energy capable of liberating electrons from molecules or atoms within human cells, leading to ionization that may induce temporary or permanent harm to the affected cells. Health issues resulting from electromagnetic wave radiation have remained a subject of research to this day. Health issues resulting from

moderate or short-term electromagnetic radiation encompass vertigo and chronic fatigue, whereas those associated with severe or prolonged exposure include insomnia, leukemia, and breast cancer. Most migrant children may also lack adequate education concerning the appropriate use and prevention of radiation effects; consequently, they require comprehensive instruction to enhance their quality of life (Purmal, Alam and Nambiar, 2013; Yürük, 2024). Overall, this health education is essential for migrant children as it can assist them in addressing health issues they may encounter while residing in Peninsular Malaysia.

PROBLEM SOLUTION

Referring to partner problems according to the priority problems being handled, solutions are created for each problem and are shown in Table 1.

Table 1. Problem solution

PROBLEM	SOLUTION
Aspects of Dental and Oral Health Education	
Lack of knowledge regarding the function of teeth	Counseling and training related to the function of teeth
Lack of knowledge regarding oral cavity diseases and growth and development	Counseling related to various types of oral cavity diseases and growth and development
Lack of knowledge regarding the importance of maintaining oral hygiene	Education about the importance of maintaining oral hygiene
Aspects of utilization and prevention of radiation effects	
Lack of knowledge regarding the use and prevention of radiation effects	Counseling related to the use and prevention of radiation effects

3. LITERATURE REVIEW

This community service research aims to improve the knowledge and awareness of children of foreign workers in Malaysia regarding the importance of maintaining oral health and understanding the risks of radiation exposure during dental X-rays. Through dental health education and radiation safety outreach activities, it is hoped that participants will be able to understand how to maintain oral hygiene, the importance of regular dental check-ups, and the principles of safe and prudent radiation use. Additionally, this initiative aims to evaluate the effectiveness of the educational program in improving participants' understanding and preventive behaviors regarding oral health and radiation risks, particularly among foreign migrant children who face limited access to healthcare services and information (Nakre and Harikiran, 2013).

The World Health Organization's Constitution upholds every person's fundamental right to the best possible level of health. The 2030 Agenda for Sustainable Development, which highlights health equity and universal health care through the idea of "leaving no one behind," reiterates a rights-based approach to health (WHO, 2022). Malaysia is an upper-middle-income nation distinguished by a robust economy driven by diverse and labour-

intensive sectors. Malaysia is a net importer of foreign labour, with documented migrant labourers constituting approximately 15% of the workforce. Owing to their absence of legal recognition, undocumented or illegal migrants remain unseen by policymakers, rendering their actual population a matter of debate. According to a report by the International Labour Organisation, the total number of migrant labourers in Malaysia in 2019 was estimated to be between approximately 3.85 million and 5.3 million, including undocumented workers (ILO, 2015).

Malaysia maintains a healthcare system characterized by a combination of public and private sectors. The nation is broadly acknowledged for attaining universal health coverage via a tax-funded public healthcare system, ensuring citizens' access to services at minimal personal expense. The private healthcare system is predominantly profit-driven and funded through a fee-for-service payment model. Although public healthcare services are extensively subsidized for citizens, foreign nationals are subject to higher fees. The imposition of specific fees for foreign nationals was initially promulgated in 2003 and subsequently underwent significant revision in 2014, with the objective of eliminating all forms of governmental subsidies. Migrant workers, refugees, asylum seekers, foreign students, foreign spouses, tourists, and expatriates are among the foreign nationals impacted by this policy shift (Loganathan *et al.*, 2019).

Migrant workers' and their families' health have become recognized as a significant public health concern. Because of the length of time they spend in their host nation, migrant workers do not obtain proper health care and social assistance. In order to assist people, survive and enhance their quality of life, it is crucial to establish health programs. Due to their limited access to healthcare facilities and need to adjust to a new environment, migrant workers are more likely to encounter health issues (Ponce-gonzalez *et al.*, 2019). Children of migrant workers have one of the most important unmet health needs, and many of them don't even know the basics of oral health. Various factors can contribute to the development of dental caries and oral health problems among children of migrant workers.

A comprehensive understanding of safety factors, the important role of cultural interaction, and diverse ethnic communities within the healthcare system can promote improved outcomes for high-risk populations. Lack of transportation, insurance, sick leave, the possibility of losing their job or losing their wages, language barriers, a shortage of permanent dentists, and restricted clinic hours are the main obstacles keeping children of migrant workers from receiving general health care, and dental care in particular (Susanti *et al.*, 2025).

Dental caries is becoming the main public health concern and has major effects on children's health. The detrimental effects of dental caries on children's overall health, life quality, and well-being have been studied. Chronically poor dental health has been linked to systemic problems that may develop later in life, according to numerous studies (Alloy *et al.*, 2024).

Advanced dental caries necessitates adjunctive examinations, specifically radiographic imaging, to facilitate diagnosis and treatment formulation. Children are employing this imaging modality more frequently as a result of the quick advancements in ionizing radiation imaging technologies. According to the 2013 UNSCEAR report, minors account for approximately 3 to 10% of medical diagnostic radiology procedures. Cone

beam computed tomography (CBCT), periapical radiography, panoramic radiography, and other cross-sectional imaging modalities have contributed to the diagnosis and management of pediatric patients (Mendonça *et al.*, 2025).

Radioactivity is an intrinsic natural phenomenon, and natural sources of radiation constitute an inherent aspect of the environment. Radiation and radioactive materials possess numerous advantageous applications, extending from energy production to applications within medicine, industry, and agriculture. The potential hazards posed by radiation to personnel, the general public, and the environment resulting from these applications must be evaluated and, where appropriate, mitigated (Madan *et al.*, 2015).

Radiological applications hold significant significance for the diagnosis and management of diseases, and their utilization continues to expand progressively. Radiation is recognized to exert adverse biological impacts on living organisms. Several radiological investigations utilize ionizing radiation; examples include periapical radiography, panoramic radiography, and CBCT. Radiation exposure is frequently linked to potential biological consequences, specifically cellular injury. Radiation exposure increases the risk of acquiring several cancers in children, who are more radiosensitive and have a higher life expectancy. Therefore, the public may become concerned when the word "radiation" is used (Thornton *et al.*, 2016).

A study conducted by Ria F *et al.* indicated that patients possess limited awareness of radiation imaging techniques. A lack of understanding among healthcare professionals has also been found in a number of studies, in addition to patients. This encompasses medical radiation exposure and associated hazards, in addition to radiation safety protocols for both patients and healthcare personnel. Healthcare practitioners and the general populace may possess disparate perceptions regarding radiological assessments concerning the associated radiation hazards. Patients' comprehension of radiation principles will affect their informed assent for diagnostic imaging procedures. Effective communication between healthcare practitioners and consumers is essential for enhancing the experience and supporting informed decision-making (Ria *et al.*, 2017).

The hazards associated with exposure from all forms of diagnostic imaging and their effects remain incompletely understood. Adverse effects, including cellular demise, alopecia, and erythema, manifest at significantly elevated exposure levels compared to those associated with dental diagnostic imaging. Long-term cancer risk, epidemiological data have indicated potential risks associated with radiation doses in the range of 50-100 mSv, which could result from the cumulative exposure following multiple computed tomography (CT) examinations. Nevertheless, considering the extended lifespan of children, the cumulative impact of low-dose radiation exposure from diagnostic imaging during early life could potentially elevate the long-term risk of developing cancer. Therefore, considering the limited evidence and prevailing uncertainty, it is essential for dental practitioners to adopt a cautious approach when utilizing pediatric imaging. Informed decisions that will ultimately benefit the child patients can also be made by enhancing communication between the patient and the parent-provider regarding risks and rewards (Brenner, 2020).

Community-based oral health education programs have long been recognized as vital tools in promoting dental hygiene practices and improving

oral health outcomes among populations worldwide. These initiatives, often implemented through partnerships between public health agencies, educational institutions, and community organizations, aim to raise awareness about the importance of oral hygiene, educate individuals on proper dental care techniques, and facilitate access to essential dental services (Subedi *et al.*, 2021).

Numerous studies have assessed these programs' efficacy in various socioeconomic and cultural contexts throughout time, providing insight into their effects on oral health behaviors and outcomes. It is impossible to overestimate the importance of dental health since it has an impact on a person's quality of life, social interactions, and physical health. Tooth decay, gum disease, and oral infections are just a few of the dental issues that can result from poor oral hygiene practices. If addressed, these conditions can cause pain, discomfort, and even systemic health issues. Additionally, dental problems can affect a person's speech, diet, and sense of self, underscoring the significance of preventive care and health education programs (Dimitropoulos *et al.*, 2020).

The fundamental principle of community-based oral health education initiatives is the idea that people and communities can take charge of their oral health by changing their knowledge and behaviors. These initiatives seek to address a variety of populations, including underprivileged and marginalized groups that would encounter obstacles in obtaining dental treatment, by providing focused interventions in easily accessible community locations such as schools, workplaces, houses of worship, and neighborhood health centers. Raising awareness of the significance of preventative dental care behaviors, such as frequent brushing, flossing, and dental examinations, is one of the main objectives of community-based dental health education initiatives. Participants gain the knowledge and abilities necessary to maintain proper oral hygiene practices and avoid common dental issues through engaging workshops, instructional materials, and outreach initiatives. These programs also frequently stress the importance of using fluoride and eating a balanced diet in order to maintain the best possible dental health (Bashirian *et al.*, 2023).

Community-based oral health education initiatives seek to address more general community factors of oral health in addition to encouraging individual behavioral change. Environmental conditions, cultural attitudes, and socioeconomic factors can all have a big impact on behavior and oral health results. In order to foster an atmosphere that encourages healthy habits, these programs frequently use techniques to address socioeconomic determinants of health, such as poverty, education, resource accessibility, and cultural norms. Community-based oral health education initiatives seek to address more general community factors of oral health in addition to encouraging individual behavioral change. Environmental conditions, cultural attitudes, and socioeconomic factors can all have a big impact on behavior and oral health results. As a result, these programs frequently. Additionally, community-based oral health education initiatives are essential for increasing access to dental care, especially for those with low incomes or geographical obstacles (Mcgrath, Marino and Satur, 2021).

Dental radiography serves a vital function in diagnostic procedures. Insufficient health literacy within migrant communities may engender misinterpretations or apprehension concerning radiation exposure.

Consequently, integrating radiation risk awareness into dental health education initiatives is crucial to enhance comprehension and promote informed decision-making. Integrating dental health education with fundamental radiation risk awareness through community outreach initiatives offers a comprehensive strategy for enhancing oral health literacy among children of migrant workers. This integrated educational model not only enhances knowledge acquisition but also promotes the safer utilization of dental services, thereby supporting preventive oral healthcare within underserved communities in Malaysia.

4. METODE

This research employed a pre-experimental design incorporating pre- and post-assessment measures. A pre-test is an evaluative measure conducted with participants prior to their receiving treatment within the framework of a research study. In contrast, a post-test is an evaluation administered to participants following the completion of treatment within a research study. Treatments are generally administered to the participants of a study. As previously noted, the program included three activities: (1) a lecture on dental health education covering topics such as dental health, tooth anatomy, various oral cavity diseases including tooth decay and malocclusion, different types of dental care, an introduction to the use of irradiation in dentistry and its associated risks, education on proper and effective tooth brushing techniques, the optimal timing for brushing, and the impact of diet—both beneficial and detrimental—on dental health. A simulation technique was employed on models to demonstrate tooth brushing to 48 junior high school students from SB Kampung Baru Malaysia (2). This study evaluated the community service in health education and screening activities, which involved junior high school students and were assessed both prior to and following the lecture. An assessment was administered prior to and following the lecture to evaluate the learning progression.

For the pre- and post-assessments pertaining to dental health education, there were ten questions covering topics such as dental health, tooth anatomy, various oral cavity diseases including tooth decay and malocclusion, different types of dental care, an introduction to the application of irradiation in dentistry and its associated risks, instruction on proper and effective tooth brushing techniques, the appropriate timing for brushing, and identifying foods that are beneficial or detrimental to dental health. A simulation method was employed on models to demonstrate tooth brushing to 48 junior high school pupils at SB Kampung Baru, Malaysia. This study evaluated community service efforts in health education and screening activities, involving junior high school students and conducted both prior to and following the lecture. An assessment was administered prior to and following the lecture to evaluate the learning progression.

5. RESULT AND DISCUSSION

Oral health education was delivered to students at SB Kampung Baru Malaysia utilising audio-visual aids, specifically PowerPoint presentations on oral health (Fig. 2). Informational pamphlets in the local language

concerning the matter were disseminated. This presentation encompass educational materials pertaining to dental and oral health, including tooth anatomy, a comprehensive overview of oral cavity diseases such as dental caries and malocclusion, diverse dental care modalities, an introduction to the application of irradiation in dentistry along with associated radiation hazards, instruction on appropriate tooth-brushing techniques, optimal brushing frequency, and dietary considerations impacting dental health. A simulation-based methodology was employed to demonstrate tooth hygiene techniques using models.



Figure 2. Dental and oral health education provided to student at SB Kampung Baru Malaysia using audio-visua

Following the distribution of dental and oral health materials, the students' comprehension was evaluated through a post-test, which yielded a maximum score of 100 and a minimum score of 80 (Figure 3). Figure 3 illustrates the distribution of pre-test and post-test scores among the pupils of SB Kampung Baru Malaysia. Based on the graph, it was determined that the maximum score was 100, followed by 90 and 80. Students' comprehension of the dental and oral health materials was classified as good, moderate, or low according to their post-test scores (Table 4).

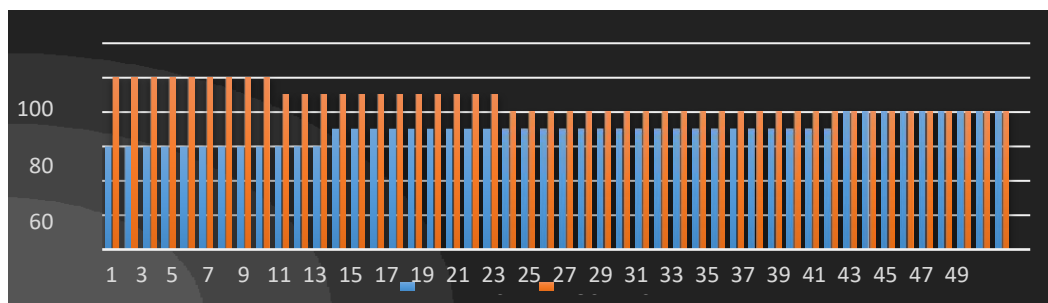


Figure 3. Graph of the frequency of dental and oral health pre and post test score

In addition to assessing the student's comprehension in SB Kampung Baru, the ongoing behavior of maintaining oral health was also evaluated. Table 3 indicated that a portion of students (52.03%) did not cleanse their teeth at night before going to bed, whereas the practice of brushing their teeth in the morning upon waking or after breakfast was performed by the majority of students (100%). Similarly, students (97.9%) have engaged in the practice of using a personal toothbrush (not shared with other family members) and fluoridated toothpaste. Based on Table 3, it is also evident that the majority of students habitually consume saccharine and sticky foods (79.16%). Meanwhile, only a negligible proportion (0%) engaged in the routine practice of dental health assessments or dental check-ups every six months. Children exhibit an almost comprehensive understanding of the dangers associated with radiation exposure.

Table 3. The results of the behavior of maintaining dental and oral hygiene in student

Variable	Total	
	n	%
Number Of Subject	48	100
Brushing teeth at night before going to bed		
Yes	25	52.1
No	23	47.9
Brushing teeth before going to Scholl		
Yes	48	100
No	0	0
Brushing teeth after eat		
Yes	20	41.7
No	28	58.3
Brushing teeth with brush and fluoride toothpaste		
Yes	47	97.9
No	1	2.1
Using toothbrush belonging to other familymembers		
Yes	0	0
No	48	100
Like to eat sweet and sticky food		
Yes	38	79.2
No	10	20.8
Check the dental health into dentist or health center		
Yes	0	0
No	48	100

has undergone dental radiography.		
Yes	0	0
No	48	100
Do electronic gadgets and smartphones release radiation?		
Yes	48	100
No	0	0
Should I allow radiographs		
Yes	48	100
No	0	0

Table 4. indicated that student comprehension was primarily classified as excellent, beating the moderate and low classifications.

This demonstrated that certain students have effectively received comprehensive dental health education. Providing education on dental and oral health can support students in comprehending methods to maintain their dental and oral health. This will consequently impact the advancement of enhanced dental and oral health within the community environment. The dental and oral health education delivered to students at SB Kampung Baru significantly enhanced their understanding and awareness of maintaining oral hygiene and overall dental health. Students who initially lacked knowledge of maintaining healthy teeth and oral hygiene, including appropriate brushing techniques, gained awareness of how to correctly implement these practices. Education in dental and oral health has been demonstrated to enhance oral and dental well-being and encourage positive oral health practices. These behaviors should be systematically developed in children from an early age (Aishah *et al.*, 2019).

Table 4. Categories of the level of dental and oral health understanding in student

Category	Number	%
Good	10	20.8
Moderate	25	52.1
Low	13	27.1

Dental and oral health education provided to students in SB Kampung Bharu revealed that 20.83% demonstrated an adequate level of understanding, 33.3% exhibited a moderate level of comprehension of the dental health education material, while 16.7% showed a low level. Most students also exhibited a tendency to consume saccharine and sticky foods, which are known to be sources of dental caries. This may be attributed to various factors influencing participants' comprehension, including age and educational background. This aligns with the research conducted by Halawany *et al.*, which indicated that educational factors, occupation, age, place of residence, parenting experience, and economic status may

influence the level of parental knowledge regarding dental and oral health (Halawany *et al.*, 2015, 2018).

Half of the participants demonstrated a satisfactory level of knowledge regarding dental health maintenance and the hazards associated with radiation exposure. Many of these students have diligently brushed their teeth twice daily, once in the morning and once before bedtime. The utilization of fluoride toothpaste and individual toothbrushes has also been effectively implemented. Based on the findings of the routine dental examinations, the procedures had not been conducted appropriately. Table 3 indicated that the majority of students had never undergone a dental examination by a dentist. This may result from a deficiency in awareness regarding the importance of maintaining oral and dental health. The delivery of dental and oral health education should also be conducted regularly and consistently to enhance parents' comprehension and knowledge in maintaining oral and dental health.

6. CONCLUSION

Based on the results of this activity community program, it can be concluded that dental and oral health education for students in SB Kampung Bharu could provide understanding and knowledge of maintaining dental health and radiation hazard so that it can help to improve behavior in maintaining dental and oral health in the society. The health education and health screenings implemented in this study increased Indonesian migrant workers' awareness of their health, implying that such programs should be repeated and expanded.

Globally, there is a pressing requirement to advance oral health initiatives within educational institutions. Significant opportunities exist for the development of comprehensive health-promotion programs utilizing a school-based framework. The dedication of central and local governmental authorities, educational institutions, families, and communities is vital. It is imperative for public health authorities and health professionals to deliver continuous support through technical assistance, financial resources, and educational materials to enable schools to evolve into health-promoting institutions with oral health integrated as a fundamental component.

SUGGESTION

Future research is recommended to involve a larger number of respondents across a broader geographic area so that the findings can provide a more representative picture of the conditions faced by children of foreign workers. Additionally, the development of more interactive educational media, such as audiovisual materials or digital applications, could also serve as an alternative to enhance children's understanding of the material presented. Future research is also expected to examine the involvement of parents, teachers, and health workers in supporting the success of promotive and preventive dental health programs as well as radiation safety among vulnerable communities.

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