

Understanding Emergency Dental Health Literacy Among Indonesian Migrants in Singapore: A Cross-Sectional Survey

Frida Arba Martadewi¹, Erma Sofiani^{2*}, Dita Sri Erisona³, Salma Nabita Eldurr⁴, Fahma Aldihyah Kunsputri⁵

¹Faculty of Dentistry, Universitas Muhammadiyah Yogyakarta, Yogyakarta, Indonesia

²Endodontics and Conservative Department, Faculty of Dentistry, Universitas Muhammadiyah Yogyakarta, Yogyakarta, Indonesia

³Faculty of Dentistry, Universitas Muhammadiyah Yogyakarta, Yogyakarta, Indonesia

⁴Faculty of Dentistry, Universitas Muhammadiyah Yogyakarta, Yogyakarta, Indonesia

⁵Prosthodontics Department, Faculty of Dentistry, Universitas Muhammadiyah Yogyakarta, Yogyakarta, Indonesia

*Corresponding Author: E-mail: ermasofiani@umy.ac.id

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ABSTRACT

Introduction: Dental health literacy is crucial in managing emergency dental and oral health issues, especially for Indonesian migrant workers in Singapore who have limited access to healthcare services. The Singapore Department of Statistics reported that as of 2023, there were 1.77 million non-residents in Singapore, a 13.1% rise from the year before. This growth was mostly due to foreign employment in domestic and construction-related industries. Language barriers, economic constraints, and differences in healthcare systems contribute to a low understanding of emergency dental actions. This study aims to analyze this group's emergency dental health literacy level.

Methods: This study employed a descriptive cross-sectional quantitative design using a survey method on 124 Indonesian migrant workers in Singapore. Data was collected through a Likert-scale-based questionnaire to measure participants' understanding, attitudes, and self-efficacy in handling emergency dental situations. Data analysis was conducted using descriptive analysis, reliability testing, Spearman's correlation, and the Kruskal-Wallis comparative test. The study has received ethical approval from the Ethics Committee of the Faculty of Medicine and Health Sciences at Universitas Muhammadiyah Yogyakarta (FKIK UMY), and participants provided informed consent in order to protect participants' rights.

Results: The Cronbach's Alpha reliability test produced a value of 0.803, indicating good internal consistency. A total of 76.6% of respondents understood emergency dental management steps, while 92% recognized the importance of seeking medical assistance if a toothache persisted for more than two days. However, only 57.3% were aware of safe over-the-counter medications for dental pain relief. Education played a role in improving dental health literacy, but no significant differences were found based on age.

Conclusion: The majority of Indonesian migrant workers in Singapore have a relatively good understanding of emergency dental health literacy; however, improvements are needed in the selection of appropriate medications. This study highlights the need for more effective awareness programs and policy support to enhance access to dental health information, enabling migrant workers to handle emergency dental issues appropriately. Concrete interventions such as increasing emergency dental literacy can be done with mobile dental health outreach, multilingual training programs, and connecting with networks in the migrant community.

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INTRODUCTION

Dental health literacy is an individual's ability to obtain, understand, and use dental health information to make informed decisions in maintaining their oral health oneself (1). Factors that influence dental health literacy include cultural, social, and economic factors. In emergencies, such as tooth and mouth pain, cavities with severe toothache, dental abscesses, or trauma due to accidents, this literacy becomes crucial because it enables individuals to recognize the early signs and symptoms of dental and oral health issues that require immediate attention and care(2). This can help individuals make the right emergency decisions for their teeth and mouth before receiving medical care, as well as understand the risks of using over-the-counter medications and the long-term impact if emergency actions are not taken correctly (3) Studies show that low health literacy related to emergency actions can lead to inadequate management, such as using traditional remedies or inappropriate medications. Delays in seeking proper care can worsen the condition and result in a greater economic burden due to the need for more complex treatments later on (4).

Health research rarely highlights emergency management of dental issues. Many individuals, especially those from vulnerable groups such as migrant workers, lack adequate knowledge to handle urgent dental problems effectively. Contributing factors include limited access to healthcare services and the tendency of workers to seek healthcare only when they are already sick. Migrant workers have poor access to dental care services, which can worsen their dental and oral health problems. Some of the challenges faced by Indonesian migrants include language barriers. Health information is often provided in English or Mandarin, making it difficult for migrants who are not fluent in either language to understand (5). Especially children from migrant families are often less likely to access routine or preventive dental care. This gap is largely attributed to several factors, including linguistic and cultural challenges. Language differences, in particular, have consistently been identified as a significant barrier that limits the use of dental services and hinders effective communication between patients and healthcare providers(6,7). In addition, migrants often find themselves unfamiliar with local oral health service policies, complicating their ability to navigate the healthcare system effectively(8)

Singapore is a country with an advanced healthcare system. The healthcare system in Singapore, which is structured and referral-based, can often be confusing for Indonesian migrant workers who are accustomed to direct access to services in Indonesia. The cost of healthcare in Singapore, including dental care, is relatively high, which encourages migrant workers to delay or avoid dental treatment(9). The limited dental health literacy results in many migrant workers being unaware of the emergency actions they can take or when to seek professional help in dental health emergencies. These barriers exacerbate the risk of complications from dental problems that could have been prevented with proper emergency action (10)

Dental health literacy among the Indonesian migrant worker population in Singapore has not been extensively studied. Previous studies have focused more on general health literacy, while emergency dental literacy remains a topic that has received less attention. In fact, this literacy is crucial to reducing the pressure on emergency healthcare services, improving the quality of life for migrants through better dental health management, and providing policymakers with the understanding needed to design more inclusive health literacy programs (11). Similar gaps have been observed in various migration situations, including Syrian refugees in Jordan and migrant laborers in Europe, where inadequate oral health literacy has been demonstrated to limit efficient emergency management and access to services(12,13).

In 2023, the Singapore Department of Statistics reported that the non-resident population in Singapore reached 1.77 million, reflecting a 13.1% rise from the prior year, primarily attributable to increases in foreign employment in industries such as domestic work and construction(14). The increasing number of Indonesian immigrants in Singapore makes health literacy, including in dental emergency situations, an important issue affecting their quality of life. This research is relevant because it raises individual awareness about the importance of dental emergency literacy, provides a foundation for health literacy intervention programs that can improve responses to emergencies, and helps design more inclusive health policies that support the needs of the immigrant population (15).

This study aims to fill the gap in the literature by focusing on dental emergency literacy among Indonesian migrant workers in Singapore. The research combines a cross-sectional quantitative approach to understand the level of dental emergency literacy among Indonesian migrant workers in Singapore, identify the barriers they face in understanding and accessing dental health information, and explore the roles of culture, language, and the healthcare

system in influencing dental emergency literacy. The findings of this study are expected to provide valuable insights for policymakers, healthcare professionals, and community organizations in developing more effective health literacy strategies for the immigrant population.

METHOD

Research Type

This study uses a descriptive quantitative cross-sectional design with a survey approach to measure the level of health literacy regarding the management of dental emergencies among Indonesian migrant workers in Singapore. The approach aims to obtain systematic and structured data on participants' knowledge, attitudes, and self-efficacy regarding emergency dental actions. All participants were provided an explanation of the research objectives and procedures they would undergo. Participation was voluntary, and participants could withdraw at any time without consequences.

Population and Sample/Informants

This study involved 124 participants, consisting of Indonesian migrant workers in Singapore which selected to represent a diverse cross-section of the community. The sampling technique used was purposive sampling. Based on public health cross-sectional survey standards, 124 respondents are generally sufficient to conduct reliable descriptive analysis(16). Given the exploratory nature of this study and constraints in accessing migrant populations, 124 respondents provided an appropriate balance between feasibility and statistical reliability. The inclusion criteria for participants were Indonesian migrant workers in Singapore who filled out the informed consent form, completed the questionnaire, and participated in all activities. The exclusion criteria were Indonesian students studying in Singapore.

Research Location

The study was conducted at the Embassy of the Republic of Indonesia (KBRI) in Singapore (KBRI Singapore, 7 Chatsworth Road, Singapore 249761).

Instrumentation or Tool

This study used a Likert scale-based questionnaire (1-5: Strongly Disagree, Disagree, Neutral, Agree, Strongly Agree) to measure participants' understanding and readiness in handling dental and oral health emergencies. The statements included were: I know the steps to take if I experience sudden tooth pain (Question 1), I understand the importance of seeking medical help if a toothache lasts more than two days (Q2), I know what over-the-counter medications are safe to take for tooth pain without a doctor's prescription (Q3), I am able to recognize a dental emergency that requires immediate attention (Q4).

Data Collection Procedures

The research activities and data collection were conducted in one day with the following sequence of events:

1. Participants filled out the informed consent form
2. Participants completed a questionnaire about Emergency Dental Literacy.
3. Participants attended a Dental Health Literacy Presentation
4. Participants had a Q&A session at the end of the presentation
5. Participants engaged in a Group Brushing Activity

During the presentation, the researchers and dental health experts provided material related to dental emergency health literacy, including types of toothaches, early signs and symptoms of serious issues, such as infections or abscesses, emergency actions for tooth pain, the right time to seek medical help, and over-the-counter medications that are safe to use in emergencies. Participants were provided with interactive explanations to enhance their understanding.



Figure 1. Dental Health Literacy Presentation

Participants were allowed to ask the dental health experts about dental issues. The discussion covered topics such as emergency management, prevention, and experiences in accessing dental healthcare services in Singapore. Participants who asked questions were appreciated for their participation, encouraging active engagement during the activities.



Figure 2. Q&A Session

The activity continues to the Group Brushing Activity. Education and practice in the correct way to brush teeth are part of general dental health literacy. The experts provided step-by-step guidance on effective tooth brushing techniques to prevent dental health issues.



Figure 3. Brushing Activity

Data Analysis

The data collected from the questionnaire were analyzed statistically to give an overview of the participants' dental health literacy levels with SPSS. Descriptive analysis was performed for each questionnaire item by presenting the percentage distribution of responses for each item. Reliability testing was conducted using Cronbach's Alpha to assess the internal consistency of the questionnaire within each topic group. Normality testing was performed on a sample of 124 participants using the Kolmogorov-Smirnov test, and the results indicated a non-normal distribution. Because the data did not follow a normal distribution, non-parametric tests were applied. A correlation test using Spearman's rank was then conducted to analyze correlations between items to ensure that items within a topic had a strong relationship. As the test does not assume normality, a comparative test using the Kruskal-Wallis test was performed to compare literacy scores based on demographic characteristics, such as age group and educational background.

Ethical Approval

This research obtained ethical approval from the Ethics Committee of the Faculty of Medicine and Health Sciences, Universitas Muhammadiyah Yogyakarta (approval number: No.061/EC-KEPK FKIK UMY/II/2025), and thus guarantee adherence to recognized ethical norms. Before participation, all subjects received an informed consent form detailing the study's objectives, possible risks, and their rights as participants. This procedure aimed to ensure that participation in the study was both voluntary and informed.

RESULTS

A total of 124 individuals participated as respondents in this study. The respondents' group of females is larger than the male. The majority are aged 30-34, followed by those aged 35-39. The most common occupation among the respondents is Domestic Worker (ART), which indicates that this profession dominates and represents the largest characteristic of the employment type identified within the respondent group in this study. The respondents in this study come from 14 provinces in Indonesia, with the majority from Central Java, followed by West Java and East Java. A total of 61 respondents had lived in Singapore for more than 5 years. Most respondents' highest level of education is high school, followed by junior high school and higher education.

Table 1. Demographic Analysis Results

Description		Total	Percentage (%)
Gender	Male	12	9.7
	Female	112	90.3
Total		124	100
Age (Years)	15-19	2	1.6
	20-24	9	7.3
	25-29	19	15.3
	30-34	27	21.8
	35-39	21	16.9
	40-44	19	15.3
	45-49	16	12.9
	50-54	9	7.3
	55-59	2	1.6
Total		124	100
Jobs	ART	91	73.4
	Non-ART	33	26.6
Total		124	100
Region Origin in Indonesia	Lampung	12	9.7
	Banten	1	0.8
	West Java	22	17.7
	Central Java	34	27.4
	East Java	21	16.9
	Bengkulu	3	2.4
	East Kalimantan	1	0.8
	North Sumatra	2	1.6
	South Sumatra	2	1.6
	Aceh	1	0.8
	DI Yogyakarta	20	16.1
	NTB	2	1.6
	NTT	2	1.6
	DKI Jakarta	1	0.8
Total		124	100
Length of Stay in Singapore	<1 year	49	39.5
	1-5 year	14	11.3
	>5 year	61	49.2
Total		124	100
Education	Elementary School	8	6.5
	Junior High School	44	35.5
	Senior High School	55	44.4
	Bachelor	17	13.7
	Not in School	0	0.0
Total		124	100

The respondents were given a questionnaire containing 4 statements regarding dental and oral health literacy in emergency situations. Prior to distribution, questionnaire validity and reliability were established through a pilot test involving 30 participants as the sample with the identical criteria, ensuring that each statement appropriately represented the intended construct. All questionnaire items met the validity criteria, with the significance value for each item being <0.05 , indicating that each item in the questionnaire accurately measures aspects of dental health literacy in emergency situations. Reliability testing using Cronbach's Alpha resulted in a value of 0.803 (>0.6). This value indicates that the questionnaire is reliable and can be trusted for use in research aimed at evaluating dental health literacy related to emergency actions among respondents in a valid and consistent manner.

The questionnaire aims to provide an overview of dental and oral health literacy regarding dental emergencies, such as toothaches or dental trauma. After data collection, the results from the questionnaire were analyzed and presented in the form of pie charts, which provide a visual representation of the distribution of respondents' answers based on their level of understanding of the appropriate steps to take in handling dental and oral health emergency situations. Below are the chart results illustrating the distribution of answers from the respondents:

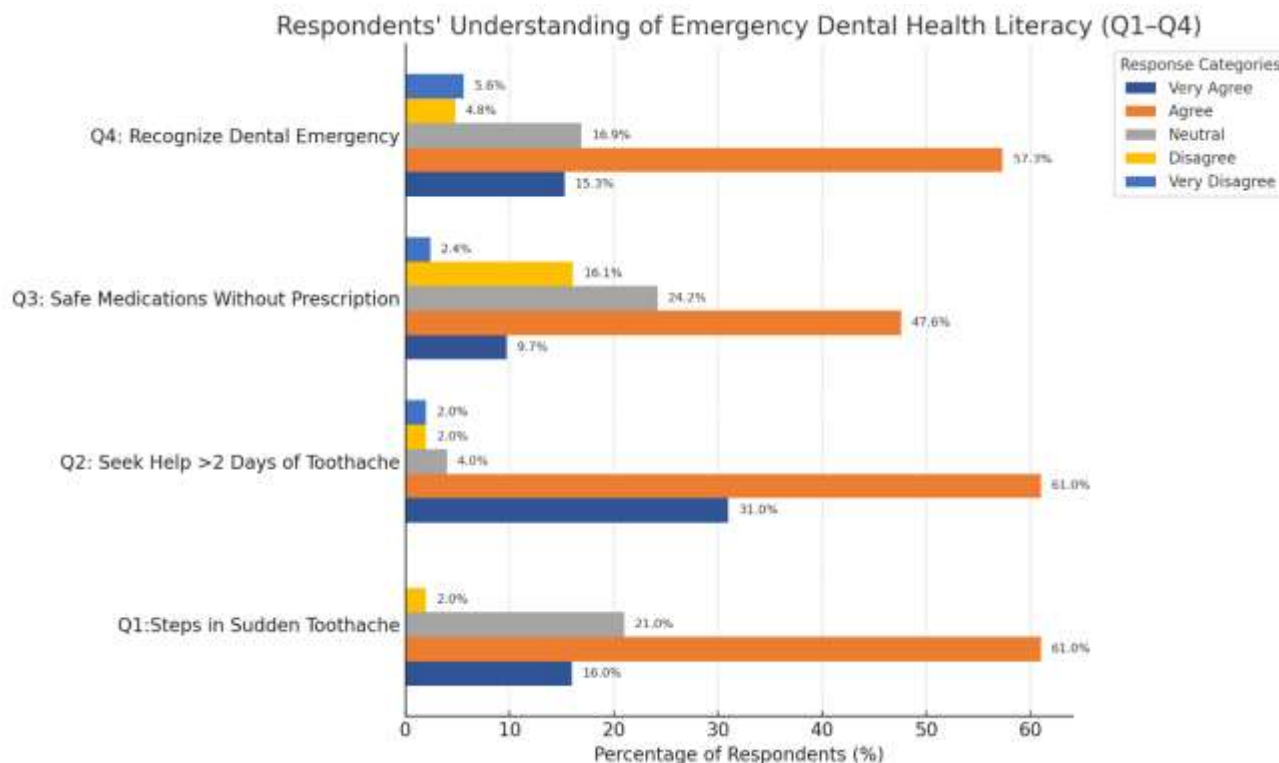


Figure 4. Respondents' Understanding of Emergency Dental Health Literacy Result

Based on Figure 4, 76.6% of respondents answered Q1 with "strongly agree" or "agree". This result indicates that the majority of respondents understand the steps to take in case of a sudden toothache, although there may still be some who are not fully aware of the procedures to follow for addressing dental issues in emergency situations. In Q2, the results indicate that 92% of respondents understand the importance of seeking medical help if a toothache lasts more than 2 days. However, a small percentage of respondents still have not fully realized the importance of immediate medical intervention to prevent more serious dental health issues that could affect their quality of life. However, in Q3 only 57.3% of respondents understand which medications are safe to take for a toothache without a doctor's prescription as an immediate treatment, and over 40% still do not fully understand the appropriate and safe medications to consume in emergency situations. The results for Q4 show that 72.7% of those who answered know how to recognize a dental emergency that has to be taken care of right away. But some of the people who answered may not fully understand the symptoms of their teeth that need immediate care. This highlights the importance of further efforts to improve dental health literacy, so individuals can more quickly recognize and respond to dental emergencies, which will reduce the risk of more complications.

The research data, which consists 124 respondents as sample, underwent a normality test, and the results indicated a non-normal distribution.

Table 2. Correlation Test Results

			Q1	Q2	Q3	Q4
Spearman's rho	Q1	Correlation Coefficient	1.000	.371**	.337**	.475**
		Sig. (2-tailed)	.	.000	.000	.000
		N	124	124	124	124
	Q2	Correlation Coefficient	.371**	1.000	.066	.384**
		Sig. (2-tailed)	.000	.	.463	.000
		N	124	124	124	124
	Q3	Correlation Coefficient	.337**	.066	1.000	.433**
		Sig. (2-tailed)	.000	0.463	.	0.000
		N	124	124	124	124
	Q4	Correlation Coefficient	.475**	.384**	.433**	1.000
		Sig. (2-tailed)	0.000	0.000	0.000	.
		N	124	124	124	124

Based on Table 2, there is a significant correlation between statement 1 and statement 4 (Q1, Q4) (<0.05). However, there is no significant correlation between statement 2 and statement 3 (Q2, Q3). This suggests that respondents are able to recognize dental emergency situations that require immediate attention, which in turn enables them to understand the steps that need to be taken.

Table 3. Comparison Test Results by Age Group.

	Q1	Q2	Q3	Q4
Chi-Square	1.823	.612	1.959	.194
df	2	2	2	2
Asymp. Sig.	.402	.736	.375	.908

The statistical analysis comparing all statements (Q1-Q4) with age groups showed that there were no significant differences ($p>0.05$).

Table 4. Comparison Test Results by Education Level Group

	Q1	Q2	Q3	Q4
Chi-Square	9.586	3.005	9.271	8.552
df	3	3	3	3
Asymp. Sig.	.022	.391	.026	.036

The statistical analysis comparing all statements with the respondents' highest level of education showed that statements 1, 3, and 4 (Q1, Q3, Q4) showed statistically significant differences ($p = 0.022-0.036$), indicating small-to-moderate associations, whereas statement 2 (Q2) demonstrated no significant difference ($p = 0.391$). The effect size of each instrument was calculated using Cramer's V to see the strengths of the association between education level and dental emergency literacy. The following formula was used to identify the Cramer's V values:

$$V = \sqrt{\frac{X^2}{n(k-1)}}$$

X^2 = chi square value

n = 124 (total participants)

k = 5 (education category)

Based on Cramer's V values, the association between education level and dental emergency literacy items on Q1, Q3, and Q4 are ranged from 0.131 to 0.139, indicating moderate but statistically significant associations. In contrast to item Q2, the association was not significant with a weak effect size ($V = 0.079$), indicating consistent understanding across education levels(17). These findings suggest that while education influences some aspects of emergency oral health literacy, the overall effect is modest.

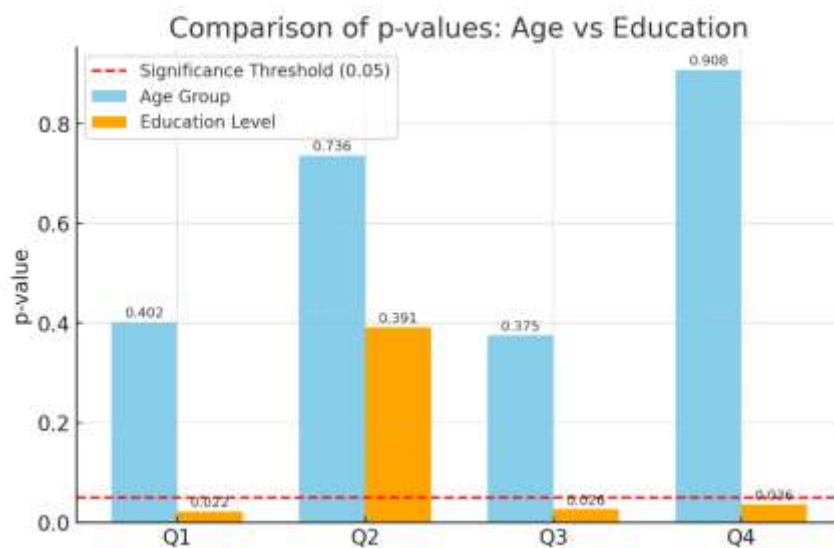


Figure 5. Comparison of P-Values by Age and Education Groups

In the Figure 8, the graph further supports these findings. It illustrates that age does not have a significant effect on dental emergency literacy, as all age-related p-values remained above the 0.05 threshold. In contrast, education level demonstrated statistical significance in three of the four statements, indicating that respondents with higher education were more capable of understanding appropriate emergency steps, identifying safe over-the-counter medication, and recognizing conditions that require urgent dental care. These results highlight the importance of developing targeted educational interventions, such as tailored health literacy programs, to enhance knowledge and decision-making in emergency dental situations among migrant workers.

DISCUSSION

Interpretation of Key Findings

This study was conducted to understand the level of dental emergency health literacy among Indonesian migrant workers in Singapore, identify the barriers they face in understanding and accessing dental health information, and explore the roles of culture, language, and the healthcare system in influencing dental emergency health literacy.

The increasing number of Indonesian migrant workers in Singapore serves as an important backdrop for understanding their dental emergency health literacy. According to statistical data from June 2023, Singapore's total population has increased by 5% compared to the previous year, consisting of both permanent and non-permanent

residents. The non-permanent resident segment, which includes migrant workers, private sector workers, expatriates, and international students, has experienced significant growth of 13.1%, reaching 1.77 million. This increase reflects the growing demand for foreign labor across various sectors in Singapore. The demand comes from countries such as Indonesia, Malaysia, Bangladesh, India, and the Philippines, with the majority working in the construction, manufacturing, and services sectors.

Indonesian migrant workers in Singapore are predominantly women, compared to men, which is influenced by social, economic, and cultural factors. The financial need for women to support their families, especially in the context of rising living costs in Indonesia, plays a significant role. Female migrant workers are employed in specific sectors according to demand, particularly in domestic work and caregiving, where women are mostly employed (18). The Ministry of Manpower in Singapore has reported that women make up a significant portion of the foreign domestic worker population, which is filled mainly by migrants from countries such as Indonesia and the Philippines. This gender gap is further exacerbated by cultural and societal norms that define what types of jobs are considered suitable for men and women, leading to women being funneled into caregiving roles while men dominate in fields such as construction and manual labor (19).

The age range of 30-39 years is considered productive. Individuals in this age group possess a combination of work experience and physical capabilities that make them highly sought after in the labor market. This age group is often seen as having the right balance between energy and maturity, which is particularly appealing to employers in sectors that require physical labor and interpersonal skills (20). Various studies have shown that workers in this age group often demonstrate higher levels of productivity and are more likely to be retained by employers due to their experience and skills. Additionally, this age range aligns with the peak earning years for many individuals, which positively contributes to economic stability for both the workers and their families back home (21)

Most Indonesian migrant workers in Singapore come from Java, particularly from Central Java, which has been identified as a significant contributor. This region is characterized by high unemployment rates and limited economic opportunities, which drives many people to seek employment abroad, including in Singapore. Workers from Central Java are supported by established migrant networks that provide assistance and information to new migrants. This is further supported by the socioeconomic conditions in Central Java, where many families rely on remittances from migrant workers as a crucial source of income (18)

The commitment of migrant workers to work in Singapore for an extended period can be attributed to several interconnected factors, including economic opportunities, social networks, and educational backgrounds. Singapore's strong economy offers higher wages compared to the workers' home countries, providing a significant incentive for them to migrate and continue working there. This economic appeal is further strengthened by the presence of established migrant worker communities, which offer social support, facilitate integration into the labor market, and reinforce the decision of migrant workers to stay longer (22)

The educational background of migrant workers is essential in their decision to work abroad. The diversity of educational levels among migrant workers significantly affects their job opportunities overseas. Workers with higher educational qualifications are more likely to secure better-paying jobs and have access to a broader range of employment options. In contrast, those with lower levels of education may be limited to low-skilled labor, which is often associated with lower wages and job insecurity. The findings of this research align with previous studies where a higher level of education increases the likelihood of successful adaptation and integration into the workforce (18,23). Thereby enhancing their commitment to remain in Singapore. Furthermore, the relationship between education and social factors, such as networks and community ties, can enhance job prospects and stability for migrant workers. These connections provide crucial support, increase their chances of finding better employment opportunities, and offer a sense of belonging. As a result, these social networks significantly influence migrant workers' decisions to stay longer in Singapore, as they feel more integrated and supported, compared to seeking opportunities elsewhere (19)

The results of the study show variation in the respondents' understanding of handling dental problems in emergency situations. The majority of respondents have a good level of awareness, though there remains a group that needs improvement in health literacy. A total of 76.6% of respondents understand the steps that should be taken in facing dental emergencies, while some others are not fully aware of the appropriate actions to take. Additionally, 92% of respondents recognize the importance of seeking medical help immediately if a toothache persists for over two

days. However, a few participants still lack an understanding of the urgency of medical intervention to prevent more serious issues that could affect their quality of life, indicating that this finding should be interpreted as potential rather than causal risks. Without knowing or being uncertain about the appropriate actions to take when faced with a dental problem in an emergency situation may increase the likelihood of delayed treatment (24,25). This could be attributed to several factors, including a lack of information and health education, limited access to healthcare services, cost, language and cultural barriers, as well as limited resources and support(7). Migrant workers are not adequately prepared to face health issues, including dental health, and they receive insufficient awareness regarding the importance of dental care in emergency situations. Moreover, they work in sectors that do not provide social protection or access to adequate healthcare services. Most migrant workers come from economically limited backgrounds, meaning they may not have the financial means for emergency dental care. Support from the government or relevant institutions is often insufficient to assist them in such emergency situations. Socialization regarding the importance of health care, including dental care, often does not cover emergency aspects (26)

As many as 57.3% of respondents understand which over-the-counter medications are safe to use during a dental emergency without a doctor's prescription. However, half of the respondents still do not fully understand the appropriate and safe medications to take in such emergency situations. The findings in this study align with global research, where migrants and ethnic minority groups similarly exhibit lower oral health literacy, leading to poorer utilization of dental services and limited understanding of emergency management and medication during dental crises(27,28). Migrant workers often face various challenges in understanding and accessing safe over-the-counter medications for dental emergencies. One of the main challenges is the lack of information they receive about medications, which can be due to language barriers, increasing the risk of errors in self-medication. Besides, a lack of trust or feeling misunderstood by healthcare providers often makes migrant workers reluctant to seek proper medical advice, and it can turn into dental anxiety. Managing dental anxiety represents a real challenge for dentists. This is particularly relevant for migrant populations who may have had limited or negative prior experiences with dental care, compounding their hesitancy to seek timely treatment(29). Additionally, 72.7% of respondents know the importance of recognizing a dental emergency requiring immediate attention. However, a small portion of migrant workers still struggle to recognize such situations. This could be related to the fact that migrant workers may not be familiar with medical terminology and may find it difficult to identify symptoms that indicate an emergency. For example, symptoms like swelling in the gums or persistent pain may be perceived as ordinary problems rather than something requiring immediate attention (30)

The statement "I know the steps to take if I experience sudden tooth pain" is related to the statement "I am able to recognize a dental emergency that requires immediate attention." These statements indicate that respondents are able to identify dental emergencies that need immediate care, allowing them to take appropriate action. On the other hand, the statement "I understand the importance of seeking medical help if a toothache lasts for more than two days" is not related to the statement "I know which over-the-counter medications are safe to take for a toothache without a prescription." This may be because respondents do not fully understand the importance of seeking medical help concerning medications. For them, medical help may not always be directly associated with medications. They often seek dental services primarily in emergencies rather than for preventive care, underscoring a reactive rather than proactive approach to oral health (31). To address such gaps in understanding, evidence from related public health interventions suggests that community-tailored educational strategies can be highly effective. For instance, a study focusing on farmworker populations demonstrated that customized education initiatives significantly improved awareness levels, showing that similar methods could enhance emergency dental health literacy among migrant workers (32). Practical and scalable interventions may include mobile dental health outreach, multilingual training programs, and collaboration with migrant community networks(33–35). Implementing such context-specific education programs in the dental health domain could bridge knowledge gaps and empower individuals to take timely action during emergencies. These strategies are in line with global policy goals that call for the inclusion of oral health in Universal Health Coverage (UHC) and Sustainable Development Goal 3 (Good Health and Well-Being) frameworks. These goals aim to make sure that everyone has equal access to important health services(36,37).

Comparison with Previous Studies

This study shows no significant differences when comparing all statements with age groups. This result contrasts with previous research, where it was found that younger individuals had a better oral health literacy level than older individuals. In relation to the comparison with the last level of education, it was found that the statements "I know the steps to take if I experience sudden tooth pain," "I know which over-the-counter medications are safe to take for a toothache without a prescription," and "I am able to recognize a dental emergency that requires immediate attention" showed significant differences. However, there was no significant difference in the statement, "I understand the importance of seeking medical help if a toothache lasts for more than two days." A higher level of education can positively influence adequate oral health literacy, indicating that education plays a key role in improving knowledge and understanding of emergency dental care (38). Comparing with another study, research involving migrant populations from other regions, such as Syrian refugees in Jordan and migrant workers in Europe. In this study, the Syrian refugees have been documented to exhibit significant challenges in recognizing emergency treatment needs due to insufficient guidance on existing healthcare resources (39). This means the limited access to inadequate health literacy is tied to healthcare issues. Another recent intervention study from Muller in 2024, it is found that oral health education programs improved oral health literacy and personal hygiene practices among immigrants, especially when delivered in English. Notably, the program also revealed significant differences in literacy outcomes based on language, highlighting the importance of linguistically appropriate health education(40). Hence, the language used when conducting the education program plays an important role in increasing dental literacy.

Limitations and Cautions

The limitations of this study lie in the research process itself. The researcher acknowledges that every study has its shortcomings and weaknesses. One limitation is the uneven sample, where the number of male and female respondents is imbalanced. It is acknowledged that this imbalance occurred because the number of male or female respondents was determined on the day of the study. Additionally, this study is limited by the number of respondents involved. Due to time and location constraints, the researcher could only conduct the study on one day, making it impossible to increase the number of respondents that could have been reached if the study were conducted over multiple days. Nevertheless, the sample size was adequate for the research requirements.

Recommendations for Future Research

Future studies could aim to increase the number of respondents to improve the overall findings, ensuring a more accurate representation of the situation and enhancing the reliability of the results.

CONCLUSION

This study examines the level of emergency dental health literacy among Indonesian migrant workers in Singapore. The majority of Indonesian migrant workers in Singapore are able to recognize a dental emergency that requires immediate attention and take the appropriate steps. However, there is still a lack of understanding regarding safe medications for initial treatment. This could be influenced by factors such as limited information, restricted access to healthcare services, as well as language and socio-economic barriers. Higher education levels are associated with a better understanding of dental health literacy, while age does not differ significantly. This study highlights the importance of improving dental health literacy among Indonesian migrant workers in Singapore through more effective socialization efforts and greater attention from policymakers. Some examples of concrete and scalable interventions are mobile dental health outreach, multilingual oral health education programs, and working with networks of migrant communities to make sure that emergency responses are faster. These plans also fit with international health frameworks like Universal Health Coverage (UHC) and Sustainable Development Goal (SDG) 3, which stress that everyone should have fair access to basic health care, including dental health.

AUTHOR'S CONTRIBUTION STATEMENT

First author, Frida Arba Martadewi contributed to the Investigation, Data Collection, and Draft Writing, specifically in field implementation, conducted interviews and surveys among Indonesian migrant workers, and contributed to the initial writing of the manuscript. The second author, Erma Sofiani, conducted data analysis,

provided academic validation of the findings, and critically revised and finalized the manuscript for submission. Third author, Dita Sri Erisona roled in content development, digital material design, and documentation, which mainly developed educational materials, designed digital campaign content, and helped organize visual documentation of the intervention. The fourth author, Salma Nabita Eldurr, coordinated outreach with migrant worker communities, assisted with program logistics, and managed data entry from questionnaires. The last author, Aldihyah Kunsputri, formulated the research framework, supervised the student research team, and guided the design of the intervention and survey methodology.

CONFLICTS OF INTEREST

The authors declare that there are no conflicts of interest associated with the content or publication of this article.

DECLARATION OF GENERATIVE AI AND AI-ASSISTED TECHNOLOGIES IN THE WRITING PROCESS

During the preparation of this article, the authors used generative artificial intelligence (AI) from ChatGPT to enhance the clarity and support the contents and Grammarly to refine the language and grammar. After using the tools, the authors reviewed and edited the content as needed to ensure its originality and took full responsibility for the publication's content.

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