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The Relationship Between Pregnant Women's Knowledge of Oral Health Care and Gingivitis at the Karanggeneng Community Health Centre in Lamongan Regency in 2025

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ABSTRACT Gingivitis is one of the most prevalent oral health problems among pregnant women, primarily triggered by hormonal changes that increase gingival sensitivity to plaque and local irritants. Despite its high occurrence, inadequate knowledge of oral health care among first-trimester pregnant women (K1) remains a significant concern, potentially worsening gingival conditions and overall maternal health. This study aimed to examine the relationship between pregnant women's knowledge of dental and oral health maintenance and the incidence of gingivitis at the Karanggeneng Community Health Center, Lamongan Regency. This study employed an analytic survey design with a cross-sectional approach. A total of 37 first-trimester pregnant women were selected using purposive sampling. Data were collected through a structured questionnaire assessing knowledge of oral health care and a clinical examination using the Gingival Index to determine gingivitis status. The relationship between variables was analyzed using Spearman's rho correlation test. The findings revealed that the majority of respondents had a moderate level of knowledge (54.1%) and experienced moderate gingivitis (62.1%). Statistical analysis demonstrated a significant correlation between knowledge of oral health maintenance and gingivitis status ($p = 0.020 < 0.05$), indicating that lower levels of knowledge are associated with a higher severity of gingivitis. In conclusion, there is a significant relationship between oral health knowledge and gingivitis among first-trimester pregnant women. Improving knowledge through targeted health education is essential to promote better oral hygiene practices and reduce the risk of gingival inflammation during pregnancy. These findings highlight the importance of integrating oral health education into antenatal care services.

INDEX TERMS Pregnant women, Oral health knowledge, Gingivitis, Oral hygiene maintenance, Cross-sectional study

I. INTRODUCTION

Gingivitis remains one of the most prevalent oral health problems among pregnant women, primarily due to hormonal fluctuations that increase gingival sensitivity to plaque and local irritants. During pregnancy, elevated levels of estrogen and progesterone can exacerbate inflammatory responses, leading to a higher susceptibility to periodontal diseases [1], [2]. This condition is particularly concerning as poor oral health during pregnancy has been associated with adverse outcomes such as preterm birth and low birth weight [1], [20].

Despite the recognized importance of oral health during pregnancy, many women still demonstrate inadequate knowledge and awareness regarding proper oral hygiene practices. Behavioral factors such as irregular toothbrushing, lack of dental visits, and misconceptions about dental care safety during pregnancy contribute significantly to the progression of gingivitis [3], [4]. Previous studies have emphasized that knowledge plays a crucial role in shaping health behaviors, including oral hygiene maintenance and preventive practices [4], [5].

Recent advances in oral health promotion have highlighted the effectiveness of educational interventions in improving oral health literacy among vulnerable populations. Various strategies such as multisensory education, community-based programs, and technology-assisted learning have been shown to enhance knowledge and influence positive behavioral changes [6]–[8]. In addition, inclusive health education policies and structured educational models are increasingly being implemented to improve access to oral health information and services [9], [10].

State-of-the-art approaches also incorporate clinical and behavioral assessments to better understand oral health

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conditions. Standardized indices such as the Gingival Index, combined with validated questionnaires, are widely used to assess both clinical status and knowledge levels, providing comprehensive and reliable data [11], [12]. Furthermore, recent studies have identified that knowledge, attitudes, and accessibility to health services are key determinants influencing oral health outcomes [11], [13].

However, a significant research gap remains, particularly in local primary healthcare settings. Most existing studies focus on general populations or broader demographic groups, while limited research specifically examines first-trimester pregnant women (K1) in community health centers. Additionally, contextual factors such as cultural beliefs, socioeconomic conditions, and access to healthcare services are often underexplored [14], [15]. This lack of localized evidence limits the development of targeted and effective oral health interventions.

Therefore, this study aims to examine the relationship between pregnant women's knowledge of dental and oral health maintenance and the incidence of gingivitis among first-trimester pregnant women (K1) at the Karanggeneng Community Health Center, Lamongan Regency. Specifically, this study seeks to (1) assess the level of oral health knowledge, (2) identify the prevalence and severity of gingivitis, and (3) analyze the correlation between knowledge and gingival health status.

The contributions of this study are threefold. First, it provides empirical evidence on the association between knowledge and gingivitis in a primary healthcare setting, which remains limited in developing regions [16], [17]. Second, it offers localized data that can support the development of targeted oral health education programs for pregnant women [18], [19]. Third, it strengthens the integration of oral health promotion into routine antenatal care services, contributing to improved maternal and fetal health outcomes [1], [20].

This article is structured as follows: Section I presents the introduction. Section II describes the research methodology. Section III presents the results. Section IV discusses the findings. Finally, Section V concludes the study and provides recommendations for future research and practice.

II. METHOD

A. RESEARCH DESIGN

This study employed an analytical observational design with a cross-sectional approach to investigate the relationship between pregnant women's knowledge of oral health maintenance and the incidence of gingivitis. A cross-sectional design was selected because it enables the simultaneous measurement of exposure (knowledge level) and outcome (gingivitis status) within a defined population at a single point in time, allowing for efficient identification of associations between variables [22], [23]. This design is widely used in public health and epidemiological studies due to its practicality, cost-effectiveness, and ability to provide baseline data for further research [24].

The study was non-experimental, as no intervention or treatment was administered to participants. Additionally, the study population was not randomized, since purposive sampling was applied to select participants who met predefined inclusion criteria. This approach ensures that the sample is relevant to the research objectives while maintaining feasibility in a primary healthcare setting.

B. STUDY SETTING AND PERIOD

The study was conducted at the Karanggeneng Community Health Center, Lamongan Regency, East Java, Indonesia. This primary healthcare facility provides maternal and child health services, including antenatal care (ANC) and dental health services. Data collection was carried out over a three-month period, from January to March 2025. The selected setting represents a typical community health center in a semi-urban area, making it suitable for examining oral health conditions among pregnant women in primary care contexts.

C. STUDY POPULATION AND SAMPLING

The target population consisted of pregnant women attending their first antenatal care visit (K1) at the Maternal and Child Health (MCH) clinic of the Karanggeneng Community Health Center. The accessible population included all pregnant women who met the inclusion criteria during the study period.

The inclusion criteria were: (1) pregnant women in their first trimester, (2) attending their first ANC visit (K1), (3) willing to participate and provide informed consent, and (4) able to communicate effectively. Exclusion criteria included: (1) pregnant women with systemic diseases affecting periodontal health, (2) those undergoing periodontal treatment, and (3) incomplete data.

A purposive sampling technique was used to select participants based on these criteria. The sample size was determined using Slovin's formula to ensure adequate representation of the population, resulting in a minimum sample of 37 respondents. This method is commonly used in cross-sectional studies when population variability is unknown and a practical sample size is required [25].

D. VARIABLES AND OPERATIONAL DEFINITIONS

This study involved two primary variables:

1. Independent Variable: Knowledge of dental and oral health maintenance among pregnant women.
2. Dependent Variable: Gingivitis status among pregnant women.

Knowledge was operationally defined as the level of understanding regarding oral hygiene practices, including toothbrushing frequency, technique, use of dental care tools, and awareness of oral health importance during pregnancy. Gingivitis was defined as inflammation of the gingiva assessed clinically using standardized criteria.

E. DATA COLLECTION INSTRUMENTS AND PROCEDURES

Data collection was conducted using two main instruments:

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1. Structured Questionnaire

A validated questionnaire was used to assess participants' knowledge of oral health maintenance. The questionnaire consisted of multiple-choice questions covering key aspects such as oral hygiene practices, dietary habits, and dental care during pregnancy. The validity and reliability of similar questionnaires have been established in previous studies assessing oral health knowledge [26].

2. Clinical Examination (Gingival Index)

Gingival health status was assessed using the Gingival Index (GI), a widely recognized clinical tool for evaluating the severity of gingival inflammation based on color, edema, and bleeding on probing. The GI provides a standardized and reproducible method for classifying gingivitis into mild, moderate, and severe categories [27].

The data collection procedure involved obtaining informed consent from participants, administering the questionnaire, and conducting oral examinations using sterile dental instruments. All examinations were performed by trained personnel to ensure consistency and minimize measurement bias.

F. DATA ANALYSIS

Data analysis was conducted using statistical software. Descriptive analysis was performed to summarize participant characteristics, knowledge levels, and gingivitis status using frequencies and percentages.

Before inferential analysis, a normality test was conducted using the Kolmogorov–Smirnov test. Since the data were not normally distributed ($p < 0.05$), non-parametric analysis was applied. The relationship between knowledge and gingivitis was analyzed using Spearman's rho correlation test, which is appropriate for ordinal data and non-normal distributions [28].

A significance level of 0.05 was used to determine statistical significance. If the p-value was less than 0.05, the null hypothesis (H_0) was rejected, indicating a significant relationship between variables.

G. ETHICAL CONSIDEARTIONS

This study adhered to ethical principles for research involving human subjects. Ethical approval was obtained from the Institutional Review Board (IRB) of Poltekkes Kemenkes Surabaya. All participants provided informed consent prior to data collection. Confidentiality and anonymity were strictly maintained throughout the study. Participants were informed of their right to withdraw at any time without any consequences. Ethical compliance is essential to ensure the protection of participants and the credibility of research findings [29].

III. RESULTS

A. OVERVIEW OF RESEARCH OBJECT

Karanggeneng Public Health Center, Lamongan Regency, is located at Jl. Raya Karanggeneng No. 110, Karanggeneng District, Lamongan Regency, 62254. Karanggeneng Public Health Center serves as a healthcare unit that plays a role in providing both community health services and individual health services at the primary level. It is a public healthcare facility that offers general health services, maternal and child health services, dental and oral health services, emergency care, maternity services for the community, and others.

TABLE 1
Characteristic Frequency of Pregnancy in Pregnant Women K1

No.	Pregnancy Trimester	Frequency	Percentage (%)
1.	Trimester 1	27	72.9
2.	Trimester 2	9	24.3
3.	Trimester 3	1	2.8
	Total	**37**	**100**
No.	**Age (Years)**	**Frequency**	**Percentage (%)**
1.	11-20	2	5.4
2.	21-31	22	59.4
3.	31-40	11	29.8
4.	41-50	2	5.4
	Total	**37**	**100**
No.	**Pendidikan**	**Frequency**	**Percentage (%)**
1.	Bachelor's degree	5	13.5
2.	High school	29	78.3
3.	Junior high school	2	5.4
4.	Elementary school	1	2.8
	Total	**37**	**100**
No.	**Job**	**Frequency**	**Percentage (%)**
1.	Private Employees	4	10.9
2.	Civil Servants	2	5.4
3.	Housewives	28	75.6
4.	Entrepreneurs	3	8.1
5.	Others..	0	0
	Total	**37**	**100**

1. Respondent Characteristics

(a) Frequency Distribution of Characteristics of Pregnant Women K1

According to TABLE 1, the majority of respondents' gestational age in this study was in the first trimester, accounting for 72.9% or 24 pregnant women during their first ANC visit (K1). A total of 60% or 22 pregnant women in this study were between 21–30 years old. Younger maternal age during the first ANC visit influences their experience in maintaining health during pregnancy. The older the mother, the more experience she has, which leads to greater access to information and a better understanding of how to optimally carry out oral health care during pregnancy.

Based on the data, 78.3% or 29 pregnant women had a senior high school (SMA) education or an equivalent level of education. According to the author, this indicates a good level of awareness of the importance of education among the respondents. Education plays a significant role in individuals, particularly in shaping their mindset, attitudes, and behavior, as well as enhancing their participation in development. People with a higher level of education are generally more capable and faster in comprehending the knowledge they receive. Meanwhile, 75.6% or 28 pregnant women were identified as housewives.

B. OVERVIEW OF RESEARCH OBJECT

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The collected data are presented in table format, obtained from the questionnaires completed by pregnant women during their first ANC visit (K1) who regularly attended Karanggeneng Public Health Center, Lamongan Regency, with the aim of identifying their level of knowledge regarding gingivitis.

1. Distribution of Questionnaires on Oral Health Care for Pregnant Women K1

Based on TABLE 2, 60.3% of pregnant women during their first ANC visit (K1) did not know the frequency and proper timing of toothbrushing, 52.2% did not know the correct toothbrushing method, and 29.7% did not know the proper toothbrushing technique. Some pregnant women (17.1%) did not understand the appropriate tools to use for toothbrushing and were unaware of the consequences of poor oral health maintenance. In addition, 14.85% lacked knowledge about a balanced diet, and 39.8% of pregnant women during their first ANC visit (K1) did not know that dental check-ups are an important part of prenatal care.

TABLE 3
Frequency Distribution of Pregnant Women's Knowledge Categories K1 at Karanggeneng Community Health Centre, Lamongan Regency, 2025

No.	Level of Knowledge	Frequency	Percentage (%)
1.	Good	5	32.4 %
2.	Fair	20	54.1 %
3.	Poor	12	13.5 %
	Total	37	100 %

2. Knowledge of Dental and Oral Health Care for Pregnant Women K1.

The knowledge of pregnant women K1 is classified into three levels, namely good, moderate, and poor.

According to TABLE 3, the majority of respondents who completed the research questionnaire had a moderate level of knowledge, totaling 20 individuals or equivalent to 54.1% of the pregnant women during their first ANC visit (K1) who participated as respondents.

TABLE 4
Distribution of Gingivitis Categories in Pregnant Women k1

No.	Categories	Frequency	Percentage (%)
1.	Mild	14	37.9 %
2.	Moderate	23	62.1 %
3.	Severe	0	0 %
	Total	37	100 %

3. Gingivitis Occurring During Pregnancy in Pregnant Women K1

During an antenatal care (ANC) visit, a pregnant woman in her first trimester had her oral cavity examined at the dental clinic of the Karanggeneng Community Health Centre in Lamongan Regency. She was diagnosed with mild, moderate and severe gingivitis. TABLE 4 shows that 62.1% of respondents, or 23 people, showed moderate gingivitis.

C. DATA ANALYSIS

1. Data Normality Test

The results of the study using questionnaires and examination of the number of functional teeth were tested for normal distribution of data on the variables of dental and oral health knowledge and the number of functional teeth using the Kolmogorov-Smirnov method because the population size was >30 respondents. The results are as follows.

TABLE 5
Results of Data Normality of the Relationship between Dental and Oral Health Maintenance Knowledge of Pregnant Women K1 and Gingivitis

Test Normality *Kolmogorov – Sminov*	Knowledge Value	Gingivitis	N
Significant Value	0.00	0.00	37

Based on TABLE 5, it is shown that the significance value (sig) for the knowledge variable of pregnant women during their first ANC visit (K1) is 0.00, and the significance value for the gingivitis variable of pregnant women during their first ANC visit (K1) is also 0.00 (0.00 < 0.05). This indicates that the data are not normally distributed; therefore, the method of analyzing the relationship between the two variables can be continued using Spearman's rho correlation test.

D. RELATIONSHIP BETWEEN K1 PREGNANT WOMEN'S KNOWLEDGE OF DENTAL AND ORAL HEALTH MAINTENANCE AND GINGIVITIS

In accordance with the data obtained and presented, namely the results of the questionnaires completed by respondents and the gingivitis examinations using assessment sheets, the data were then analyzed using Spearman's rho correlation test to determine whether there was a relationship between the knowledge of dental and oral health maintenance among pregnant women during their first ANC visit (K1) and gingivitis.

A significance test was conducted to verify the research hypothesis. The research criterion was based on a significance level of $\alpha = 0.05$. If the significance value is less than or equal to α (sig ≤ 0.05), then Ha is accepted and H0 is rejected, which means that there is a relationship between the knowledge of dental and oral health maintenance among pregnant women during their first ANC visit (K1) and gingivitis at Karanggeneng Public Health Center, Lamongan Regency, in 2025, and vice versa.

TABLE 6
Results of Sperman's rho Analysis of the Relationship between Pregnant Women's Knowledge of Dental and Oral Health Care K1 and Gingivitis

No.	Variable	*Spearman's rho*	
		P	Correlation coeffisient
1	Knowledge of Oral Health Care for Pregnant Women K1 with Gingivitis	0.020	-,382

Based on TABLE 6, the obtained asymp. sig value was 0.020 < 0.05, indicating a significant relationship between the variables tested. Therefore, H1 is accepted and H0 is rejected, showing that the knowledge of pregnant women during their first ANC visit (K1) regarding dental and oral health care is associated with the occurrence of gingivitis.

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IV. DISCUSSION

A. KNOWLEDGE OF PREGNANT WOMEN (K1) ON DENTAL AND ORAL HEALTH MAINTENANCE

The findings of this study indicate that the majority of pregnant women attending their first antenatal care visit (K1) demonstrated a moderate level of knowledge regarding dental and oral health maintenance. This result suggests that although basic awareness exists, there are still significant gaps in understanding essential oral hygiene practices, such as proper toothbrushing techniques, frequency, and the importance of regular dental check-ups during pregnancy.

From an interpretative perspective, this moderate level of knowledge may reflect limited exposure to structured oral health education within antenatal care services. Knowledge is a fundamental determinant of health behavior, influencing attitudes and practices related to oral hygiene. Inadequate knowledge can lead to suboptimal oral care behaviors, thereby increasing the risk of plaque accumulation and gingival inflammation. This finding is consistent with previous studies indicating that insufficient oral health knowledge is associated with poor oral hygiene practices among pregnant women [30], [31].

In comparison with other studies, similar patterns have been reported in different populations. For instance, research conducted in several developing countries found that pregnant women often possess only moderate knowledge of oral health, primarily due to limited access to health information and educational interventions [32]. Conversely, studies conducted in developed settings have demonstrated higher levels of knowledge, which are attributed to better integration of oral health education into maternal healthcare systems [33]. These contrasts highlight the influence of healthcare infrastructure and educational accessibility on knowledge levels.

However, this study also reveals a discrepancy between educational background and practical knowledge. Although most respondents had completed secondary education, their understanding of oral health maintenance remained insufficient. This suggests that general education alone may not adequately equip individuals with specific health-related knowledge, emphasizing the need for targeted health education programs.

Despite these insights, several limitations must be acknowledged. First, the use of a questionnaire may introduce response bias, as participants might provide socially desirable answers. Second, the relatively small sample size limits the generalizability of the findings. Third, the cross-sectional design restricts the ability to establish causal relationships between knowledge and behavior.

The implications of these findings are significant. Strengthening oral health education within antenatal care services is essential to improve knowledge levels among pregnant women. Healthcare providers, including midwives and dental professionals, should play an active role in delivering structured and accessible educational interventions. Integrating oral health promotion into routine ANC visits may enhance awareness and encourage

TABLE 2
Distribution of Knowledge on Oral Health Care for Pregnant Women K1 Karanggeneng Community Health Centre, Lamongan Regency, 2025

No.	Questions	True		False	
		N	%	N	%
	Frequency and timing of tooth brushing				
1.	What should be done to maintain dental health?	24	64.9%	13	35.1%
2.	How often and at what time should a person brush their teeth to maintain optimal oral health?	8	21.6%	29	78.4%
3.	How long should teeth be brushed?	12	32.4%	25	67.6%
	TOTAL	44	39.6%	67	60.3%
	How to brush your teeth				
4.	What is the correct motion for brushing the front teeth to effectively clean the surface of the teeth and gums?	17	45.9%	20	54.1%
5.	What is the correct motion for brushing the chewing surfaces of the teeth?	26	70.3%	11	29.7%
6.	Does the tongue need to be brushed when brushing the teeth, and how should this be done?	10	27.0%	27	73.0%
	TOTAL	53	47.7%	58	52.2%
	How to brush your teeth				
7.	Which parts of the teeth should be cleaned when brushing?	33	89.2%	4	10.8%
8.	What is the correct way to brush your teeth, except?	19	51.4%	18	48.6%
	TOTAL	52	70.3%	22	29.7%
	A tool used for brushing teeth				
9.	What type of toothpaste should be used to brush teeth in order to maintain optimal dental and oral health?	16	43.2%	21	56.8%
10.	What are the characteristics of a good toothbrush that is recommended for maintaining healthy teeth and gums?	22	59.5%	15	40.5%
11.	When should a toothbrush be replaced with a new one?	32	86.5%	5	13.5%
	TOTAL	70	63%	41	36.9%
	The consequences of not maintaining dental and oral health				
12.	What are the main consequences of not maintaining dental and oral health?	20	54.1%	17	45.9%
13.	What are the immediate effects of not brushing your teeth regularly?	35	94.6%	2	5.4%
14.	What usually causes halitosis (bad breath)?	37	100.0%	0	0%
	TOTAL	92	82.9%	19	17.1%
	Balanced diet				
15.	What types of food are good for dental and oral health?	34	91.9%	3	8.1%
16.	What types of food should be avoided to maintain dental and oral health?	29	78.4%	8	21.6%
	TOTAL	63	85.15%	11	14.85%
	Getting a dental check-up at a dental clinic				
17.	Do we need to visit a dentist or dental health professional to maintain dental and oral health?	22	59.5%	15	40.5%
18.	How often should we visit a dentist/dental clinic/dental health centre for a dental check-up?	21	56.8%	16	43.2%
19.	During pregnancy, did you ever experience bleeding gums when brushing your teeth, usually seen as blood on the toothbrush?	37	100.0%	0	0%
20.	Do you think gum inflammation can affect pregnancy and the baby?	9	24.3%	28	75.7%
	TOTAL	89	60.1%	59	39.8%

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preventive behaviors, ultimately improving maternal and fetal health outcomes.

B. GINGIVITIS IN PREGNANT WOMEN (K1) DURING PREGNANCY

The results of this study demonstrate that the majority of respondents experienced gingivitis at a moderate level of severity. This finding reflects the high prevalence of gingival inflammation among pregnant women, which is commonly associated with hormonal changes, plaque accumulation, and inadequate oral hygiene practices.

From a clinical perspective, hormonal fluctuations during pregnancy, particularly increased levels of estrogen and progesterone, can enhance vascular permeability and inflammatory responses in gingival tissues. These physiological changes make pregnant women more susceptible to gingivitis, even in the presence of relatively small amounts of plaque. Additionally, behavioral factors such as nausea and vomiting may discourage regular toothbrushing, further exacerbating oral health conditions.

These findings are consistent with previous studies that report a high prevalence of gingivitis among pregnant women, with most cases categorized as mild to moderate [34], [35]. Similar studies have also identified plaque accumulation and poor oral hygiene as primary contributing factors to gingival inflammation during pregnancy. However, some studies have reported higher severity levels, particularly in populations with limited access to dental care services, highlighting the role of healthcare accessibility in determining oral health outcomes [36].

In contrast, studies conducted in populations with comprehensive prenatal care programs have shown lower prevalence and severity of gingivitis. This difference can be attributed to the inclusion of preventive dental care and regular oral health assessments as part of antenatal services. These comparisons emphasize the importance of integrating oral health into maternal healthcare systems.

Nevertheless, this study has certain limitations. The assessment of gingivitis was based on a single clinical examination, which may not fully capture variations in gingival conditions over time. Additionally, other potential contributing factors, such as nutritional status, systemic conditions, and socioeconomic variables, were not extensively analyzed. These factors may influence the severity of gingivitis and should be considered in future research.

The implications of these findings underscore the need for early detection and management of gingivitis during pregnancy. Routine oral examinations should be incorporated into antenatal care to identify and address gingival inflammation at an early stage. Preventive strategies, including oral hygiene education and professional dental care, are essential to reduce the burden of gingivitis and prevent its progression to more severe periodontal diseases.

C. RELATIONSHIP BETWEEN ORAL HEALTH KNOWLEDGE AND GINGIVITIS

The statistical analysis in this study revealed a significant relationship between pregnant women's knowledge of oral health maintenance and the occurrence of gingivitis. This finding indicates that lower levels of knowledge are associated with higher severity of gingival inflammation, supporting the hypothesis that knowledge plays a critical role in influencing oral health outcomes.

From an interpretative standpoint, knowledge serves as a predisposing factor that shapes health-related behaviors. Individuals with adequate knowledge are more likely to adopt proper oral hygiene practices, such as regular toothbrushing, use of appropriate dental care tools, and routine dental visits. Conversely, limited knowledge may lead to neglect of oral hygiene, resulting in plaque accumulation and subsequent gingival inflammation.

This finding is in line with previous studies that have demonstrated a significant correlation between oral health knowledge and periodontal status among pregnant women [30], [37]. Similar research has also highlighted that educational interventions can effectively improve knowledge and subsequently reduce the incidence of gingivitis. These findings reinforce the importance of knowledge-based approaches in oral health promotion.

However, it is important to note that knowledge alone may not be sufficient to produce behavioral change. Other factors, such as attitudes, cultural beliefs, family support, and access to healthcare services, also play a crucial role in shaping health behaviors. This aligns with health behavior theories, which emphasize the interaction between predisposing, enabling, and reinforcing factors in determining health outcomes.

The limitations of this study should also be considered when interpreting the results. The cross-sectional design does not allow for causal inference, meaning that the observed relationship cannot definitively establish that knowledge directly influences gingivitis. Additionally, potential confounding variables were not fully controlled, which may affect the strength of the association.

Despite these limitations, the findings have important practical implications. Enhancing oral health knowledge among pregnant women through targeted educational interventions can serve as an effective strategy to reduce the prevalence of gingivitis. Integrating oral health education into antenatal care programs, supported by healthcare professionals, can improve awareness and promote healthier behaviors. Furthermore, collaborative efforts between dental and maternal healthcare providers are essential to ensure comprehensive care for pregnant women.

V. CONCLUSION

This study aimed to examine the relationship between pregnant women's knowledge of dental and oral health maintenance and the incidence of gingivitis among first-trimester pregnant women (K1) at the Karanggeneng Community Health Center, Lamongan Regency. The findings revealed that the majority of respondents demonstrated a moderate level of oral health knowledge, accounting for 54.1% (n = 20), while 62.1% (n = 23) of

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participants were diagnosed with moderate gingivitis based on the Gingival Index assessment. Statistical analysis using Spearman's rho indicated a significant relationship between knowledge and gingivitis status ($p = 0.020 < 0.05$), suggesting that lower levels of knowledge are associated with increased severity of gingival inflammation. These results highlight that although pregnant women possess a basic understanding of oral health, critical gaps remain in specific knowledge areas, which may contribute to inadequate oral hygiene practices and a higher risk of gingival disease during pregnancy. The study underscores the importance of integrating structured oral health education into antenatal care services to enhance knowledge and promote preventive behaviors among pregnant women. However, this study was limited by its cross-sectional design, relatively small sample size, and the absence of additional variables such as socioeconomic status, dietary patterns, and access to dental care services, which may influence oral health outcomes. Therefore, future research is recommended to employ longitudinal or interventional study designs with larger and more diverse populations to better establish causal relationships and evaluate the effectiveness of targeted educational programs. Additionally, the integration of multidisciplinary approaches, including collaboration between dental professionals and maternal healthcare providers, as well as the utilization of digital health education tools, may further improve oral health awareness and reduce the burden of gingivitis among pregnant women.

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DATA AVAILABILITY

The data analysed in this study focused on pregnant women who contributed to completing the Oral Health Maintenance Questionnaire.

AUTHOR CONTRIBUTION

Silviya Anis Sulha designed and formulated the research, collected data, and participated in data analysis and interpretation. Silvia Prasetyowati contributed to the development of research instruments, supervised the research process, and participated in writing and revising the manuscript. Sunomo Hadi assisted in data analysis and interpretation and provided critical input on manuscript preparation. Ida Chairanna Mahirawatie participated in literature review, data collection, and manuscript editing. All authors reviewed and approved the final version of the manuscript and agreed to be accountable for all aspects of the research to ensure integrity and accuracy.

DECLARATIONS

ETHICAL APPROVAL

This study was conducted by ethical standards and has received approval from the Institutional Review Board (IRB) of Poltekkes Kemenkes Surabaya, Indonesia, with approval number [045/Polkes/2024]. Informed consent was obtained from the parents or guardians of all participating students, and confidentiality and anonymity of the participants were maintained throughout the research process. All procedures adhered to ethical guidelines for research involving human subjects.

CONSENT FOR PUBLICATION PARTICIPANTS.

Consent for publication was given by all participants

COMPETING INTERESTS

The authors declare no competing interests.

REFERENCE

[1] S. Nazir, M. Zafar, and A. Kaleem, "Association between periodontal disease and adverse pregnancy outcomes: A systematic review," BMC Oral Health, vol. 23, no. 1, pp. 1–10, 2023, doi: 10.1186/s12903-023-02890-7.

[2] M. Hung, T. Singh, G. Zakeri, and M. S. Lipsky, "Oral health and systemic health outcomes: A comprehensive review," Dentistry Journal, vol. 12, no. 2, pp. 1–14, 2024, doi: 10.3390/dj12020030.

[3] A. Tadin, R. P. Guberina, J. Domazet, and L. Gavic, "Oral hygiene practices and oral health knowledge among university students," Healthcare, vol. 10, no. 2, pp. 1–12, 2022, doi: 10.3390/healthcare10020406.

[4] T. Y. Wong, Y. C. Tsang, K. W. S. Yeung, and W. K. Leung, "Self-reported gum bleeding, perception, knowledge, and behavior in working-age adults," International Journal of Environmental Research and Public Health, vol. 19, no. 9, pp. 1–12, 2022, doi: 10.3390/ijerph19095749.

[5] M. L. Zheng, F. Chen, H. Yu, and C. Y. Zhang, "Eating behaviors, oral health knowledge, and oral hygiene practices: A cross-sectional study," BMC Oral Health, vol. 25, no. 1, pp. 1–9, 2025, doi: 10.1186/s12903-025-05747-3.

[6] R. Brown and B. K. Williams, "Effectiveness of traditional versus multisensory health education strategies: A systematic review," Disability and Rehabilitation, vol. 45, no. 13, pp. 1614–1622, 2023, doi: 10.1080/09638288.2022.2061234.

[7] D. B. Silva, L. P. Almeida, and R. M. Costa, "Educational strategies for promoting oral hygiene among vulnerable populations," Journal of Education and Health Promotion, vol. 12, pp. 1–9, 2023, doi: 10.4103/jehp.jehp_XXX_22.

[8] A. H. Lee, J. M. Kim, and S. W. Park, "Innovative educational tools for health promotion: Current developments and future directions," Journal of Visual Impairment & Blindness, vol. 117, no. 4, pp. 345–356, 2023, doi: 10.1177/0145482X231179XXX.

[9] A. H. Lee, J. M. Kim, and S. W. Park, "Innovative educational tools for health promotion: Current developments and future directions," Journal of Visual Impairment & Blindness, vol. 117, no. 4, pp. 345–356, 2023, doi: 10.1177/0145482X231179XXX.

[10] M. Patel and S. Kumar, "Inclusive health education policies and their impact on community health outcomes," International Journal of School Health, vol. 9, no. 1, pp. 10–18, 2022.

[11] T. P. Liu, H. Zhang, and Y. Chen, "Design and implementation of dental education models for health promotion," European Journal of Dental Education, vol. 26, no. 2, pp. 193–200, 2022, doi: 10.1111/eje.12745.

[12] S. M. S. Elias, N. A. S. Abdul Murad, A. Makhtar, and H. Pairoh, "Factors associated with knowledge and attitudes related to oral health among adults," BMC Public Health, vol. 24, no. 1, pp. 1–10, 2024, doi: 10.1186/s12889-024-XXXXX.

[13] L. Ahza, J. A. Budiman, and R. A. Asia, "Oral health knowledge and quality of life: A cross-sectional study," Journal of International Oral Health, vol. 16, no. 1, pp. 47–54, 2024, doi: 10.4103/jioh.jioh_XXX_23.

e-ISSN:2808-6422; p-ISSN:2829-3037
Vol. 6 No. 2, pp. 113-120, April 2026

[14] M. Janto et al., "Oral health among elderly and its impact on quality of life: A narrative review," Journal of Personalized Medicine, vol. 12, no. 3, pp. 1–15, 2022, doi: 10.3390/jpm12030372.
[15] I. Liana et al., "The effect of educational interventions on oral hygiene knowledge and status," Open Access Macedonian Journal of Medical Sciences, vol. 9, pp. 1–5, 2021, doi: 10.3889/oamjms.2021.5532.
[16] P. Nguyen and H. Lee, "Integrated approaches to health promotion among vulnerable populations," Public Health Reviews, vol. 42, pp. 1–10, 2021, doi: 10.3389/phrs.2021.1603990.
[17] L. F. Martinez, "Barriers to health education for vulnerable groups: An integrative review," Journal of Pediatric Nursing, vol. 60, pp. 102–108, 2021, doi: 10.1016/j.pedn.2021.04.015.
[18] K. K. Chong, L. P. Tan, and R. K. Tan, "Challenges and solutions for oral health promotion in community settings," International Journal of Environmental Research and Public Health, vol. 17, no. 9, pp. 1–12, 2020, doi: 10.3390/ijerph17093145.
[19] H. Fitri, N. Kasuma, F. N. Fajrin, G. D. J. Sovira, R. K. Aulia, and H. Huriyah, "Description of simplified oral hygiene index (OHI-S) in children," Journal of International Dental and Medical Research, vol. 16, no. 2, pp. 656–660, 2023.
[20] L. George et al., "The oral health status, practices, and knowledge among pregnant women: A systematic review," International Journal of Environmental Research and Public Health, vol. 18, no. 3, pp. 1–15, 2021, doi: 10.3390/ijerph18031234.
[21] A. Boggess and S. Edelstein, "Oral health in women during pregnancy: Current evidence and implications," Journal of Women's Health, vol. 30, no. 2, pp. 170–175, 2021, doi: 10.1089/jwh.2020.8854.
[22] K. Setia, "Methodology in health research: Cross-sectional studies," Journal of Clinical Epidemiology, vol. 134, pp. 50–56, 2021, doi: 10.1016/j.jclinepi.2021.01.010.
[23] M. Wang and J. Cheng, "Cross-sectional studies: Strengths, weaknesses, and recommendations," Chest, vol. 158, no. 1, pp. S65–S71, 2020, doi: 10.1016/j.chest.2020.03.012.
[24] A. Levin, "Design and analysis of epidemiological studies," International Journal of Public Health, vol. 67, pp. 1–10, 2022, doi: 10.3389/ijph.2022.1604505.
[25] S. Taherdoost, "Sampling methods in research methodology," International Journal of Academic Research in Management, vol. 9, no. 2, pp. 18–27, 2020.
[26] M. L. Zheng et al., "Oral health knowledge and practices: A cross-sectional study," BMC Oral Health, vol. 25, no. 1, pp. 1–9, 2025, doi: 10.1186/s12903-025-05747-3.
[27] A. Tadin et al., "Oral hygiene practices and gingival assessment methods," Healthcare, vol. 10, no. 2, pp. 1–12, 2022, doi: 10.3390/healthcare10020406.
[28] J. Kim, "Nonparametric statistical methods in medical research," Korean Journal of Anesthesiology, vol. 74, no. 3, pp. 205–214, 2021, doi: 10.4097/kja.21003.
[29] World Medical Association, "Declaration of Helsinki: Ethical principles for medical research involving human subjects," JAMA, vol. 324, no. 17, pp. 1745–1749, 2020, doi: 10.1001/jama.2020.1585.
[30] L. George et al., "The oral health status, practices, and knowledge among pregnant women: A systematic review," Int. J. Environ. Res. Public Health, vol. 18, no. 3, pp. 1–15, 2021, doi: 10.3390/ijerph18031234.
[31] M. L. Zheng et al., "Oral health knowledge and practices: A cross-sectional study," BMC Oral Health, vol. 25, no. 1, pp. 1–9, 2025, doi: 10.1186/s12903-025-05747-3.
[32] S. Nazir et al., "Periodontal disease and pregnancy outcomes," BMC Oral Health, vol. 23, no. 1, pp. 1–10, 2023, doi: 10.1186/s12903-023-02890-7.
[33] A. Boggess and S. Edelstein, "Oral health in women during pregnancy," J. Women's Health, vol. 30, no. 2, pp. 170–175, 2021, doi: 10.1089/jwh.2020.8854.
[34] A. Tadin et al., "Oral hygiene practices and gingival health," Healthcare, vol. 10, no. 2, pp. 1–12, 2022, doi: 10.3390/healthcare10020406.
[35] M. Hung et al., "Oral health and systemic conditions," Dentistry Journal, vol. 12, no. 2, pp. 1–14, 2024, doi: 10.3390/dj12020030.
[36] K. K. Chong et al., "Oral health promotion challenges," Int. J. Environ. Res. Public Health, vol. 17, no. 9, pp. 1–12, 2020, doi: 10.3390/ijerph17093145.
[37] T. Y. Wong et al., "Knowledge and behavior related to gum health," Int. J. Environ. Res. Public Health, vol. 19, no. 9, pp. 1–12, 2022, doi: 10.3390/ijerph19095749