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Motivation for Maintaining Oral Health and Its Association with Gingivitis among Pregnant Women at Berbek Public Health Center, Nganjuk, in 2025

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ABSTRACT Gingivitis is one of the most common oral health problems encountered during pregnancy, largely influenced by hormonal changes that heighten gingival vascularization and inflammatory responses. Preliminary findings from the Berbek Public Health Center, Nganjuk, indicated a high prevalence of gingivitis among pregnant women, reflecting inadequate oral hygiene practices and limited awareness. This situation underscores the need to understand behavioral determinants, particularly motivation, that may influence oral health status during pregnancy. Therefore, this study aimed to analyze the association between pregnant women's motivation to maintain oral health and the occurrence of gingivitis in the working area of Berbek Public Health Center in 2025. A descriptive-analytic study with a cross-sectional design was conducted involving 30 pregnant women selected through purposive sampling. Motivation levels were assessed using a validated Likert-scale questionnaire, while gingival status was examined using the Loe and Silness Gingival Index. Data were analyzed using Spearman's correlation test to determine the relationship between motivation and gingival condition. The results revealed that 56.7% of respondents had moderate motivation and 43.3% had strong motivation for maintaining oral hygiene. Gingivitis assessment showed that 60% of participants exhibited mild gingivitis, while 40% had moderate gingivitis. Spearman's test demonstrated a strong and statistically significant correlation between motivation and gingivitis ($\rho = 0.714$; $p = 0.001$), indicating that higher motivation was associated with better gingival health. In conclusion, motivation plays a crucial role in shaping oral health behaviors during pregnancy and is significantly related to the incidence of gingivitis. Strengthening maternal motivation through targeted health education and integrated maternal–dental health programs is essential to reduce gingivitis risk and support optimal pregnancy outcomes.

INDEX TERMS Pregnancy, Oral Health Motivation, Gingivitis, Maternal Health, Dental Hygiene Behavior.

I. INTRODUCTION

Oral health during pregnancy is a critical yet often overlooked aspect of maternal well-being. Physiological changes marked by elevated estrogen and progesterone levels increase gingival vascularization and inflammatory responsiveness, making pregnant women more susceptible to gingivitis and periodontal complications [1]–[3]. Gingivitis during pregnancy has been linked not only to local oral health problems but also to adverse pregnancy outcomes such as preterm birth and low birth weight caused by systemic inflammatory responses [4]–[6]. Global epidemiological evidence shows that nearly two-thirds of pregnant women exhibit signs of periodontal disease, highlighting an ongoing public health concern that requires targeted intervention [7]–[9]. Preliminary screening conducted in the working area of Berbek Public Health Center, Nganjuk, in 2024 reported an alarming 87% of pregnant women with moderate-to-severe gingivitis, underscoring the urgency of addressing modifiable behavioral risk factors.

One behavioral determinant frequently associated with oral health outcomes is motivation. Health motivation influences individuals' willingness to perform preventive behaviors, including regular toothbrushing, plaque control, and dental check-ups during pregnancy [10]–[12]. State-of-the-art approaches emphasize motivational interviewing, structured oral health counseling, and behavior change models that improve self-efficacy and adherence to oral hygiene practices among pregnant women [13]–[16]. Several randomized controlled trials have demonstrated that enhancing maternal motivation significantly reduces plaque accumulation, improves gingival health, and promotes long-term oral hygiene habits [17], [18].

Despite these advancements, research gaps persist—particularly in rural and underserved regions. Existing studies largely focus on urban populations with higher access

to health services, leaving limited evidence on how motivation influences gingival health among pregnant women in rural primary care settings [19], [20]. Additionally, many previous studies emphasize knowledge and attitudes but rarely examine the direct correlation between motivation levels and gingivitis severity using validated clinical indices. Consequently, there is a lack of localized data that could guide targeted oral health interventions within community health centers.

To address this gap, the present study aims to examine the relationship between pregnant women's motivation in maintaining oral health and the incidence of gingivitis in the Berbek Public Health Center area in 2025. This study contributes to the literature in three important ways. First, it provides empirical evidence on the behavioral determinants of gingival health in rural maternal populations. Second, it integrates motivation measures with clinically validated gingival assessments to produce more comprehensive findings. Third, it offers actionable recommendations for health promotion strategies within maternal and child health (MCH) programs, particularly in low-resource settings.

The remainder of this article is structured as follows. Section II presents the methodological approach, including design, sampling procedure, instruments, and analysis techniques. Section III outlines the research findings supported by descriptive and inferential statistics. Section IV provides a detailed discussion, integrating comparisons with previous studies, limitations, and practical implications. Finally, Section V summarizes the major conclusions and proposes recommendations for future research.

II. METHODS

The present study employed a quantitative analytic approach using a cross-sectional design to examine the relationship between motivation to maintain oral health and gingivitis among pregnant women. A cross-sectional design was selected because it allows simultaneous measurement of exposure (motivation) and outcome (gingival status) and is commonly utilized in epidemiological studies investigating behavioral and clinical correlations within a defined population [31], [32].

A. STUDY SETTING AND DURATION

The research was conducted in the working area of Berbek Public Health Center, Nganjuk Regency, East Java, Indonesia. Data collection took place at the Auxiliary Health Centers (Pustu), Village Maternity Homes (Polindes), and Village Health Posts (Poskesdes) located in Grojogan, Sonopatik, Bulu, Tiripan, and Balongrejo Villages. The study was carried out over a three-month period from January to March 2025 to ensure the availability of respondents across different pregnancy trimesters.

B. STUDY POPULATION AND DESIGN

The study population consisted of all pregnant women registered in the maternal health program (KIA) within the Berbek Public Health Center catchment area. A non-probability purposive sampling method was applied to select participants who met the predefined eligibility criteria. Purposive sampling was chosen due to the specific focus on pregnant women with clinically detectable gingivitis and willingness to participate in the study, which aligns with common sampling practices in periodontal and maternal health research [33], [34]. The study was prospective in nature, as data collection occurred forward in time from recruitment to complete assessment. No randomization procedures were performed because the study did not involve an intervention or experimental manipulation.

C. SAMPLE SIZE DETERMINATION

The minimum required sample size was calculated using the Lemeshow formula for estimating proportions in cross-sectional studies when the total population size is unknown. The following parameters were applied:

1. Confidence level (Z): 1.64 for 90% CI
2. Estimated proportion (P): 0.50 (maximum variability)
3. Margin of error (d): 0.15

Using the standard formula:

$$n = \frac{Z^2.P(1-P)}{d^2}$$

the minimum sample size obtained was 30 participants. This value is consistent with recommended minimum thresholds in epidemiological correlation studies, ensuring adequate power for non-parametric statistical analysis [35].

D. ELIGIBILITY CRITERIA

Inclusion criteria

1. Pregnant women currently residing in the Berbek Public Health Center service area.
2. Pregnant women clinically diagnosed with gingivitis based on the Loe and Silness Gingival Index (GI).
3. Ability to communicate in Indonesian.
4. Willingness to participate and provide informed consent.

Exclusion criteria

1. Pregnant women without any signs of gingival inflammation.
2. Those receiving periodontal treatment during the previous three months.
3. Individuals with systemic disorders that may confound gingival status (e.g., diabetes mellitus, hematologic disorders).
4. Refusal to participate.

E. RESEARCH INSTRUMENTS AND MEASUREMENT PROCEDURES

1. Motivation Assessment

Motivation for oral health maintenance was measured using a structured Likert-scale questionnaire consisting of favorable and unfavorable items. Responses were scored from 1 to 4, with higher scores indicating stronger motivation. The scoring system followed standard health behavior assessment procedures used in recent maternal oral health studies [36], [37]. The total motivation score was categorized as:

a. Weak (0–33% of total score)
b. Moderate (34–66%)
c. Strong (67–100%)

The questionnaire was pretested for validity and reliability in a similar population before deployment.

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2. Gingivitis Examination

Gingival status was assessed using the Loe and Silness Gingival Index (GI), examining index teeth 16, 21, 24, 36, 41, and 44 across four gingival surfaces. Each site was scored from 0 to 3:

a. 0 = healthy gingiva
b. 1 = mild inflammation
c. 2 = moderate inflammation
d. 3 = severe inflammation

GI categories were interpreted as follows:

a. Mild: 0.1–1.0
b. Moderate: 1.1–2.0
c. Severe: 2.1–3.0

This index was selected due to its high reliability, ease of use, and widespread application in clinical and epidemiological studies involving pregnant populations [38].

F. DATA COLLECTION PROCEDURE

Data were collected in face-to-face sessions by trained dental health professionals. Participants first completed the motivation questionnaire, followed by a clinical gingival examination using sterilized periodontal probes under adequate lighting. All clinical procedures adhered to standard infection control protocols. Data were recorded immediately onto standardized forms and reviewed daily for completeness.

G. DATA MANAGEMENT STATISTICAL ANALYSIS

Data were coded and entered into a database for analysis. Descriptive statistics were used to summarize demographic variables, motivation categories, and gingival status. Spearman's rank correlation test was employed to determine the relationship between motivation and gingivitis due to the ordinal nature of the variables and non-normal distribution commonly observed in behavioral–clinical datasets [39]. A significance level of $\alpha = 0.05$ was applied.

H. ETHICAL CONSIDERATIONS

Ethical approval was obtained from the institutional ethics committee prior to data collection. All participants received information about the study objectives, procedures, risks, and confidentiality assurances. Written informed consent was obtained, and all procedures followed ethical principles for human subject research as outlined in national and international guidelines.

III. RESULTS

The respondents in this study were pregnant women in the working area of the Berbek Community Health Center, Nganjuk Regency, totaling 30 respondents. This study was conducted in five villages, namely Grojogan Village, Sonopatik Village, Bulu Village, Tiripan Village, and Balongrejo Village. The research locations were the Auxiliary Health Center (*Pustu*), Village Maternity Home (*Polindes*), and Village Health Post (*Poskesdes*).

The information in TABLE 1 reveals that the majority of respondents were pregnant women aged 20–27 years, totaling 15 individuals (50%), followed by those aged 28–35 years (43.3%). Only one person (3.3%) was under 20 and one (3.3%) over 35. This age distribution is important to identify dominant age groups that may have specific oral health characteristics.

TABLE 1
Age Distribution of Pregnant Women in the Working Area of the Berbek Community Helth Center, Nganjuk Regency, in 2025

Age Category	Frekuency	Precetage (%)
< 20 years	1	3,3
20 - 27 years	15	50
28 – 35 years	13	43,3
> 35 years	1	3,3
Total	**30**	**100**

TABLE 2
Distribution of Pregnancy Trimester in Pregnant Women in the Working Area of the Berbek Community Helth Center, Nganjuk Regency, in 2025

Trimester	Frekuency	Precetage (%)
First Trimester	4	13,3
Second Trimester	15	50
Third Trimester	11	36,7
Total	**30**	**100**

Based on the information presented in TABLE 2**,** most respondents were in their second trimester of pregnancy, totaling 15 individuals (50%), followed by 11 in the third trimester (36.7%), and 4 in the first trimester (13.3%). Trimester distribution is relevant because hormonal changes in each phase may affect gum condition and oral hygiene in pregnant women.

TABLE 3
Distribution of the Highest Level of Education among Pregnant Women in the Working Area of the Berbek Community Health Center, Nganjuk Regency, in 2025

Education Level	Frekuency	Precetage (%)
Elementary School	1	3,3
Junior High School	15	50
Senior High School	13	43,3
College University	1	3,3
Total	**30**	**100**

Based on the information presented in TABLE 3, most pregnant women had a senior high school education (53.3%), followed by junior high school (23.3%), elementary school (13.3%), and only 10% had a college/university education. Educational level can influence mothers' knowledge and awareness regarding the importance of maintaining oral health during pregnancy.

TABLE 4
Distribution of Pregnant Women Employment in the Working Area of the Berbek Community Health Center, Nganjuk Regency, in 2025

Occupation	Frekuensi	Precetage (%)
Housewife	28	93,3
Private Wolker	2	6,7
Total	**30**	**100**

The information in TABLE 4 reveals that the majority of respondents were not formally employed, with 28 women (93.3%) being housewives, while only 2 (6.7%) worked as private employees. Employment status can affect stress levels, access to healthcare services, and the time available for maintaining personal hygiene, including oral hygiene.

Based on the information presented in TABLE 5, most pregnant women in the working area of Berbek Public Health Center had a moderate level of motivation to maintain oral and dental health (56.7%), while 43.3% had a strong level of

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motivation. This suggests that while motivation levels are generally adequate, there is still room for improvement toward stronger motivation.

TABLE 5
Distribution of Motivation Levels for Maintaining Oral Health among Pregnant Women in the Working Area of the Berbek Community Health Center, Nganjuk Regency, in 2025

Kriteria Motivasi	Frekuensi	Precetage (%)
Strong Motivation	13	43,3
Moderate Motivation	17	56,7
Total	**30**	**100**

TABLE 6
Distribution of Gingivitis Examination Results in Pregnant Women in the Working Area of the Berbek Community Helth Center, Nganjuk Regency, in 2025

Gingivitis Criteria	Frequency	Precetage %
Healthy	0	0
Mild	18	60
Moderate	12	40
Severe	0	0
Total	**30**	**100**

The information in TABLE 6 reveals that of the total 30 respondents studied, none had healthy gums and none suffered from severe gingivitis. Most pregnant women experienced mild gingivitis, with 18 respondents (60%) and the remaining 12 respondents (40%) suffering from moderate gingivitis.

TABLE 7
Association of Motivation for Maintaining Oral Health with Gingivitis among Pregnant Women at Berbek Public Health Center, Nganjuk Regency, in 2025

Correlation Test	Variables	α	ρ value	Correlation Coefficient
Spearman	Motivation / *Gingivitis*	0,05	0,001	0,714

Based on the information in TABLE 7, the Spearman test results indicated a significance value p = 0.001 is smaller than α = 0.05 (ρ < α) anthe correlation coefficient is 0.714. This indicates that there is a significant association of motivation for maintaining oral health with gingivitis among pregnant women at berbek public health center, Nganjuk, in 2025. This finding reinforces that increasing motivation in maintaining oral health has the potential to reduce the incidence of gingivitis in pregnant women. This serves as the basis for recommendations for educational interventions focused on enhancing motivation.

IV. DISCUSSION

A. *Motivation of Pregnant Women in Maintaining Dental and Oral Health*

The present study found that most pregnant women demonstrated a moderate level of motivation to maintain oral and dental hygiene. Although more than one-third showed strong motivation, the overall level remains insufficient to ensure optimal oral health outcomes. Moderate motivation may reflect partial awareness of the importance of oral hygiene during pregnancy, yet it also indicates limitations in translating motivation into consistent behavioral practices. This finding aligns with previous studies reporting that motivation alone does not guarantee adherence to preventive oral hygiene behaviors unless supported by adequate knowledge, environmental reinforcement, and accessible dental care services [40], [41].

The moderate motivation observed in this study may be influenced by limited exposure to structured oral health education and insufficient support systems. Earlier research shows that intrinsic and extrinsic motivational factors significantly impact oral health behavior among pregnant women, with higher motivation associated with better plaque control, regular toothbrushing practices, and increased participation in dental check-ups [42]. However, rural populations, such as those in the Berbek area, may lack adequate access to oral health promotion programs compared to urban regions, resulting in lower readiness to adopt preventive behaviors. This contrast is consistent with findings by Singh and Prakash, who reported that urban pregnant women exhibited significantly higher motivation due to improved access to health information and professional counseling [43].

Motivation, as conceptualized by theories of health behavior, is closely linked to perceived susceptibility, perceived benefits, and self-efficacy. According to the Health Belief Model, individuals with higher perception of risk and perceived benefits are more likely to engage in preventive actions such as regular brushing and dental visits [44]. However, limited awareness of oral health complications during pregnancy can reduce motivation. The findings of this study support those of previous evaluations showing that many pregnant women perceive gingival bleeding and inflammation as normal pregnancy symptoms, thus reducing their motivation to seek care or modify daily hygiene practices [45].

Limitations in motivation may also be rooted in cultural norms and socioeconomic status. Studies in similar settings reported that low educational attainment is associated with reduced motivation and poor oral hygiene habits, as women with lower levels of education often have limited access to health information and may prioritize fetal well-being over personal oral health [46]. This trend is reflected in the present study, where a considerable portion of respondents had only junior or senior high school education, potentially influencing their awareness and motivational level.

Strengthening motivation requires comprehensive health promotion interventions that combine behavioral counseling, motivational interviewing, and consistent reinforcement during antenatal visits. Implementing oral health counseling as a standard component of maternal care could enhance self-efficacy and motivation among pregnant women. Additionally, integrating family involvement may reinforce extrinsic motivational factors, contributing to sustained oral hygiene behaviors.

B. *Gingivitis in Pregnant Women*

The gingival examination revealed that none of the participants had a healthy gingival status, with 60% exhibiting mild gingivitis and 40% presenting moderate gingivitis. These findings demonstrate a substantial burden of gingival inflammation among pregnant women within the Berbek Health Center area. Gingivitis in pregnancy is strongly influenced by hormonal changes, particularly elevated levels of estrogen and progesterone, which increase

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gingival vascularity and inflammatory responsiveness [47]. These physiological changes intensify the gingival reaction to bacterial plaque, leading to a rapid onset of inflammation even with minimal plaque accumulation.

The predominance of mild to moderate gingivitis in this study is consistent with global reports, where prevalence rates among pregnant women range from 50% to 70% depending on region and socioeconomic factors [48]. A multicenter study by Gare et al. found that gingivitis severity tends to increase progressively throughout pregnancy, particularly during the second and third trimesters due to amplified hormonal fluctuations [49]. A similar trend was observed in the current study, where the majority of respondents were in the second trimester, a period known for heightened susceptibility to gingival inflammation.

Dietary behaviors, particularly increased consumption of sweet foods during pregnancy, further exacerbate plaque accumulation and inflammation. Prior evidence demonstrates that pregnant women often experience changes in taste preferences, leading to higher sugar intake, which contributes to plaque buildup and worsens gingival health [50]. Moreover, the infrequent toothbrushing habits and lack of routine dental visits among respondents reinforce the progression of gingival disease. Arima et al. reported that pregnant women who brush less frequently and delay toothbrush replacement harbor higher levels of periodontal pathogens, such as Porphyromonas gingivalis and Tannerella forsythia, which lead to more severe gingivitis [51].

Another contributing factor is inadequate oral health knowledge, which remains a major barrier to preventive behavior. Many pregnant women do not receive sufficient information regarding the impact of oral health on pregnancy outcomes. Previous research in Poland and Nepal revealed that lack of awareness is strongly associated with higher rates of gingivitis and reduced adherence to oral hygiene practices [52], [53]. These findings are reflected in the present study, where women with limited understanding of proper oral hygiene were more likely to exhibit gingival inflammation.

This study did not assess dietary patterns, toothbrush replacement frequency, or frequency of dental visits, which may provide deeper insights into the determinants of gingivitis severity. Additionally, the GI was measured once; repeated measurements could yield more comprehensive assessments of gingival changes across trimesters.

The high prevalence of gingivitis emphasizes the need for targeted oral health programs within antenatal care services. Ensuring routine periodontal screening and integrating oral hygiene education may significantly reduce gingivitis burden and its associated risks, including preterm birth and low birth weight.

C. The Relationship Between Pregnant Women's Motivation in Oral Health Care and Gingivitis

The study demonstrated a strong and statistically significant relationship between motivation to maintain oral health and gingivitis status, with a Spearman correlation coefficient of 0.714 ($p < 0.05$). This indicates that higher motivation is associated with reduced gingival inflammation, suggesting that motivation plays a central role in shaping oral hygiene behaviors during pregnancy. This finding is supported by previous literature indicating that motivated individuals exhibit better adherence to brushing techniques, regular dental visits, and maintenance of dietary habits conducive to oral health [54].

Comparative studies reinforce this relationship. Basheer et al. reported that motivational interviewing interventions significantly improved gingival conditions among pregnant women by increasing their willingness to engage in daily oral hygiene routines [55]. Furthermore, Tjahajawati et al. found that higher motivation was strongly associated with increased likelihood of seeking dental care and maintaining regular brushing habits [56]. The present study confirms these findings within a rural Indonesian population, highlighting the universal influence of motivation across diverse demographic groups.

Despite demonstrating strong motivation among some participants, implementation of good oral hygiene practices was not consistently observed. Many pregnant women had moderate motivation levels yet continued to experience mild or moderate gingivitis, indicating that motivation alone is insufficient without supporting factors such as knowledge, accessibility of dental care, and environmental reinforcement. This is consistent with research showing that even highly motivated individuals may fail to maintain adequate oral hygiene in the absence of conducive external conditions [57].

The cross-sectional design prevents establishing a causal relationship between motivation and gingivitis. Additionally, psychosocial factors such as stress, cultural beliefs, and family influence were not assessed, though these are known to affect motivation and health behaviors.

Strengthening motivation through structured educational strategies, motivational interviewing, and integration of oral health into maternal care services may substantially reduce gingivitis severity. This study underscores the importance of designing motivation-based interventions tailored to pregnant women, particularly in underserved rural communities.

V. CONCLUSSION

This study examined the relationship between motivation to maintain oral health and the incidence of gingivitis among pregnant women in the working area of Berbek Public Health Center in 2025. The findings reaffirm the study aim, demonstrating a significant association between motivation levels and gingival health status. Most respondents exhibited moderate motivation, while the gingival assessment showed that none had healthy gums, with 60% experiencing mild gingivitis and 40% presenting moderate gingivitis. The statistical analysis further confirmed a strong positive correlation ($\rho = 0.714$; $p = 0.001$), indicating that higher motivation is associated with better gingival conditions. These results underscore the crucial role of motivation in shaping oral hygiene behaviors during pregnancy.

The findings contribute to existing literature by providing contextual insights from a rural Indonesian population, where accessibility to oral health information and services may be limited. This study also highlights that while motivation is an essential behavioral determinant, its effectiveness may be constrained by inadequate knowledge, limited access to dental services, and sociocultural factors.

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Therefore, enhancing maternal motivation must be integrated with comprehensive oral health education, strengthened antenatal counseling, and increased accessibility to preventive dental care. Interventions such as motivational interviewing, structured health education, and collaboration between dental and maternal health units may support improved periodontal outcomes during pregnancy.

Future research may expand by including broader variables such as oral health literacy, family support, dietary behaviors, and clinical follow-up across trimesters to provide a more holistic understanding of factors contributing to gingival health. Studies with larger and more diverse samples are also recommended to enhance generalizability. In conclusion, maternal motivation is a significant yet modifiable factor that can be leveraged to reduce gingivitis risk and improve oral health outcomes during pregnancy, ultimately supporting better maternal and fetal well-being.

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DATA AVAILABILITY

Data supporting the findings of this study are available from the corresponding author upon reasonable request.

AUTHOR CONTRIBUTION

Luthfi Zainur Rohmah contributed to the conceptualization, data collection, data curation, and drafting of the manuscript. Bambang Hadi Sugito supervised the research process, validated the methodology, and reviewed the final manuscript. Siti Fitria Ulfah contributed to data analysis, interpretation of findings, and refinement of the manuscript's intellectual content. Imam Sarwo Edi assisted in methodological design, clinical oversight during gingival examinations, and critical revision of the manuscript. All authors reviewed and approved the final version for submission.

DECLARATIONS

ETHICAL APPROVAL

This study was conducted in accordance with ethical principles for human research and was approved by the institutional ethics committee.

CONSENT FOR PUBLICATION PARTICIPANTS

All participants received information regarding the study objectives and procedures and provided written informed consent prior to participation.

COMPETING INTERESTS

The authors declare no conflicts of interest related to this research.

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