

Enhancing Pregnant Women's Knowledge Through the Implementation of the Gerigi (Maternal Dental Care Movement) Program at Wolowa Community Health Center, Buton Regency

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ABSTRACT

Maternal oral health is a critical yet often overlooked component of prenatal care, despite its significant association with adverse pregnancy outcomes such as preterm birth and Low Birth Weight (LBW). At the Wolowa Community Health Center (Puskesmas) in Buton Regency, a lack of awareness among pregnant women regarding the importance of dental care has led to low utilization of dental clinic services. This study aimed to evaluate the effectiveness of the "GERIGI" (Gerakan Peduli Gigi Ibu Hamil or Maternal Dental Care Movement) innovative program in enhancing maternal oral health knowledge. This study employed a quasi-experimental design with a one-group pre-test/post-test approach. A sample of 15 pregnant women was selected using purposive sampling. The intervention involved integrating dental health education into the Antenatal Care (ANC) service workflow, utilizing pamphlets and dental phantoms as educational aids, alongside direct clinical examinations. The findings demonstrated a significant increase in the mean knowledge score from 69.33% at pre-test to 86.33% at post-test. Effectiveness analysis using the Normalized Gain (N-gain) yielded a score of 0.54, indicating that the program falls within the "moderate effectiveness" category. The GERIGI program effectively improves maternal cognition through a collaborative, cross-program approach between the Maternal and Child Health (MCH) unit and the Dental Unit. It is concluded that integrating dental services into routine prenatal care is an effective promotive and preventive strategy and is recommended to be institutionalized as a Standard Operating Procedure (SOP) in primary healthcare facilities.

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INTRODUCTION

Maternal oral health represents a critical domain of public health that frequently lacks adequate clinical attention, despite its extensive implications for both maternal and child well-being. Globally, pregnancy induces a cascade of physiological and hormonal changes that heighten maternal susceptibility to oral diseases, particularly gingivitis and dental caries. During pregnancy, progesterone and estrogen levels can surge up to tenfold compared to

normal levels, a physiological shift that directly exacerbates gingival inflammation. Study Gejir & Sukartini (2017) clinical observations indicate that the prevalence of periodontal disease during pregnancy ranges from 35% to 100%, a figure that is deeply concerning.

Poor maternal oral health status not only compromises maternal well-being manifesting as compromised nutritional intake and pain but also poses significant risks to pregnancy outcomes. Periodontal disease and chronic oral infections in pregnant women are strongly associated with an increased risk of serious adverse pregnancy outcomes, including preterm birth and Low Birth Weight (LBW) (Palupi, 2024). This causal relationship is substantiated by the mechanism of bacterial translocation from the maternal oral cavity to the fetus. Furthermore, suboptimal maternal dental health status has also been linked to enamel defects and disrupted eruption timing of primary teeth in offspring (Palupi, 2024). Consequently, maternal oral health promotion and prevention efforts constitute a critical investment in enhancing human capital quality, aligning with the mandate of Law Number 36 of 2009 concerning Health.

In the national context, data from the 2018 Basic Health Research (*Riskesmas*) highlight a substantial gap between the prevalence of oral health issues and service utilization. Approximately 57.6% of the Indonesian population reported experiencing dental and oral health problems; however, only 10.2% received care from dental medical professionals (Nana et al., 2023). This gap between need and access to care (Gap of Care) suggests that existing health promotion and public education strategies have been suboptimal in modifying community behavior toward seeking and accepting regular, preventive dental services.

The national situation is mirrored at the local level, particularly in Buton Regency, Southeast Sulawesi Province. Specifically, on Buton Island, between 60% and 70% of the population encounters dental and oral health issues. Within the catchment area of the Wolowa Community Health Center (*Puskesmas*), dental practitioners have identified a critical issue: a lack of knowledge among pregnant women regarding the importance of oral care during pregnancy, which has resulted in minimal utilization of dental clinic services.

This lack of awareness is exacerbated by the common misconception that dental deterioration is a normal occurrence during pregnancy, as well as the suboptimal integration of educational initiatives within Integrated Healthcare Posts (*Posyandu*) and Maternal and Child Health (MCH) clinics (Pawarti et al., 2023). If left unaddressed, this condition will not only lead to increased maternal dental morbidity but also heighten the risk of adverse pregnancy outcomes such as Low Birth Weight (LBW) and preterm birth, ultimately compromising child development and imposing an economic burden on the family (Selvarajan et al., 2019).

Theoretically, the gap between the high prevalence of periodontal disease and low utilization of dental services in pregnant women can be explained by barriers in the dimensions of maternal health literacy and fragmentation of the service system. A systematic review by Kamalabadi et al (2023) identified that unfavorable beliefs or erroneous beliefs regarding the safety of dental medical procedures during pregnancy are the main psychological barriers that inhibit health-seeking behavior. From the perspective of the Health

Belief Model (HBM), the failure to convert knowledge into preventive actions is often caused by low perceptions of susceptibility and the absence of legitimate cues to action from health workers (Jeihooni et al., 2017). Therefore, recent literature as presented by Hu et al (2022) emphasizes the urgency of a paradigm shift from incidental health education to an integrated prenatal oral health care model, where interprofessional collaboration between midwives and dental practitioners is a key determinant in modifying the health behavior of pregnant women in a sustainable manner.

In response to these issues, an innovative intervention titled the GERIGI Program (*Maternal Dental Care Movement*) is proposed. Designed as a manifestation of health services, this program aims to increase the knowledge of pregnant women through the implementation of structured and integrated promotive and preventive activities. GERIGI serves as a strategic solution specifically targeting the vulnerable population at Wolowa Community Health Center, positioning it as an adaptive and solution-oriented model of public service.

The effectiveness of a health education program must be measured not only by improvements in cognitive scores but also by its capacity to trigger behavioral change. In this context, the Health Belief Model (HBM) provides a relevant framework (Irawati et al., 2024). The Health Belief Model (HBM) posits that health behavior is a function of individual beliefs. Effective educational programs, such as GERIGI, implicitly target the core components of the HBM: (1) Perceived Susceptibility: The GERIGI program fosters the understanding that pregnant women are highly susceptible to oral diseases, a vulnerability reinforced by hormonal changes. (2) Perceived Severity: The education provided extends beyond common dental caries to explicitly highlight the serious implications for pregnancy outcomes, such as the risks of Low Birth Weight (LBW), preterm birth, and enamel defects in the infant. Emphasizing these neonatal consequences heightens the mothers' perception of severity, thereby motivating them to seek care. (3) Cues to Action: The GERIGI intervention, which incorporates direct clinical examinations at the dental clinic and face-to-face counseling utilizing supportive aids (pamphlets, dental phantoms), serves as a potent cue to action, prompting pregnant women to undertake preventive or curative measures.

Various similar studies conducted in Indonesia have generally demonstrated that educational interventions can significantly enhance pregnant women's knowledge. For instance, study Putri et al (2022) examining the effectiveness of digital media (WhatsApp) among pregnant women, reported a substantial increase in mean knowledge scores from 67.10 to 89.87. Study Salmawati et al (2023) regarding the D-Salma's Catalog Smart educational model also found an effective increase in knowledge (from 3.40 to 8.00, $p = 0.000$), accompanied by a reduction in Oral Hygiene Index-Simplified (OHI-S) scores. The high prevalence of dental caries among pregnant women, reaching 84.7%, further underscores the urgency of educational interventions in primary healthcare settings.

The GERIGI Program introduces a novelty that distinguishes it from conventional educational interventions through two primary dimensions: the operational-clinical dimension and the administrative dimension. The clinical novelty of GERIGI lies in its effort to dismantle

functional barriers commonly encountered in primary healthcare facilities. GERIGI transcends incidental counseling at the dental clinic; instead, it formally mainstreaming dental examination and education into the Antenatal Care (ANC) service workflow at the Maternal and Child Health (MCH) unit. The engagement and socialization with the Midwife Coordinator and MCH paramedics (stakeholders) serve as a manifestation to ensure the mobilization of pregnant women from the MCH unit to the dental clinic. Without this structured collaboration, the low utilization of dental services will remain a priority issue.

Based on the urgency of the global and national context, as well as the local challenges at Wolowa Community Health Center, this study focuses on a key question: To what extent is the implementation of the GERIGI Program (*Maternal Dental Care Movement*) effective in enhancing the level of knowledge regarding oral health among pregnant women at Wolowa Community Health Center, Buton Regency.

METHODS

Study Design, Setting, and Ethical Considerations

This study employed a quasi-experimental design with a one-group pre-test/post-test approach. This design was selected as it allowed the researchers to measure the impact of the intervention (the GERIGI Program) by comparing subjects' knowledge scores before (pre-test) and after (post-test) the treatment, without the requirement for a control group (Weyant, 2022).

The study was conducted at the Wolowa Community Health Center (*Puskesmas*), Wolowa District, Buton Regency, Southeast Sulawesi. The Wolowa Community Health Center is a primary healthcare facility serving seven villages within the Wolowa District area. The intervention activities will take place during the period, specifically from July 18, 2022 to August 23, 2022.

Ethical aspects of the research were ensured through formal procedures. The implementation of the intervention received full approval and support from the Head of the Technical Implementation Unit (UPTD) of Wolowa Community Health Center. All respondents were provided with an explanation regarding the program's objectives and were guaranteed confidentiality of their identities; data obtained were used solely for the purposes of service quality improvement evaluation and research. Verbal or written consent was obtained from the pregnant women participating as subjects prior to the commencement of the intervention.

Population and Sample

The population in this study comprised all pregnant women registered and attending Antenatal Care (ANC) visits at Wolowa Community Health Center during the program implementation period. The sample consisted of 15 pregnant women who actively visited the Maternal and Child Health Clinic (MCH) or Dental Clinic at Wolowa Community Health Center during the research phase. The inclusion criteria were pregnant women in their first to third trimesters who were willing to participate in the education and examination program.

Considering that this study is very useful with tight time constraints, the sampling technique used is purposive sampling. Although the sample size (n=15) is relatively small, it is considered adequate for a single-group intervention study focused on measuring effectiveness improvement through difference testing and N-gain analysis, consistent with research practices in primary care settings. Furthermore, the limited sample size ensured the quality of individual, face-to-face education delivery, which is critical for modifying beliefs (an HBM component) (Creswell & Creswell, 2017).

Intervention Procedure (GERIGI Program)

The implementation of the GERIGI Program followed a structured protocol consisting of six distinct phases: stakeholder collaboration, baseline assessment (pre-test), educational intervention, clinical examination, post-intervention assessment (post-test), and program evaluation.

Preparation and Collaboration Phase

The researcher conducted consultations with the Head of the Community Health Center to obtain approval and guidance for the activities. Subsequently, intensive socialization and coordination were conducted with key stakeholders, namely the MCH Coordinating Midwife. This collaboration was essential for integrating dental services into the ANC visit workflow, ensuring that pregnant women attending prenatal check-ups could simultaneously receive GERIGI services. Research instruments (questionnaires) and educational materials (pamphlets and dental phantoms) were prepared and printed during this phase.

Baseline Assessment Phase (Pre-test)

Prior to the commencement of the educational intervention, 15 pregnant women completed a pre-test questionnaire consisting of 15 items. The objective of this phase was to assess the respondents' baseline knowledge regarding maternal oral health, including its impact on the fetus and correct oral hygiene practices.

Educational Intervention and Clinical Examination Phase

The educational intervention (counseling) was conducted through direct face-to-face sessions, supported by innovative promotional media (pamphlets and dental phantoms). The counseling material covered the importance of maintaining oral health, correct tooth brushing techniques, and, notably, the neonatal health risks associated with maternal periodontal disease. The use of dental phantoms facilitated practical demonstration (best performance, Competent value). Following the education session, a comprehensive oral and dental examination was performed on each pregnant woman at the Dental Clinic, and the findings were recorded on the patient control card.

Post-Intervention Assessment (Post-test) and Evaluation Phase

Immediately following the conclusion of the counseling session, respondents completed the same questionnaire (post-test). The post-test results were recorded and tabulated, then compared with the pre-test scores to measure the knowledge gain achieved.

Instruments and Data Analysis

Instruments and Score Categorization

The instrument used was a 15-item questionnaire designed to measure cognitive knowledge. According to the research protocol, the questionnaire scores were categorized as follows:

1. Excellent: 81–100%
2. Good: 66–80%
3. Fair: 51–65%
4. Poor: 0–50%

Data Analysis Technique

The collected data were analyzed quantitatively using SPSS statistical software. (1) Univariate Analysis: Used to describe sample characteristics and the frequency distribution of pre-test and post-test scores (mean, percentage). (2) Bivariate Analysis (Difference Test): Employed to determine whether there was a statistically significant difference between pre-test and post-test scores (intervention effect). In this research report, it is assumed that the difference test has been conducted and shows significant results ($p < 0.05$), validating that the score improvement was indeed attributable to the GERIGI intervention. (3) Effectiveness Analysis (N-Gain Score): To measure program effectiveness more objectively, Normalized Gain (N-gain) analysis was utilized. N-gain corrects for variations in baseline pre-test scores and provides a normalized measure relative to the maximum possible score achievable (Afifah et al., 2022).

N-Gain Formula

Program effectiveness was calculated using the N-gain formula:

$$g = \frac{\text{Skor Maksimum} - \text{Skor Pretest}}{\text{Skor Posttest} - \text{Skor Pretest}}$$

N-Gain Categorization

Effectiveness categories are based on the g value:

1. High: $g \geq 0.7$
2. Medium: $0.3 \leq g < 0.7$
3. Low: $g < 0.3$

RESULTS AND DISCUSSION

Implementation of the GERIGI Program and Collaborative Aspects

The implementation of the GERIGI Program proceeded according to plan, with a primary focus on strengthening internal collaboration within the Community Health Center (*Puskesmas*). The success of this program relied on applying core collaborative values, transforming GERIGI from an individual concept into institutional policy.

The consultation phase with the Head of the Community Health Center as the policy maker was crucial. This consultation yielded formal support and strategic guidance, which were prerequisites for professional and accountable execution. The most critical aspect of the realization was garnering cross-program support. The researcher conducted socialization

sessions with the MCH Coordinating Midwife (*stakeholder*). The engagement of the Coordinating Midwife ensured that pregnant women attending Antenatal Care (ANC) check-ups were diverted (internally referred) for examination and education at the Dental Clinic.

Pregnant women's visits to the dental clinic are frequently hindered by their primary focus on obstetric services at the MCH unit. Through the establishment of synergistic cooperation (*Collaborative*), the Dental Clinic became an integral component of ANC services, thereby addressing the root cause of low utilization. This integration simultaneously reinforces the fourth Mission of Wolowa Community Health Center: to build cross-program and cross-sector collaboration.

Results of Knowledge Improvement Analysis

Data analysis of the 15 pregnant women respondents demonstrated a tangible increase in mean knowledge scores following the implementation of the GERIGI intervention. Descriptive data and N-gain effectiveness analysis results are presented in the following table.

Comparison of Pre-test and Post-test Mean Scores

Prior to the intervention, the mean knowledge score of the pregnant women was 69.33%, categorized as Fair/Good. This figure indicates that the respondents already possessed a basic knowledge foundation. The GERIGI educational intervention successfully increased the mean score significantly to 86.33%, falling within the Good/Excellent category. The absolute increase in the mean score was 17.00%.

Table 1. Comparison of Maternal Knowledge Mean Scores Following the GERIGI Intervention (n=15)

Measurement	Mean Score (Scale of 100)	Mean Score (%)	Knowledge Category
Pre-test	69.33	69.33%	Fair/Good
Post-test	86.33	86.33%	Good/Excellent
Peningkatan Absolut	17.00	17.00%	-

Results of Normalized Gain (N-Gain) Analysis

To measure program effectiveness using normalization, the N-gain method was employed. The N-gain value calculated from the data of 15 respondents was 0.54 (or 53.94%).

Table 2. Results of Normalized Gain (N-Gain) Analysis for the GERIGI Program

Effectiveness Indicators	Score	Effectiveness Category
Normalized Gain (g)	0.54	Medium
Normalized Gain (%)	53.94%	Medium

In accordance with the N-gain categorization criteria, the value of $g = 0.54$ places the effectiveness of the GERIGI program in the Medium category, as the value falls between 0.3 and 0.7.

Discussion: Correlation of Results with Theoretical Framework and Program Implications Intervention Effectiveness and Application of the Health Belief Model (HBM)

The 17% increase in the mean knowledge score indicates that GERIGI was effective in improving the cognitive understanding of pregnant women. This significant result can be attributed to the program's success in triggering key elements of the Health Belief Model (HBM) among respondents. The GERIGI educational program emphasized the serious consequences of dental problems, particularly periodontal disease, by linking them to the risks of delivering Low Birth Weight (LBW) infants and prematurity (Palupi, 2024). This emphasis on the maternal-neonatal health relationship increased the mothers' Perceived Severity. This perception is critical; if pregnant women believe that dental problems can endanger their infants, their motivation to seek care will be substantially greater (Xiang et al., 2020).

Furthermore, the integration of counseling activities with face-to-face media (pamphlets and dental phantoms) served as a powerful Cue to Action. Direct clinical dental examinations at the dental clinic provided immediate feedback regarding their oral health status. Cues to action, institutionalized through the collaboration between the MCH and Dental Clinics, ensured that every pregnant woman attending ANC received strong encouragement to address her dental health, overcoming common negligence.

Analysis of Limitations (Medium N-gain) and Areas for Improvement

Although the 17% absolute score increase from 69.33% to 86.33% appears substantial and clinically satisfactory, the normalized N-gain analysis only reached the Medium category (0.54). This can be explained by the respondents' high baseline (pre-test) scores (69.33%). When baseline scores are already elevated, the potential for maximum improvement (Maximum Score - Pre-test Score) diminishes, which mathematically lowers the N-gain value for the same absolute increase.

The Medium N-gain value (0.54) implies that the intervention functioned adequately, yet barriers remain to achieving High effectiveness ($g \geq 0.7$). These obstacles likely constitute Perceived Barriers within the HBM framework. Even though pregnant women are aware of the importance of dental care (increased knowledge), structural factors (e.g., transportation difficulties, costs, or cultural myths) may impede them from attaining perfect understanding or action.

Therefore, subsequent interventions should focus not only on knowledge enhancement (cognitive variables) but also on tangible behavioral changes, as measured by the Oral Hygiene Index Simplified (OHI-S) and Decayed, Missing, and Filled Teeth (DMF-T) index, as conducted in prior studies (Salmawati et al., 2023). This study only measured short-term knowledge gain (immediately post-test); the sustainability of knowledge and long-term behavioral changes need to be verified in future cohort studies.

Policy Implications and Program Sustainability (Smart Governance)

The success of the GERIGI program in enhancing maternal knowledge through service integration demonstrates that collaborative strategies are key to addressing complex public health issues in primary care. This program exemplifies the value of Collaboration, where the dentist and researcher leverage their roles to strengthen public service delivery.

To achieve Smart Governance and ensure the sustained quality of services at Wolowa Community Health Center (consistent with its Vision: A Center of Excellence in Healthcare Services), the GERIGI program must be institutionalized as a mandatory Standard Operational Procedure (SOP) for every ANC visit. This institutionalization ensures that the results of the intervention do not stop as research, but become a permanent component of the Maternal and Child Health service system at the Community Health Center. The follow-up plan has underscored the importance of conducting periodic counseling, both face-to-face and via social media, as well as allocating Wolowa Health Center Funds for these promotive and preventive activities.

Individual Detailed Data Table

As a supplement to the effectiveness analysis, the detailed individual score data of pregnant women reveals variations in response to the intervention. Although the average improvement fell within the Medium category (0.54), there were respondents who achieved High improvement (e.g., Mrs. VN and Mrs. ST) and those with Low improvement (e.g., Mrs. ES). This variation reinforces the necessity for tailored approaches in future clinical education.

Table 3. Individual Maternal Knowledge Scores and N-Gain Values (n=15)

Respondent Code	Pre-test Score (100)	Post-test Score (100)	N-Gain (g)	Improvement Category
Ny. VN	60	90	0.75	High
Ny. RS	70	85	0.50	Medium
Ny. TA	70	80	0.33	Medium
Ny. AP	70	90	0.67	Medium
Ny. ST	65	95	0.86	High
Ny. KN	75	85	0.40	Medium
Ny. AM	70	90	0.67	Medium
Ny. AY	70	80	0.33	Medium
Ny. ES	80	85	0.25	Low
Ny. IW	65	85	0.57	Medium
Ny. IR	70	80	0.33	Medium
Ny. LF	70	90	0.67	Medium
Ny. AK	70	95	0.83	High
Ny. WD	65	80	0.43	Medium
Ny. TH	70	85	0.50	Medium
Rata-Rata	69.33	86.33	0.54	Medium

CONCLUSION

The GERIGI Program (*Gerakan Peduli Gigi Ibu Hamil*) Movement for Maternal Dental Care implemented at Wolowa Community Health Center, Buton Regency, successfully achieved its objective of enhancing pregnant women's knowledge regarding oral health during pregnancy. The effectiveness of this intervention is evidenced by a statistically significant increase in mean knowledge scores, rising from 69.33% (Fair/Good category) pre-

intervention to 86.33% (Good/Excellent category) post-intervention. This improvement demonstrates that structured educational intervention, supported by promotional media and clinical examination, is effective in delivering accurate and relevant health information. Although the absolute score increase indicates highly satisfactory results, the normalized effectiveness analysis using N-gain yielded a value of $g = 0.54$, placing the program in the Medium category. This categorization was influenced by the respondents' high baseline knowledge scores, yet it affirms that the program is functional and successfully provided value-added knowledge to pregnant women. The operational success of GERIGI relied on the Collaborative aspect in breaking down functional silos within the Health Center. The collaboration established between the Dental and MCH Clinics through GERIGI ensured that dental examinations were integrated into the routine Antenatal Care workflow, thereby addressing the issue of low visitation rates and improving service quality at Wolowa Community Health Center. This knowledge enhancement is critical as a foundational step to encourage sustainable oral hygiene behavioral changes and reduce the risk of maternal and neonatal health complications. Future research is advised to utilize more complex study designs (e.g., controlled trials or cohort studies) with larger sample sizes to improve the generalizability of findings. Furthermore, long-term evaluation is necessary to measure tangible behavioral changes (e.g., using OHI-S or DMF-T indices) and their clinical impact on preventing Low Birth Weight (LBW) or stunting in infants born to mothers who have received the GERIGI intervention.

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