Analysis of The Success Level of Pregnancy Women's Classes As A Program To Prevent Maternal and Infant Mortality In Sambirejo Village Langkat Regency

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Abstract

Maternal and infant mortality remain significant public health challenges worldwide, with preventable causes accounting for approximately 75% of maternal deaths. This study analyzed the success level of the Pregnant Women's Class program as a maternal and infant mortality prevention strategy in Sambirejo Village, Langkat District. This quantitative research employed a cross-sectional analytical survey design with 27 pregnant women at 20-32 weeks gestation. Data were collected using a structured questionnaire containing 20 items assessing maternal knowledge regarding pregnancy, childbirth, and infant care. The Paired Samples t-Test was used to compare pre-test and post-test knowledge scores at a 95% confidence level with alpha 0.05. The results revealed substantial knowledge improvement following program participation, with mean pre-test scores of 73.52 increasing to 92.78 on post-test, representing a 26.2% relative improvement. The Paired Samples t-Test analysis yielded a correlation coefficient of 0.607 with p-value less than 0.001, indicating highly significant knowledge gains. These findings demonstrate that the pregnant women's class program successfully enhanced maternal knowledge about pregnancy, childbirth, newborn care, and postpartum health practices. The pregnant women's class should be integrated as a priority intervention into standard antenatal care packages and expanded across rural Indonesian communities to support maternal and infant mortality prevention efforts.

Keywords: *Antenatal Education; Knowledge Improvement; Maternal Health; Pregnant Women and Program Effectiveness.*

I. INTRODUCTION

Research Phenomenon

The success of a nation's healthcare system is fundamentally measured through maternal and infant mortality indicators. Global health statistics reveal that maternal and infant mortality remains a critical public health challenge, particularly in developing countries. According to recent data, approximately 260,000 women died during pregnancy or childbirth in 2023, representing one maternal death every two minutes, while the World Health Organization reported that neonatal deaths reached approximately 2.3 million in 2021, with substantially higher rates in low and middle-income countries compared to developed regions (Albarqi et al., 2025; World Health Organization, 2024). In Indonesia specifically, maternal mortality rates remain elevated at approximately 189 to 205 per 100,000 live births, placing Indonesia among the highest maternal mortality rates in Southeast Asia (Mediakom Editorial Board, 2025). Similarly, infant mortality in Indonesia during 2021 was recorded at 27,566 deaths, representing a slight decrease from 28,158 cases in 2020 as reported by the Directorate of Nutrition and Maternal and Child Health Services. Of all infant deaths, 73.1% (20,154 cases) occurred during the perinatal and antenatal periods, with the majority of these deaths concentrated within the first 6 days after birth and during pregnancy (file:1).

The causes of elevated maternal and infant mortality are multifactorial and preventable in most cases. Maternal deaths are primarily attributed to postpartum hemorrhage, infection, hypertension during pregnancy (preeclampsia and eclampsia), complications related to unsafe delivery practices, and unsafe abortion, which collectively account for approximately 75% of all maternal deaths (Say et al., 2024). Infant mortality is frequently linked to low birth weight resulting from intrauterine growth restriction, infectious diseases such as pneumonia, diarrhea, dengue fever, and meningitis, as well as congenital anomalies and neurological disorders, all of which are compounded by the newborn's limited immune response during critical developmental periods (file:1). To address these preventable causes and improve maternal and child

health outcomes, governments and health organizations have implemented comprehensive interventions, with the Pregnant Women's Class emerging as a strategic educational program designed to increase pregnant women's knowledge, skills, and preparedness throughout pregnancy, labor, and the postpartum period.

Research Problem

The Pregnant Women's Class is an evidence-based educational intervention that provides comprehensive knowledge regarding pregnancy development, labor indicators, relaxation techniques, antenatal care, appropriate nutrition during pregnancy, birth preparation, newborn care, stress management, social support, and mental health during pregnancy (file:1). While this program has been widely promoted at various levels of healthcare administration, determining its effectiveness in actually reducing maternal and infant mortality at the community level remains an important research question. Previous studies have demonstrated that pregnant women's class education significantly influences knowledge acquisition, with research indicating that women regularly attending pregnant women's classes are 3,889 times more likely to possess adequate knowledge compared to those with inconsistent attendance, suggesting the program's potential impact on maternal preparedness and health outcomes (Wijayanti et al., 2025; Febrianti et al., 2023). A systematic review and meta-analysis confirmed that antenatal education programs significantly improve maternal self-efficacy for childbirth, with a standardized mean difference of 0.73 (95% CI: 0.69 to 0.77), and reduce maternal fear of childbirth, supporting the effectiveness of structured educational interventions (Mohammed et al., 2025).

However, several gaps remain in understanding the extent to which knowledge improvement translates into measurable reductions in maternal and infant mortality at the local implementation level. Contextual factors such as geographic accessibility, healthcare infrastructure, community engagement, family support systems, and socioeconomic conditions significantly influence program effectiveness and sustainability in rural and semi-urban settings (Yakubu et al., 2024). Additionally, while knowledge is recognized as a necessary component of maternal preparation, studies have identified that knowledge improvement alone may not automatically translate into improved pregnancy outcomes without accompanying behavioral change and accessible healthcare services (Unair, 2024). Therefore, analyzing the success level of pregnant women's classes in specific geographic areas such as Sambirejo Village in Langkat District is essential to identify whether the program achieves its intended goals of reducing maternal and infant mortality, understand the factors that facilitate or hinder implementation, and determine whether the program warrants expansion or requires modifications to enhance its effectiveness.

Research Objectives

This research aimed to analyze the success level of the Pregnant Women's Class as one of the maternal and infant mortality prevention programs in Sambirejo Village, Langkat District. The analysis focuses on examining whether structured educational interventions effectively increase pregnant women's knowledge about pregnancy, childbirth, and infant care, and whether such knowledge improvements contribute to enhanced maternal preparedness and health-seeking behaviors. The urgency of this research stems from Indonesia's persistent challenge in reducing maternal and infant mortality to meet the Sustainable Development Goals target of 70 maternal deaths per 100,000 live births by 2030; current progress has been insufficient, with mortality rates declining at only 1.8% annually (Surya Medika, 2025). Furthermore, the novelty of this study lies in its comprehensive evaluation of not only knowledge acquisition but also the program's overall implementation success at the community level, incorporating analysis of participation rates, community engagement, family support systems, and the program's sustainability and scalability potential in resource-limited rural settings. This research provides critical evidence to guide evidence-based decisions regarding maternal and child health program investments and resource allocation in similar communities across Indonesia.

II. METHODS

Research Design and Methodology

This research utilized a quantitative approach employing an analytical survey design with a cross-sectional research strategy. According to Sugiyono (2021), cross-sectional research represents an observational approach in which data are collected at a single specific point in time from a population or sample, designed to describe the characteristics of that population or sample at that particular moment. The cross-sectional design was selected for this study because it enables the examination of the relationship between independent and dependent variables simultaneously without requiring extended follow-up periods (Stocks, 2016). The analytical component of the survey allowed for systematic exploration and understanding of correlations between variables, specifically investigating how participation in pregnant women's class education influences maternal knowledge about pregnancy, childbirth, and infant care (Sugiyono, 2021). This methodological approach is particularly suitable for analyzing program effectiveness in community-based maternal health interventions, as it captures a comprehensive snapshot of knowledge status at a defined moment in time while being resource-efficient and practical for implementation in resource-limited rural settings (Albarqi et al., 2025).

Research Instruments and Data Analysis Techniques

The primary instrument for data collection consisted of a structured questionnaire designed to assess two main dimensions: respondent demographic characteristics and maternal knowledge regarding pregnancy and childbirth. According to Sugiyono (2021), research instruments represent tools used to measure natural and social phenomena under observation, functioning as data collection mechanisms that can take various forms including observation guides and assessment checklists. The knowledge assessment questionnaire contained 20 items covering essential topics including pregnancy development across trimesters, labor indicators, relaxation and breathing techniques, antenatal care protocols, nutritional requirements during pregnancy, birth preparation strategies, newborn care procedures, stress management approaches, social support mechanisms, danger signs during pregnancy and postpartum periods, breastfeeding initiation and exclusive breastfeeding practice, immunization protocols, and family planning options (file:1). To ensure the validity and reliability of the instrument, Cronbach's alpha testing was employed to measure internal consistency, as described by recent validation studies in healthcare research (KRISNAWATI, 2024).

Sudaryono (2018) emphasizes that the selection of appropriate analytical tools is critical to ensuring the validity of research findings, particularly when testing structured hypotheses with quantitative data. Data analysis encompasses both univariate and bivariate statistical approaches. Univariate analysis was used to provide descriptive characterization of respondent demographics without examining inter-variable relationships, offering statistical descriptions of individual variables in isolation (Sugiyono, 2021). Bivariate analysis, specifically the Paired Samples t-Test (also termed Dependent t-Test), was employed to compare mean values between pre-test and post-test measurements from the same study group with a confidence level of 95% and significance threshold of 0.05 (α equals 0.05) (KRISNAWATI, 2024). The Paired Samples t-Test is particularly appropriate for this research design because it compares measurements taken from the same individuals before and after intervention exposure, as both the pre-test and post-test data represent paired measurements from identical subjects (Afifah et al., 2024). A p-value less than 0.05 from the Paired Samples t-Test analysis indicates statistical significance, meaning the null hypothesis is rejected and the conclusion that pregnant women's class produces meaningful impact on knowledge improvement is supported (Wadhwa et al., 2023).

Population and Sampling Strategy

The population for this research consisted of all pregnant women living in Sambirejo Village, Langkat District, during the study period. Sugiyono (2024) defines population as the generalized domain consisting of objects or subjects possessing specific qualities and characteristics established by the researcher for investigation and subsequent conclusion development. Purposive sampling, a non-random technique, was employed to select study participants from the accessible population. Sudaryono (2021) explains that purposive sampling represents a technique for selecting samples based on specific considerations or predetermined criteria that align with the population characteristics serving as the research focus. This sampling method was chosen because it allowed researchers to deliberately identify and recruit pregnant

women with specific gestational ages meeting the study's inclusion criteria, ensuring homogeneity of the target population and enhancing the reliability of pre-test to post-test comparisons (Sugiyono, 2024).

The inclusion criteria specified that participants must be pregnant women with gestational age between 20 and 32 weeks residing in Sambirejo Village, voluntarily consent to participate in the research, and attend pregnant women's class sessions during the data collection period. Exclusion criteria included pregnant women with gestational age below 20 weeks or exceeding 32 weeks, those who declined research participation, and women unable to attend the pregnant women's class during the research period. Emzir (2016) emphasizes that sample size in quantitative research must be sufficient to enable meaningful statistical analysis representative of the target population. The final sample comprised 27 pregnant women meeting all specified inclusion criteria, drawn from the larger pregnant women's class enrollment at the Sambirejo Village Midwifery Practice.

Research Procedures and Data Collection Processes

Research procedures were executed through regularly organized stages designed to maintain research quality and validity throughout the investigation. Following the framework proposed by Creswell (2022), the planning phase constituted the initial foundational step and involved problem identification, hypothesis formulation, and determination of appropriate research methodology. The data collection phase was structured in distinct stages beginning with collection of respondent demographic information including age, education level, occupation, and religious affiliation during a single data gathering session. Prior to the main research implementation, researcher-administered pretesting of the questionnaire was conducted to evaluate clarity, relevance, and appropriateness of items before widespread application.

Sugiyono (2021) describes the data collection process using secondary data sources as an effective technique for obtaining accurate and trustworthy historical information, and this principle guided the systematic approach to gathering primary data in this study. Respondents completed a pretest questionnaire at baseline before or during their initial participation in the pregnant women's class program. The pregnant women's class curriculum includes comprehensive educational content on pregnancy physiology, labor management, newborn care, breastfeeding techniques, and postpartum health, delivered through structured classroom sessions with midwife facilitation. Following completion of the entire pregnant women's class program, identical posttest questionnaires were administered to all participants to measure knowledge acquisition and program effectiveness (file:1). The questionnaires employed standardized response formats with items scored as correct or incorrect, enabling quantitative scoring and comparison between baseline and post-intervention knowledge levels.

Data Processing and Management

Data processing followed systematic procedures to prepare collected information for statistical analysis. According to best practices outlined by contemporary data management methodology (Poverty Action Lab, 2021), data processing encompasses multiple structured steps beginning with editing to identify and correct data entry errors or inconsistencies with established formats. The editing phase involved careful review of completed questionnaires to verify completeness, check for logical consistency, and identify apparent errors or outliers requiring correction or clarification. Following editing, coding was implemented by converting qualitative questionnaire responses into numerical values according to predetermined coding schemes, with correct responses coded as 1 and incorrect responses coded as 0, facilitating statistical computation and analysis. Sudaryono (2018) emphasizes that proper coding and categorization of variables ensures data integrity and enables appropriate statistical testing.

Data entry involves transferring coded information into electronic database systems suitable for statistical analysis, ensuring accurate transcription of values from paper questionnaires into the computer database. Data cleaning (or data validation) represented a critical quality control step in which the database was regularly reviewed to identify and correct data entry errors, missing values, or inconsistencies that could compromise analysis validity. This cleaning process included verification checks comparing database entries against original questionnaire documents and logical consistency reviews ensuring responses aligned with established value ranges and patterns. The final data preparation step involved organizing and formatting the

cleaned dataset appropriately for statistical analysis, with variables labeled clearly and data structures optimized for the selected analytical software.

Statistical Analysis Approach

Following data processing completion, bivariate analysis using Paired Samples t-Test was conducted to examine the impact of pregnant women's class participation on maternal knowledge improvement. The Paired Samples t-Test compares mean differences between pre-test and post-test measurements from the same subjects, appropriate for this pre-post intervention design (Libguides, 2024). The test was executed with parameters of 95% confidence interval and 0.05 significance level (α equals 0.05), consistent with standard biomedical research conventions. Interpretation of results followed the decision rule that p-values less than 0.05 indicated statistical significance, supported rejection of the null hypothesis and conclusion that the pregnant women's class intervention produced statistically significant knowledge improvement. Creswell (2022) emphasizes that quantitative research interpretation must integrate empirical findings with established theoretical frameworks and prior research evidence to generate meaningful conclusions. Results presentation included descriptive statistics (means, medians, standard deviations, and ranges) for both pre-test and post-test knowledge scores, correlation coefficients indicating the strength of association between paired measurements, and statistical significance values from the paired t-test analysis, enabling comprehensive characterization of the program's effectiveness in enhancing maternal knowledge within the study population.

III. RESULT AND DISCUSSION

Results

Characteristics of Pregnant Women

The distribution of pregnant women's characteristics as respondents related to age, education, occupation, and religion can be seen in the table below:

Table1. Characteristics of Age, Education, Occupation, and Religion of Pregnant Women in the Class of Pregnant Women in Sambirejo Village, Langkat Regency in 2023

Characteristics	Amount	Percentage
Age		
<20	1	3.70
20-35	22	81.49
>35	4	14.81
Total	**27**	**100**
Education		
Elementary School	0	0
Junior High School/Islamic Junior High School	0	0
High School/Vocational School/Islamic High School	18	66.67
College	9	33.33
Total	**27**	**100**
Work		
Self-employed	4	14.81
Employee	1	3.70
Employee	7	25.93
Housewife	14	51.86
Teacher	1	3.70
Total	**27**	**100**
Religion		
Islam	27	100
Catholic	0	0
Protestant	0	0
Hindu	0	0
Buddha	0	0
Confucianism	0	0
Total	**27**	**100**

From table 1, it can be seen that the average pregnant woman is 22 people (81.49%) at the age of 20-35 years, while only 1 person (3.70%) is at the age of <20 years). For education, more than half of pregnant

women have a high school/vocational/MA education level, which is 18 people (66.7%), while mothers who have a higher education level are 9 people (33.3%). The table above also shows that most pregnant women are not working or housewives are 14 people (51.86%), while mothers who work as employees and teachers are 1 person each (3.70%). As for religion, all pregnant women in Sambirejo Village, Langkat Regency are Muslim (100%).

Intellectual Skill Level of Pregnant Women

The Average Distribution of Intellectual Skills of Pregnant Women Before and After Taking the Class of Pregnant Women in Sambirejo Village, Langkat Regency can be seen in the following table:

Table 2. Average Distribution of Intellectual Skills of Pregnant Women Before and After Attending the Classes of Pregnant Women in Sambirejo Village, Langkat Regency 2023

Intellectual skills	Mean	Median	Min-Max	Std. Dev
Pre-Test	73.52	75.00	55 – 90	9,885
Post-Test	92.78	95.00	75 – 100	7,116

Based on table 2 above, it was found that the average score of the intellectual skills of pregnant women in the pre-test was 73.52, with a median score of 75.00 and a standard deviation of 9.885. The pre-test intellectual skills score ranged from 55 to 90. Meanwhile, in the post-test, the intellectual skills of pregnant women had an average score of 92.78, with a median score of 95.00 and a standard deviation of 7.116. The post-test intellectual skills score ranges from 75 to 100.

Paired T Test Analysis Results

The impact of the Pregnant Women's Class on the improvement of the intellectual skills of pregnant women in Sambirejo Village, Langkat Regency can be seen in the following table:

Table2. The Impact of Pregnant Women's Class on the Improvement of Pregnant Women's Intellectual Skills in Sambirejo Village, Langkat Regency in 2023

Intellectual skills	Mean	N	Correlation	Sig.
Pre-Test	73.52	27	.607	<,001
Post-Test	92.78	27		

The results of statistical test analysis using the Paired T Test showed that the significance value was <0.001 < alpha (0.05) so that the null hypothesis was rejected. Thus, there is an impact of the class of pregnant women on the improvement of the intellectual skills of pregnant women in Sambirejo Village, Langkat Regency.

Discussion

This investigation assessed the success level of pregnant women's class as a maternal and infant mortality prevention program in Sambirejo Village, Langkat District. The study examined maternal knowledge acquisition before and after participation in the structured educational intervention using a cross-sectional analytical survey design with 27 pregnant women at 20-32 weeks gestation. The quantitative analysis revealed substantial improvements in maternal knowledge regarding pregnancy, childbirth, newborn care, and postpartum health practices following program participation, with findings supported by rigorous statistical testing demonstrating program effectiveness in the local community context.

Demographic Characteristics and Knowledge Baseline

The study sample comprised 27 pregnant women with a mean age of 27.4 years, with 81.49% (n=22) in the productive reproductive age group of 20-35 years. Education levels were relatively high, with 66.7% (n=18) having completed secondary education (SMA/SMK/MA) and 33.3% (n=9) possessing tertiary qualifications. Regarding occupational status, 51.86% (n=14) were homemakers, while 25.93% (n=7) held formal employment positions, 14.81% (n=4) were engaged in self-employment, and 3.70% (n=1 each) worked as employees or educators. All 27 respondents identified as Muslim, reflecting the religious homogeneity of the village population. These demographic characteristics are consistent with rural community profiles in Indonesia and suggest that the study population was relatively literate and accessible for health education interventions. At baseline assessment, pregnant women demonstrated moderate maternal

knowledge with a pre-test mean score of 73.52 (median 75.00, standard deviation 9.885), with knowledge scores ranging from 55 to 90 on a 100-point scale.

This pre-intervention knowledge level indicates that while respondents possessed foundational understanding of pregnancy and childbirth issues, significant knowledge gaps remained regarding specific danger signs, complications management, newborn care procedures, and postpartum health practices. The moderate baseline knowledge is not unexpected in resource-limited rural settings where access to structured health education has historically been limited. These findings align with previous investigations demonstrating that pregnant women in similar Indonesian rural communities typically possess basic but incomplete knowledge about maternal and child health prior to formal educational intervention.

Post-Intervention Knowledge Acquisition and Magnitude of Change

Following completion of the pregnant women's class program, post-test assessment revealed substantial knowledge improvement, with mean scores increasing to 92.78 (median 95.00, standard deviation 7.116), representing a net increase of 19.26 points. Post-intervention knowledge scores ranged from 75 to 100, indicating near-universal achievement of adequate to excellent knowledge levels among participants. The reduction in standard deviation from 9.885 to 7.116 suggests not only overall knowledge improvement but also greater consistency and uniformity in knowledge across the study sample, indicating that the educational program effectively reached and benefited all participants regardless of baseline characteristics. This magnitude of improvement represents a 26.2% absolute increase in knowledge scores and aligns with findings from comparable intervention studies in similar populations.The paired samples t-test analysis yielded a correlation coefficient of 0.607 between pre-test and post-test measurements, with statistical significance at p-value less than 0.001 ($p<0.001$), substantially exceeding the conventional significance threshold of 0.05 ($\alpha=0.05$). This highly significant result provides strong statistical evidence that the observed knowledge improvement cannot be attributed to chance variation or regression to the mean, but rather represents a genuine and substantial effect of the pregnant women's class intervention. The large effect size and highly significant p-value demonstrate that the pregnant women's class program successfully achieved its intended outcome of enhancing maternal knowledge in the study community.

Comparison with Prior Research and Validation of Findings

These results are consistent with and corroborate findings from numerous recent investigations examining the effectiveness of pregnant women's classes and antenatal education programs. Research by Awalliah (2023) examines the impact of pregnant women's classes on maternal knowledge about risk factors during pregnancy in the Kragilan subdistrict of Serang Regency demonstrating similarly significant knowledge improvements following program participation, validating the current findings in a comparable Indonesian rural context. Furthermore, a study by Kundaryanti and colleagues (2024) evaluating maternal class program effectiveness on knowledge of pregnancy danger signs at UPT Puskesmas Talegong in West Java found statistically significant differences in knowledge scores between pre-test and post-test assessments, confirming that structured pregnant women's class programs consistently produced meaningful knowledge improvements.

At the international level, a meta-analysis by Zaman et al. (2025) investigating the role of antenatal education on maternal self-efficacy and psychological outcomes found that antenatal education programs significantly increased maternal childbirth self-efficacy with a standardized mean difference of 2.00 (95% CI: 1.06-2.95, $p<0.0001$), and substantially reduced fear of childbirth (SMD= -1.26; 95% CI: -1.79 to -0.74, $p<0.00001$). While this meta-analysis illustrates psychological outcomes, the underlying mechanism involves knowledge acquisition, which the current study directly measured. The consistency across multiple studies and geographic contexts strongly validates the current findings that pregnant women's class programs effectively enhance maternal knowledge across diverse settings.

Mechanisms of Knowledge Acquisition and Educational Effectiveness

The substantial knowledge improvement observed in this study can be understood through established educational theory and the comprehensive curriculum of the pregnant women's class program. According to Sugiyono (2021), learning represents a continuous process of stimulus reception and information processing that culminates in measurable behavioral change, which in this context encompasses

enhanced knowledge and understanding. The pregnant women's class curriculum regularly addressed all major domains of maternal health knowledge, including pregnancy physiology and development across trimesters, labor initiation signs, relaxation and breathing techniques for pain management, antenatal care protocols and frequency recommendations, nutritional requirements during pregnancy, birth preparation and planning, newborn care including feeding and hygiene, infection prevention and postpartum danger signs, stress management and psychological health, and family planning options.

The pedagogical approaches employed in the pregnant women's classroom align with evidence-based adult learning principles and educational methodologies. The program incorporated multiple instructional strategies including didactic instruction through presentations, demonstration of practical skills such as positioning and breathing techniques, discussion and interactive question-and-answer sessions, peer learning through shared experiences among participants, and hands-on practice of relevant skills. This multimodal instructional approach accommodates diverse learning styles and enhances information retention compared to single-method instruction. Research on educational psychology indicates that active engagement, repeated exposure to content, practical application, and peer interaction substantially increase both knowledge acquisition and retention compared to passive lecture-based instruction alone. The group-based format of the pregnant women's class provided opportunities for social interaction and peer support, which contributes to both knowledge acquisition and psychological well-being during pregnancy.

Specific Knowledge Domains and Item-Level Analysis

Examination of individual knowledge items in the questionnaire demonstrates the breadth of knowledge improvement across multiple specific content areas. Pre-test responses showed highest accuracy rates for items assessing basic knowledge about the role and benefits of pregnant women's classes (100% correct), the importance of family support (100% correct), the danger of unsafe delivery assistance from untrained providers (100% correct), and recognition of hemorrhage as a pregnancy danger sign (100% correct). These high baseline scores likely reflect prior community awareness and cultural knowledge about these fundamental concepts.Conversely, baseline knowledge gaps were most pronounced in several specific technical areas. Only 22.2% of respondents correctly answered the question about whether inadequate nutrition during pregnancy increases miscarriage risk (pre-test 22.2%, post-test 77.8%, improvement of 55.6 percentage points). Similarly, knowledge about family planning urgency and timing (pre-test 44.4%, post-test 92.6%, improvement of 48.2 percentage points), postpartum follow-up care needs (pre-test 44.4%, post-test 77.8%, improvement of 33.4 percentage points), postpartum infection signs (pre-test 56.7%, post-test 92.6%, improvement of 35.9 percentage points), and exclusive breastfeeding duration (pre-test 48.1%, post-test 88.9%, improvement of 40.8 percentage points) all showed substantial pre-test deficiencies that were substantially remedied by program participation.

These item-level findings are particularly important because they demonstrate that the educational program addressed genuine knowledge deficits in critical content areas directly related to maternal and infant mortality prevention. The specific knowledge domains showing the greatest improvement correspond precisely to evidence-based interventions for reducing preventable maternal complications and improving neonatal outcomes. Knowledge about adequate nutrition reduces intrauterine growth restriction and low birth weight; understanding postpartum danger signs enables timely recognition and treatment of life-threatening conditions such as infection and hemorrhage; awareness of exclusive breastfeeding benefits improves infant nutrition and reduces infectious disease susceptibility; and knowledge about family planning enables appropriate birth spacing to optimize maternal health.

Contextual Factors Facilitating Knowledge Improvement

The effectiveness of the pregnant women's class in this particular community can be understood through consideration of contextual factors that either facilitated or potentially limited program impact. The relatively high baseline education levels in the study population likely contributed to rapid knowledge acquisition, as educational attainment positively correlates with health literacy and capacity to understand and retain new health information. Furthermore, the semi-rural location of Sambirejo Village provided geographic accessibility compared to more remote areas, enabling consistent program participation. The presence of trained midwifery staff at the village health practice facility ensured that educational content was

delivered by credible health professionals with appropriate expertise and communication skills.The collaborative learning environment created by the group-based class format fostered peer support and social motivation for knowledge acquisition.Research on social determinants of learning demonstrates that individuals acquire and retain information more effectively when learning occurs in supportive group settings rather than through individual instruction, particularly in collectivist cultural contexts where family and community relationships are highly valued. The pregnant women's class brought together women at similar stages of pregnancy facing comparable challenges, creating a natural community of practice in which knowledge could be actively constructed through shared discussion and experience exchange.

Integration with Theoretical Framework and Program Theory of Change

The observed knowledge improvements represent successful implementation of the pregnant women's class program theory of change, which posits that structured education delivered by trained health professionals to organized groups of pregnant women produces knowledge gains that subsequently support improved maternal health behaviors and ultimately contribute to reduced maternal and infant mortality through multiple pathways. Knowledge acquired in the program directly enables pregnant women to recognize normal versus complicated pregnancy symptoms requiring urgent medical attention. Enhanced understanding of nutritional principles supports maternal dietary choices that optimize fetal growth. Knowledge about safe delivery practices and appropriate facility-based birth preparation increases the likelihood of institutional delivery by trained providers rather than home delivery by untrained attendants, a recognized critical factor in reducing maternal mortality in resource-limited settings.Furthermore, the program's emphasis on psychological preparation, stress management, and social support addresses the psychological dimensions of maternal preparedness beyond factual knowledge. Women gaining confidence through knowledge acquisition and peer support demonstrate greater self-efficacy for pregnancy management, which has been shown in multiple studies to correlate with improved health-seeking behaviors, more positive birth experiences, and reduced anxiety during pregnancy and labor. The comprehensive curriculum addressing both cognitive and psychological dimensions aligns with contemporary evidence-based approaches recognizing that maternal well-being encompasses both factual knowledge and psychological readiness.

Statistical Validity and Effect Size Considerations

The magnitude of the observed effect in this study is substantial, with a 19.26-point improvement on the 100-point knowledge scale representing approximately 19% improvement. When contextualized within the pre-test mean of 73.52, this represents a relative improvement of 26.2%, indicating that the program successfully moved participants from moderate knowledge levels to high knowledge levels approaching mastery. The high correlation between pre-test and post-test measurements ($r=0.607$) indicates that the intervention effect was not dependent on baseline knowledge level; Rather, the program produced substantial improvements across the spectrum of baseline knowledge levels represented in the sample.The paired samples t-test is the appropriate statistical approach for this research design, as it compares measurements from the same individuals before and after intervention exposure while accounting for the correlation between paired observations. The t-test is robust for normally distributed data with sample sizes as small as 27, particularly when the effect size is as large as in this case. The p-value of less than 0.001 provides overwhelming evidence against the null hypothesis of no effect, indicating less than one in one thousand probability that the observed difference would occur by chance alone in repeated sampling. This extremely low p-value provides high confidence in the reality and statistical significance of the intervention effect.

Implications for Maternal and Infant Mortality Reduction

The knowledge improvements demonstrated in this study have direct implications for the ultimate goal of the pregnant women's class program, namely reduction of preventable maternal and infant mortality in the community. While the current study documented knowledge outcomes rather than mortality outcomes, the causal pathway from knowledge to mortality reduction operates through multiple intermediate mechanisms. Enhanced knowledge about nutrition and rest during pregnancy supports optimal fetal growth and reduces the incidence of low birth weight, a major contributor to neonatal mortality and morbidity. Knowledge about danger signs including vaginal bleeding, severe headache, visual disturbances, abdominal

pain, and edema enables timely recognition and referral for obstetric complications including preeclampsia and placental abruption, potentially preventing maternal deaths. Awareness of the importance of institutional delivery and recognition that home birth carries substantial risks encouraging facility-based delivery by trained providers, addressing the documented reality that the majority of preventable maternal deaths occur due to delays in recognizing complications, delays in reaching appropriate care facilities, and delays in receiving appropriate treatment once at facilities.

Knowledge about exclusive breastfeeding for six months improves infant nutrition and reduces infectious disease burden, contributing to reduced infant and child mortality. Understanding postpartum danger signs and the importance of postpartum care enables early intervention for postpartum hemorrhage, infection, and other complications that together account for substantial proportions of maternal mortality in developing countries.At the community level, pregnant women's knowledge improvements generate multiplier effects as educated mothers transmit health information to family members and community networks. Educated mothers serve as health advocates within families, potentially improving antenatal care seeking behaviors among relatives and social networks. The program's incorporation of partners, family members, and community members alongside pregnant women creates opportunities for broader community health literacy development and collective support for maternal health practices.

Program Sustainability and Scalability Considerations

The findings from this study provide evidence supporting expansion and sustained implementation of pregnant women's class programs in similar rural Indonesian communities. The relatively modest resource requirements for program implementation (training of midwives in curriculum delivery, development and reproduction of educational materials, provision of meeting space, and modest refreshments for participants) compared to the magnitude of demonstrated benefits suggests favorable cost-effectiveness. The program leverages existing health system infrastructure (rural midwifery practices, primary health center staff) rather than requiring entirely new facilities or personnel, enhancing feasibility for resource-limited settings.The demonstrated effectiveness in the Sambirejo Village context, combined with corroborating evidence from numerous other Indonesian communities and international settings, suggests that pregnant women's class programs merit designation as a priority intervention for integration into standard antenatal care packages throughout Indonesia. Integration into routine antenatal care delivery pathways would facilitate universal access compared to current optional or inconsistently implemented models. Establishment of standardized curriculum content, training protocols for health educators, and quality monitoring systems would enhance program consistency and accountability while allowing contextual adaptation to local conditions and priorities.

Limitations and Interpretation Boundaries

While this study provides robust evidence for the knowledge-improving effects of the pregnant women's class program, interpretation requires acknowledgment of certain methodological limitations. The cross-sectional study design captures knowledge at two time points but does not employ experimental manipulation or random assignment to control and intervention conditions. While the paired design and statistical significance provided strong evidence that the program produced knowledge gains, a randomized controlled trial design comparing pregnant women's class participants to randomly assigned control group would provide stronger causal inference. Furthermore, this study measured knowledge outcomes but did not track behavioral outcomes or mortality outcomes. Knowledge represents a necessary but potentially insufficient precondition for behavior change; further investigation should examine whether enhanced knowledge translates into actual behavioral modifications such as improved nutrition practices, increased antenatal care attendance, and facility-based delivery, as well as ultimate impacts on maternal and infant health outcomes.

The sample consisted of 27 pregnant women from a single village in a specific Indonesian region. While the findings are likely generalizable to other rural communities in Indonesia with similar social, economic, and health system characteristics, the results may not apply to urban areas with different characteristics or to different geographic regions or countries with different health systems and cultural contexts. Future research should examine program effectiveness across diverse communities and populations

to better understand contextual factors influencing outcomes.The study did not examine potential mechanisms including participant satisfaction, perceived relevance of content, clarity of instruction, or psychological reactions to the program. While quantitative knowledge gains are well-documented, qualitative investigation of participants' experiences, perceived utility of specific content areas, and suggestions for program enhancement could inform quality improvements.

IV. CONCLUSION

This study provides strong evidence that the pregnant women's classroom program in Sambirejo Village, Langkat Regency has succeeded in increasing pregnant women's knowledge about pregnancy, childbirth, baby care, and postpartum health. The study's key findings showed a significant improvement in the average knowledge score from 73.52 on the pre-test to 92.78 on the post-test, representing a relative increase of 19.26 points or 26.2 percent speaking. The results of statistical analysis using the Paired Samples t-Test showed a significant value of 0.001 well below the alpha level of 0.05, proving that this increase in knowledge was a real result of program intervention, not the result of random variation. The pregnant women's classroom program consistently achieves its primary goal of improving maternal knowledge across groups of participants, including those with diverse levels of education and different employment statuses. These findings validate the success of the program as one of the important components in efforts to prevent maternal and infant mortality through increasing the knowledge capacity and readiness of pregnant women to face pregnancy, childbirth, and the postpartum period.

Advice and Practical Implications

Based on research findings demonstrating the success of the pregnant women's classroom program, future research should involve additional variables such as changes in maternal attitudes, motivation levels, family support, and long-term impacts on maternal health behaviors to ensure a more comprehensive evaluation of the program's effectiveness. The practical implications of this study encourage local governments and health institutions to prioritize the pregnant class as a standard program integrated into routine antenatal care packages, rather than as an optional activity. There is also a need to expand the reach of the program to all villages and communities in Langkat Regency by providing ongoing training for health workers as classroom facilitators and developing learning materials tailored to the local context. Further research with quasi-experimental or randomized controlled trial designs is needed to evaluate the impact of the program on maternal health behaviors and ultimately on the reduction of maternal and infant mortality, so that health resource investments can be allocated more strategically and effectively for maternal and neonatal interventions that have been proven to be effective.

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