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The Effectiveness of Health Literacy on Knowledge of Healthy Dietary Patterns Among Pregnant Women in the First, Second, and Third Trimesters at TPMB Bd. Eny Islamiati, S.Tr.Keb Bululawang

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ABSTRACT

Background: Pregnant women's knowledge regarding healthy dietary patterns is often still inadequate, which may negatively affect maternal and fetal health outcomes. Limited health literacy may contribute to poor understanding of balanced nutrition during pregnancy. Therefore, health literacy interventions are needed to improve pregnant women's nutritional knowledge and promote healthier dietary behavior during pregnancy.
Methods: This study employed a quantitative pre-experimental design using a one-group pretest–posttest approach. The study was conducted at TPMB Bd. Eny Islamiati, S.Tr.Keb Bululawang in January 2026. A total of 32 pregnant women were recruited using a consecutive sampling technique. Data were collected using a structured questionnaire consisting of 20 knowledge items regarding healthy dietary patterns during pregnancy. The questionnaire underwent validity testing using the Pearson Product Moment test, with all items declared valid ($r > 0.361$), and reliability testing showed a Cronbach's alpha value of 0.876. The intervention consisted of health literacy education using leaflets and booklets about balanced nutrition and healthy dietary patterns during pregnancy, delivered for approximately 5–10 minutes. Data were analyzed using the Paired Sample t-test with a significance level of $\alpha = 0.05$.
Results: Before the intervention, most respondents had poor knowledge levels (84.4%), while only 15.6% had moderate knowledge. The mean pretest score was 40.12 ± 3.51, which increased to 58.46 ± 4.25 after the intervention, with a mean difference of -18.34. After the intervention, 65.6% of respondents had moderate knowledge and 34.4% had good knowledge, with no respondents remaining in the poor category. The Shapiro–Wilk normality test showed that the data were normally distributed ($p > 0.05$). The Paired Sample t-test demonstrated a statistically significant difference between pretest and posttest scores ($p = 0.000$).
Conclusion: Health literacy interventions effectively improved pregnant women's knowledge regarding healthy dietary patterns. The findings indicate that health literacy-based education has important implications for maternal health promotion by enhancing pregnant women's understanding of balanced nutrition during pregnancy. Therefore, integrating health literacy interventions into routine maternal healthcare services is recommended to support better maternal and fetal health outcomes and prevent nutrition-related pregnancy complications.

Introduction a

Pregnancy is a natural physiological process that begins from conception until childbirth and lasts approximately 280 days or 40 weeks, calculated from the first day of the last menstrual period. During pregnancy, adequate nutritional intake is essential because maternal nutritional status directly influences maternal health and fetal growth and

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development. Poor maternal nutrition during pregnancy may increase the risk of anemia, chronic energy deficiency (CED), low birth weight (LBW), preterm birth, stunting, and impaired fetal development (Papežová et al., 2023). Therefore, maintaining healthy dietary patterns during pregnancy is an important component of maternal healthcare.

Maternal malnutrition remains a global public health problem. The World Health Organization (WHO) reported that approximately 40% of pregnant women worldwide experience anemia, particularly in low- and middle-income countries. Inadequate nutritional intake during pregnancy contributes significantly to maternal morbidity and mortality and negatively affects fetal outcomes, including intrauterine growth restriction, low birth weight, and stunting (Nawabi et al., 2022). UNICEF also reported that maternal nutritional problems are closely related to the increasing prevalence of stunting among children globally. These conditions are relevant to the Sustainable Development Goals (SDGs), particularly SDG 2 (Zero Hunger) and SDG 3 (Good Health and Well-being), which aim to improve maternal nutrition and reduce maternal and infant mortality. In Indonesia, nutritional problems among pregnant women remain relatively high. Data from the Indonesian Health Survey (2023) showed that the prevalence of anemia among pregnant women aged 25–34 years reached 31.4%, while 16.9% experienced chronic energy deficiency. These findings indicate that nutritional fulfillment during pregnancy has not yet been optimal and remains a serious health concern. Poor maternal nutritional status during pregnancy can negatively affect pregnancy outcomes and increase the risk of complications for both mothers and infants (Nadhira Silmi Alifa & Evi Martha, 2025).

One of the factors influencing maternal nutritional status is nutritional knowledge and health literacy. Health literacy refers to an individual's ability to access, understand, evaluate, and apply health information appropriately in everyday life (Nutbeam, 2006). Pregnant women with adequate health literacy are more likely to understand nutritional recommendations, follow healthy dietary patterns, and comply with antenatal healthcare advice (Prihadianto et al., 2025). However, many pregnant women still have limited understanding regarding balanced nutrition during pregnancy, causing them to focus more on food quantity rather than nutritional quality (Jauhari et al., 2025).

Several previous studies have examined the relationship between health literacy and maternal nutritional behavior. Nawabi et al. (2022) found that pregnant women with higher health literacy levels demonstrated healthier lifestyle behaviors during pregnancy. Papežová et al. (2023) reported that nutritional literacy significantly influenced pregnant women's nutritional knowledge and dietary practices. Prihadianto et al. (2025) also demonstrated that educational interventions effectively improved maternal health literacy regarding pregnancy-related health information.

Although previous studies have shown positive effects of nutritional education and health literacy, several limitations remain. Most previous studies focused on general maternal health literacy or nutritional literacy assessment without specifically evaluating the effectiveness of health literacy interventions on knowledge of healthy dietary patterns among pregnant women. In addition, many studies used observational or cross-sectional designs, limiting the ability to identify causal relationships between interventions and outcomes. Research conducted in community-based maternal healthcare settings, particularly independent midwifery practices (TPMB), is still limited.

Various government programs, such as the First 1000 Days of Life movement, nutrition counseling at community health posts (posyandu), and the provision of Multiple Micronutrient

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Supplements (MMS), have been implemented to improve maternal nutrition. However, the prevalence of anemia, chronic energy deficiency, and low birth weight remains relatively high. This condition suggests that providing information alone may not be sufficient if pregnant women are unable to understand and apply health information properly in daily life. Therefore, improving maternal health literacy is considered an important promotive strategy to support healthy dietary behavior during pregnancy.

Based on these conditions and research gaps, this study aims to determine the effectiveness of health literacy interventions on knowledge of healthy dietary patterns among pregnant women at TPMB Bd. Eny Islamiati, S.Tr.Keb Bululawang. The findings of this study are expected to provide scientific evidence regarding the importance of health literacy-based educational interventions in improving maternal nutritional knowledge and supporting promotive maternal healthcare services.

Methods

This study employed a quantitative pre-experimental research design using a one-group pretest–posttest approach to determine the effectiveness of health literacy on knowledge of healthy dietary patterns among pregnant women. In this design, the dependent variable was measured before and after the intervention to assess changes following the provision of health literacy education. The study was conducted at TPMB Bd. Eny Islamiati, S.Tr.Keb Bululawang, Malang Regency, during January 2026. The population consisted of all pregnant women who attended antenatal care services at the clinic during the study period, totaling 32 respondents. The sampling technique used was consecutive sampling, in which all pregnant women who met the inclusion criteria during the data collection period were recruited consecutively until the required sample size of 32 respondents was achieved. The inclusion criteria were pregnant women in the first to third trimester, willing to participate in the study, able to read and write, cooperative, able to communicate well, and willing to participate in the health literacy intervention from beginning to end. The exclusion criteria were pregnant women who refused to participate or were absent during the intervention sessions. The independent variable in this study was health literacy education, while the dependent variable was knowledge of healthy dietary patterns during pregnancy. The intervention was delivered through health education using educational media in the form of leaflets and booklets focusing on balanced nutrition and healthy dietary patterns for pregnant women. The educational session was conducted for approximately 5–10 minutes. Data were collected using a structured questionnaire consisting of 20 knowledge items related to healthy dietary patterns during pregnancy. The questionnaire underwent validity and reliability testing prior to data collection. Validity testing was conducted using the Pearson Product Moment test, with all questionnaire items declared valid because the calculated r-value exceeded the r-table value ($r > 0.361$). Reliability testing using Cronbach's alpha showed a value of 0.876, indicating that the instrument had good reliability. The research procedure consisted of three stages: preparation, implementation, and final evaluation. During the preparation stage, the researcher prepared research instruments, conducted validity and reliability testing, and obtained research permission and ethical clearance. During the implementation stage, respondents completed the pretest questionnaire before receiving the health literacy intervention, followed by a posttest after the educational session. In the final stage, the collected data were checked, coded, entered, and analyzed using SPSS version 22. Data analysis included univariate analysis to describe respondent characteristics and the distribution of knowledge levels before and after the

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intervention. Bivariate analysis was conducted using the Paired Sample t-test after the normality assumption was fulfilled. Statistical significance was set at $\alpha = 0.05$. This study received ethical approval from the Health Research Ethics Committee of ITSK RS dr. Soepraoen Malang with ethical clearance number No. KEPK-EC/476/1/2026. The study was declared ethically appropriate according to the seven WHO 2011 standards and CIOMS 2016 guidelines. All participants provided informed consent prior to participation, and confidentiality of respondents' data was strictly maintained throughout the study.

Results

Table 5.1 Characteristics of Respondents

Variable	Category	f	%
Age	17–25 years	7	21.9
	26–35 years	20	62.5
	36–45 years	5	15.6
Education	Elementary School	6	18.8
	Junior High School	13	40.6
	Senior High School	9	28.1
	Higher Education	4	12.5
Occupation	Housewife	11	34.4
	Private Employee	10	31.3
	Entrepreneur	11	34.4
Trimester	Trimester I	12	37.5
	Trimester II	6	18.8
	Trimester III	14	43.8
Parity	1 child	8	25.0
	2 children	15	46.9
	3 children	9	28.1
Income	< 2 million IDR	12	37.5
	2–4 million IDR	11	34.4
	> 4 million IDR	9	28.1

Based on age characteristics, the majority of respondents were in the 26–35 years age group, totaling 20 individuals (62.5%). In terms of education, nearly half of the respondents had a junior high school education, with 13 individuals (40.6%). Regarding occupation, almost half of the respondents worked as housewives and entrepreneurs, each accounting for 11 individuals (34.4%). Based on pregnancy trimester, nearly half of the respondents were in the third trimester, totaling 14 individuals (43.8%). In terms of parity, almost half of the respondents had two children, totaling 15 individuals (46.9%). Meanwhile, based on income, nearly half of the respondents had an income of less than 2 million IDR, totaling 12 individuals (37.5%).

Table 5.2 Knowledge Before Intervention

Knowledge Level	f	%
Moderate	5	15.6
Poor	27	84.4
Total	32	100.0

Based on the research results, before the health literacy intervention, the majority of respondents had a poor level of knowledge, totaling 27 individuals (84.4%), while a small proportion had a moderate level of knowledge, totaling 5 individuals (15.6%). This indicates

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that prior to the intervention, most pregnant women had limited understanding of healthy dietary patterns during pregnancy.

Table 5.3 Knowledge After Intervention

Knowledge Level	f	%
Good	11	34.4
Moderate	21	65.6
Total	32	100.0

Based on the research results after the health literacy intervention, the majority of respondents had a moderate level of knowledge, totaling 21 individuals (65.6%), while nearly half of the respondents had a good level of knowledge, totaling 11 individuals (34.4%). There were no respondents categorized as having poor knowledge after the intervention.

Table 5.4 Normality Test

Variable	Kolmogorov-Smirnov Statistic	df	Sig.	Shapiro-Wilk Statistic	df	Sig.
Pretest	0.093	32	0.200*	0.977	32	0.697
Posttest	0.083	32	0.200*	0.978	32	0.739

The results of the normality test indicate that the data on pregnant women's knowledge before and after the health literacy intervention are normally distributed. This is shown by the Shapiro-Wilk significance values of 0.697 for the pre-test and 0.739 for the post-test ($p > 0.05$). Therefore, the assumption of normality is met, and the analysis can be continued using a parametric test, namely the paired sample t-test, to determine the effectiveness of the health literacy intervention in improving knowledge of healthy dietary patterns among pregnant women.

Table 5.5 Mean Scores of Knowledge Before and After Health Literacy Intervention

Variable	N	Mean	Std. Deviation	Minimum	Maximum
Pretest Knowledge Score	32	40.1250	3.51724	33.00	47.00
Posttest Knowledge Score	32	58.4688	4.25770	49.00	68.00

Based on Table 5.5, the mean pretest knowledge score before the health literacy intervention was 40.1250 with a standard deviation of 3.51724, while the mean posttest score increased to 58.4688 with a standard deviation of 4.25770. The minimum and maximum scores also showed improvement after the intervention. These findings indicate that there was an increase in pregnant women's knowledge regarding healthy dietary patterns following the health literacy intervention.

Table 5.6 Paired Sample t-test

Variable	Mean Difference	Std. Deviation	Std. Error Mean	95% CI Lower	95% CI Upper	t	df	Sig. (2-tailed)
Pretest – Posttest	-18.34375	2.89169	0.51118	-19.38632	-17.30118	-35.885	31	0.000

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Based on the results of the paired sample t-test, the Sig. (2-tailed) value is 0.000 ($p < 0.05$), indicating a statistically significant difference between pre-test and post-test scores. This result demonstrates that health literacy is effective in improving knowledge of healthy dietary patterns among pregnant women.

Discussion

Knowledge of Healthy Dietary Patterns Before Intervention

Based on the results of the study conducted at TPMB Bd. Eny Islamiati, S.Tr.Keb Bululawang, it was found that prior to the health literacy intervention, the majority of respondents had a poor level of knowledge, totaling 27 individuals (84.4%), while a small proportion had a moderate level of knowledge, totaling 5 individuals (15.6%). This condition indicates that most pregnant women did not yet have an optimal understanding of healthy dietary patterns during pregnancy, including the types of food consumed, daily nutritional requirements, and the importance of balanced nutrition for maternal and fetal health.

This low level of knowledge may increase the risk of nutritional problems during pregnancy, which can negatively affect both maternal condition and fetal development. Knowledge is one of the key factors in shaping individual health behavior, where adequate knowledge encourages individuals to make appropriate decisions in maintaining their health. In the context of pregnancy, knowledge of healthy dietary patterns is crucial, as nutritional needs increase to support fetal growth and development.

Research by Alifa and Martha (2025) indicates that nutritional literacy among pregnant women remains relatively low, leading to suboptimal fulfillment of nutritional needs during pregnancy. This low literacy level causes pregnant women to have difficulty understanding health information, including how to select nutritious and balanced foods. Another study by Irwan et al. (2024) also states that low health literacy is associated with a reduced ability of pregnant women to perform self-care, including managing dietary patterns during pregnancy. This highlights that health literacy is an important factor influencing both knowledge levels and health behaviors among pregnant women.

According to the researcher, the low level of knowledge prior to the intervention was not only influenced by a lack of information but also by ineffective methods of information delivery. Pregnant women tend to receive information passively without in-depth and continuous explanations. Additionally, educational background and socioeconomic conditions also limit their ability to understand health information. Therefore, an intervention is needed that not only provides information but also enhances the ability of pregnant women to understand and apply such information, one of which is through health literacy.

Knowledge of Healthy Dietary Patterns After Intervention

After the implementation of the health literacy intervention, there was a significant improvement in respondents' knowledge levels. The majority of respondents were in the moderate category, totaling 21 individuals (65.6%), while nearly half were in the good category, totaling 11 individuals (34.4%). No respondents remained in the poor knowledge category after the intervention.

This indicates a positive change in the knowledge level of pregnant women after receiving health literacy-based education. Health literacy is defined as an individual's ability to access, understand, evaluate, and use health information to improve quality of life. Improved health literacy enables individuals to better understand information provided by healthcare professionals and apply it in their daily lives.

Research by Nurultania et al. (2025) shows that nutritional education provided to pregnant women can significantly improve knowledge, especially when the material is delivered

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using simple and easily understandable methods. Effective education enhances mothers' understanding of the importance of healthy dietary patterns during pregnancy. Furthermore, research by Gani et al. (2022) states that health literacy-based interventions can improve pregnant women's ability to understand health information and increase awareness of maintaining health during pregnancy.

According to the researcher, the improvement in knowledge observed after the intervention indicates that health literacy is an effective method for educating pregnant women. The systematic delivery of information, the use of simple language, and the adaptation of materials to respondents' conditions make the content easier to understand. Additionally, direct interaction between the researcher and respondents helps clarify the information provided. This demonstrates that properly delivered education can significantly improve knowledge.

Effectiveness of Health Literacy on Knowledge of Healthy Dietary Patterns

The results of the analysis using the Paired Sample t-test showed a significance value of 0.000 ($p < 0.05$), indicating a significant difference between knowledge before and after the intervention. The mean difference value of -18.34375 indicates an increase in knowledge scores after the health literacy intervention. Therefore, it can be concluded that health literacy is effective in improving knowledge of healthy dietary patterns among pregnant women.

Health literacy is one of the most effective promotive strategies for improving public knowledge and health behavior. Individuals with good health literacy are more capable of understanding health information and making appropriate decisions regarding their health. Research by Alifa and Martha (2025) shows that nutritional literacy has a significant influence on improving both knowledge and dietary behavior among pregnant women. This indicates that improvements in health literacy can directly impact changes in health behavior.

Furthermore, research by Irwan et al. (2024) states that health literacy plays an important role in enhancing pregnant women's ability to manage their health independently, including maintaining healthy dietary patterns during pregnancy. According to the researcher, the success of the health literacy intervention in this study demonstrates that an appropriate educational approach can have a significant impact on improving knowledge among pregnant women. In addition to increasing understanding, health literacy also has the potential to encourage positive behavioral changes.

This success is influenced by interactive delivery methods, relevant materials, and active participation of respondents during the educational process. Therefore, health literacy is highly recommended to be routinely implemented in midwifery services as a promotive effort to improve maternal and fetal health.

This study has several limitations that should be considered when interpreting the findings. First, the study involved a relatively small sample size of only 32 respondents, which may limit the generalizability of the results to a wider population of pregnant women. Second, the study used a one-group pretest–posttest design without a control group, making it difficult to fully determine whether the improvement in knowledge was solely caused by the health literacy intervention. Third, the research was conducted in a single setting, namely TPMB Bd. Eny Islamiati, S.Tr.Keb Bululawang, which may limit the applicability of the findings to other healthcare settings with different population characteristics. In addition, the intervention was conducted over a relatively short duration, so the long-term effects of health literacy on behavioral changes and maternal health outcomes could not be evaluated. Therefore, future studies are recommended to involve larger sample sizes, include control groups, utilize multicenter settings, and assess long-term outcomes to strengthen the evidence regarding the effectiveness of health literacy interventions among pregnant women.

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Conclusion

This study concludes that health literacy is effective in improving knowledge of healthy dietary patterns among pregnant women. Prior to the intervention, the majority of respondents had a low level of knowledge, indicating limited understanding of proper nutrition during pregnancy. After the implementation of health literacy-based education, there was a significant improvement, with no respondents remaining in the poor knowledge category and most achieving moderate to good levels of knowledge. The findings highlight the importance of health literacy as a promotive strategy in maternal health care. Improving health literacy not only enhances knowledge but also has the potential to influence positive health behaviors, particularly in maintaining a healthy diet during pregnancy. Therefore, integrating health literacy interventions into routine maternal health services is highly recommended to support maternal and fetal well-being. Further research is recommended to explore the long-term impact of health literacy interventions on behavioral changes and pregnancy outcomes, as well as to involve larger sample sizes and control groups to strengthen the validity of findings.

Ethics Approval and Consent to Participate

This study involving human participants was conducted following ethical principles and received ethical approval from the Health Research Ethics Committee of ITSK RS dr. Soepraoen Malang with reference number No. KEPK-EC/476/1/2026. The research protocol (version 1) entitled "The Effectiveness of Health Literacy on Knowledge of Healthy Eating Patterns in Pregnant Women at TPMB Bd. Eny Islamiati, S.Tr.Keb Bululawang" was declared ethically appropriate in accordance with the seven (7) WHO 2011 standards, namely: (1) Social Value, (2) Scientific Value, (3) Equitable Assessment of Burden and Benefit, (4) Risk, (5) Persuasion/Exploitation, (6) Confidentiality and Privacy, and (7) Informed Consent, referring to the CIOMS 2016 guidelines. This ethical approval is valid from January 10, 2026 to January 9, 2027. All participants provided informed consent prior to participation, and confidentiality of data was strictly maintained throughout the study.

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