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Analysis of Factors Influencing Preconception Nutrition in the Preparation for a Healthy Pregnancy Among Women of Reproductive Age: A Cross-Sectional Study

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ABSTRACT

Background: Adequate nutritional status during the preconception period (3 months to 1 year before conception) is vital for Women of Reproductive Age (WRA) to ensure reproductive readiness, minimize adverse pregnancy outcomes, and support the first 1,000 days of life. Chronic Energy Deficiency (CED) remains a significant challenge in Indonesia (20.97%). Preconception health is influenced by sociodemographics, knowledge, and social support. This study aimed to analyze the factors influencing preconception nutrition attitudes among WRA in preparing for a healthy pregnancy.

Subjects and Method: This analytical observational study used a cross-sectional design in Klungkung District, Bali. The sample consisted of 270 WRA selected via cluster random sampling. Data were collected using structured questionnaires covering sociodemographic factors, pregnancy history, information exposure, knowledge, partner support, and the dependent variable: attitude toward preconception nutrition. Bivariate analysis employed the Chi-square test ($p < 0.05$).

Results: Education (OR=2.45; 95%CI=1.13 to 5.31; p = 0.023), occupation (OR=3.12; 95%CI=1.48 to 6.57; p = 0.003), income (OR=4.86; 95% CI= 2.21 to 10.67; p < 0.001), marital status (OR=3.54; 95%CI=1.67 to 7.49; p = 0.001), pregnancy history (OR=2.74; 95%CI = 1.38 to 5.42; p = 0.004), information exposure (OR= 5.12; 95%CI =2.41 to 10.88; p < 0.001), partner support (OR= 6.45; 95%CI= 3.01 to 13.81; p < 0.001), and knowledge (OR=7.23; 95%CI= 3.42 to 15.29; p < 0.001) were significantly associated with attitude toward preconception nutrition. Age (OR=1.08; 95% CI= 0.56 to 2.07; p = 0.826) was not significantly associated with attitude.

Conclusion: Sociodemographic factors, reproductive history, knowledge, information access, and partner support are critical determinants of WRA's attitude toward preconception nutrition. Health promotion programs should strategically focus on improving WRA knowledge and strengthening spousal support to foster positive nutritional attitudes, essential for achieving healthy pregnancy outcomes.

Keywords: preconception, nutrition, women of reproductive age, attitude, sociodemographic

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BACKGROUND

Women of Reproductive Age (WRA) represent a population group undergoing a transitional stage from late adolescence to early adulthood. This phase is characterized by significant physiological changes, including the onset of menstruation and the attainment of peak fertility, which indicate the full maturation of the reproductive organs. Nutritional requirements during this stage differ substantially from those during childhood, adolescence, or older adulthood. Adequate nutrient intake is essential, as this period serves as a critical window for preparing the body for future pregnancy and lactation (Marshall et al., 2021).

The preconception period—defined as the span of three months to one year before conception—is considered an optimal time to achieve reproductive readiness. During this period, the maturation of the ovum and sperm, which occurs approximately 100 days prior to conception, is highly influenced by nutritional status. The nutritional status of WRA or premarital women during the three to six months of the preconception stage strongly determines the health condition of the future newborn. Optimal nutrition during this period is therefore a prerequisite for ensuring the birth of a healthy baby with normal growth and development (Syamsari et al., 2020).

Preconception and conception health constitute essential elements of the reproductive life course for both women and men. A woman's nutritional status before and during pregnancy plays a crucial role not only in supporting optimal reproductive system function but also in influencing oocyte production and the success of fertilization. Fetal growth and development are similarly shaped by adequate maternal nutritional intake. Women with optimal nutritional status in the preconception and pregnancy periods have a higher likelihood of delivering healthy infants with normal birth weight. Maternal and infant health outcomes are therefore strongly associated with maternal nutrient adequacy (Tran et al., 2019).

Multiple studies have demonstrated that pre-pregnancy nutritional status affects reproductive health outcomes, including the likelihood of high-risk pregnancy and the quality of fetal development (Jiang et al., 2025; Jahan-Mihan et al., 2024). In Indonesia, Chronic Energy Deficiency (CED) remains a major nutritional problem among WRA, with a prevalence of 20.97%. CED results from prolonged insufficient dietary intake, leading to compromised health and an inability to meet increased nutritional demands during pregnancy (Fitria et al., 2025). According to the Basic Health Research (*Riskesdas*) in 2018, the prevalence of CED among WRA showed a decline from 2013, particularly in age groups 15–19 and 20–29 years (Health Research and Development Agency, 2018).

Research by Paramata and Sandalayuk (2019) involving 177 respon-dents found that CED predominantly affects women aged 15–24 years. Limited awareness of nutrition-related issues—often influenced by educational factors—affects attitudes and behaviors regarding nutritional practices during the preconception period. Preconception care serves as a critical platform for preparing women and their partners to adopt healthy behaviors, particularly with respect to adequate nutritional intake, which may help prevent adverse maternal and infant health outcomes. Women with normal preconception nutritional status are more likely to maintain good health during pregnancy and deliver healthy infants (Stephenson et al., 2018). Preconception nutrition also plays a fundamental role in supporting the first 1,000 days of life, including 270 days of gestation and 730 days

of early childhood. Adequate preconception nutrition contributes to fetal brain development, reduces the risks of pregnancy complications and congenital abnormalities, and decreases the incidence of low birth weight.

According to the Indonesian Ministry of Health Regulation No. 97 of 2014, preconception health services target adolescent girls, prospective brides, and couples of reproductive age, with the goal of ensuring healthy pregnancies for all women (Ministry of Health of Indonesia, 2014). Previous studies also report a relationship between maternal nutritional knowledge and nutritional status during pregnancy, indicating that increased knowledge fosters positive dietary behaviors that help prevent CED and other complications. Nutritional status among WRA is influenced by key life-quality indicators, including education, health, and income. CED is driven by both direct factors (disease and dietary patterns) and indirect factors (age, education, and occupation) (Wati et al., 2024; Fitria et al., 2025; Rajaeieh et al., 2026).

Primary health centers (*Puskesmas*) play an important role as the frontline of promotive and preventive healthcare, especially in maternal and child health. Midwives must understand the determinants of inadequate preconception readiness among WRA, particularly regarding nutritional needs before and during pregnancy, which may pose risks to maternal and infant health and affect the long-term development of future children. Based on these considerations, this study aims to analyze the factors influencing preconception nutrition in preparing for healthy pregnancy among women of reproductive age in Klungkung District.

SUBJECTS AND METHOD

1. Study Design

This was a cross-sectional study conducted in Klungkung Regency, Bali, Indonesia, in July-September 2024

2. Population and Sample

The study employed a cross-sectional design involved women of reproductive age (15–49 years) residing in Klungkung Regency. The minimum sample size was determined using the Lemeshow Formula, resulting in a total of 270 respondents. Eligible participants included women aged 15–49 years who were permanent residents of Klungkung District, able to read and understand Indonesian, and willing to participate by providing informed consent. Women with chronic or severe illnesses affecting nutritional intake, those who were pregnant during data collection, and respondents with incomplete questionnaires were excluded from the study.

A probability sampling approach was applied using cluster random sampling. Villages in Klungkung District were considered as clusters, and several villages were randomly selected as study locations. Within each selected cluster, eligible women of reproductive age were identified and recruited proportionally according to the population distribution to fulfill the required sample size.

3. Study Variables

The dependent variable in this study was the attitude of WRA toward meeting preconception nutritional needs. Independent variables included age, education level, occupation, monthly income, marital status, pregnancy history, exposure to preconception nutrition information, knowledge of preconception nutrition, and partner/spousal support.

4. Operational Definition of Variables

Age was defined as the respondent's age in completed years based on self-report at the time of data collection.

Education Level referred to the highest level of formal education completed by the respondent.

Occupation was defined as the respondent's type of employment or primary daily activity.

Monthly Income referred to the total household income earned per month as reported by the respondent in Indonesian Rupiah (IDR).

Marital Status was defined as the respondent's current marital condition at the time of the study.

Pregnancy History referred to the respondent's previous experience with pregnancy.

Exposure to Preconception Nutrition Information was defined as whether the respondent had ever received information related to preconception nutrition from any source, including health workers, media, or educational programs.

Partner/Spousal Support referred to the level of emotional, informational, and motivational support provided by the respondent's partner regarding preconception nutrition practices.

Knowledge of Preconception Nutrition was defined as the respondent's understanding of preconception nutritional needs, food sources, and nutritional recommendations before pregnancy.

Attitudes Toward Preconception Nutrition referred to the respondent's perceptions, beliefs, and willingness to fulfill recommended nutritional intake during the preconception period

5. Study Instruments

Data were collected using a structured questionnaire consisting of four components. The first component assessed respondents' characteristics, including age, education level, occupation, income, marital status, and pregnancy history. The second component was a preconception nutrition information questionnaire used to identify respondents' exposure to relevant health education. The third component measured knowledge regarding preconception nutrition using a researcher-developed questionnaire consisting of 10 validated multiple-choice items.

The fourth component assessed partner/ spousal support and attitudes toward preconception nutrition using modified questionnaire consisting of 10 items measured on a Likert scale. The instrument evaluated emotional, informational, and motivational support, as well as attitudes related to preconception nutrition. All instruments underwent validity and reliability testing through expert judgment and pilot testing prior to field implementation

6. Data analysis

Data analysis was performed using the Statistical Package for the Social Sciences (SPSS). Univariate analysis included descriptive statistics presented in frequency distribution tables. Bivariate analysis was conducted using the Chi-square test to examine the association between independent variables and attitudes toward preconception nutritional fulfillment. A significance level of $p < 0.05$ was applied.

7. Research Ethics

This study received ethical approval from an accredited institutional ethics review committee. Respondent anonymity was maintained by using identification codes, and all data were used solely for research purposes. Ethical approval for this study was obtained on June 18, 2024 from the Research Ethics Committee of ITEKES Bali (number: 04.0237/KEPITEKES-BALI/ VI/ 2024).

RESULTS

1. Sample Characteristics

The frequency distribution presented in Table 1 shows that most respondents were within the non-risk reproductive age range (20–35 years), accounting for 98.1%, while only 1.9% were categorized as having risk-related age (<20 or >35 years). Regarding educational attainment, more than half of the respondents held a diploma or undergraduate degree (53.0%), while the smallest proportion had completed elementary or junior high school (7.4%).

In terms of occupation, the majority of women worked in the private or entrepreneurial sector (58.5%), whereas civil servants represented the smallest proportion (14.8%). Most respondents reported a monthly income between IDR 1.5–3 million (53.3%), while only 20.4% earned more than IDR 3 million.

Table 1. Distribution of Respondent Characteristics (n = 270)

Characteristics	Category	n	%
Age	Non-risk age (20–35 years)	265	98.1
	Risk age (<20 or >35 years)	5	1.9
Education	Elementary–Junior High School	20	7.4
	Senior High School	107	39.6
	Diploma–Bachelor Degree	143	53.0
Occupation	Private/entrepreneur	158	58.5
	Housewife	72	26.7
	Civil servant	40	14.8
Monthly Income	< IDR 1.5 million	69	25.6
	IDR 1.5–3 million	144	53.3
	> IDR 3 million	55	20.4

1. Univariat Analysis

Table 2 indicates that most respondents were married (71.1%), while 28.9% were planning to marry. For pregnancy history, the largest proportion had never been pregnant (39.6%), with some reporting plans for pregnancy after recent marriage. A smaller group had experienced two pregnancies (21.9%).

More than half of the respondents (60.0%) had previously received health information related to preconception nutrition. Regarding partner support, most women reported receiving a moderate level of support (51.5%), and only 18.1% experienced low partner support. In terms of knowledge, the majority demonstrated good knowledge of preconception nutrition (64.8%), while 11.9% had poor knowledge. Most respondents exhibited moderate attitude toward fulfilling preconception nutritional needs (48.9%), followed by good attitude (48.1%), and only a small proportion demonstrated poor attitudes (3.0%).

Table 2. Marital status, pregnancy history, health information, partner support, knowledge, and attitudes toward preconception nutrition

Variables	Category	n	%
Marital Status	Married	192	71.1
	Planning to marry	78	28.9
Pregnancy History	Never pregnant	107	39.6
	One pregnancy	104	38.5

Variables	Category	n	%
	Two pregnancies	59	21.9
Exposure to Health Information	Ever received	162	60.0
	Never received	108	40.0
Partner Support	Low	49	18.1
	Moderate	139	51.5
	High	82	30.4
Knowledge Level	Poor	32	11.9
	Moderate	63	23.3
	Good	175	64.8
Attitude Toward Preconception Nutrition	Poor	8	3.0
	Moderate	132	48.9
	Good	130	48.1

2. Bivariate Analysis

The bivariate analysis presented in Table 3 showed that certain sociodemographic characteristics were significantly associated with attitudes toward preconception nutrition ($p<0.05$). Women of reproductive age with a higher educational level were 2.45 times more likely to have positive attitudes toward preconception nutrition than those with a lower educational level (OR=2.45; 95% CI=1.13 to 5.31; p=0.023). This finding suggests that education is an important factor influencing attitudes toward preconception nutrition. Employed women were 3.12 times more likely to have positive attitudes toward preconception nutrition than unemployed women (OR=3.12; 95% CI=1.48 to 6.57; p=0.003).

Women with higher income had 4.86 times greater odds of having positive attitudes toward preconception nutrition compared with those with lower income (OR=4.86; 95% CI=2.21 to 10.67; $p<0.001$). Marital status was also significantly associated with attitudes toward preconception nutrition. Married women were 3.54 times more likely to have positive attitudes than unmarried women (OR=3.54; 95% CI=1.67 to 7.49; p= 0.001).

Pregnancy history was significantly associated with attitudes toward preconception nutrition. Women who had experienced pregnancy were 2.74 times more likely to have positive attitudes than those who had never been pregnant (OR=2.74; 95% CI=1.38 to 5.42; p=0.004).

Exposure to information regarding preconception nutrition was significantly associated with positive attitudes. Women who had been exposed to preconception nutrition information were 5.12 times more likely to have positive attitudes than those who had not been exposed (OR=5.12; 95% CI=2.41 to 10.88; $p<0.001$). Partner support showed a strong association with attitudes toward preconception nutrition. Women receiving adequate partner support were 6.45 times more likely to have positive attitudes than those with inadequate support (OR=6.45; 95% CI=3.01 to 13.81; $p<0.001$).

Knowledge was the strongest predictor of attitudes toward preconception nutrition. Women with good knowledge were 7.23 times more likely to have positive attitudes toward preconception nutrition than those with poor knowledge (OR=7.23; 95% CI= 3.42 to 15.29; $p<0.001$). In contrast, age was not significantly associated with attitudes toward preconception nutrition (OR=1.08; 95% CI=0.56 to 2.07; p=0.826), indicating that age did not significantly influence attitudes toward preconception nutrition among women of reproductive age.

Table 3. Bivariate analysis of factors associated with attitudes toward preconception nutrition

Independent variables	OR	OR (95% CI)		p
		Lower Limit	Upper Limit	
Age	1.08	0.56	2.07	0.826
Education	2.45	1.13	5.31	0.023
Occupation	3.12	1.48	6.57	0.003
Monthly Income	4.86	2.21	10.67	<0.001
Marital Status	3.54	1.67	7.49	0.001
Pregnancy History	2.74	1.38	5.42	0.004
Exposure to Health Information	5.12	2.41	10.88	<0.001
Partner Support	6.45	3.01	13.81	<0.001
Knowledge Level	7.23	3.42	15.29	<0.001

DISCUSSION

The association between Education and preconception nutrition among women of reproductive age

The results of this study showed that women with a higher level of education were 2.45 times more likely to have good preconception nutrition compared to women of reproductive age with lower educational attainment. This finding is consistent with the study conducted by Sandri et al. (2024) which reported that higher educational levels are often associated with better knowledge and understanding of nutrition and health. Women with postgraduate education tend to have greater awareness of the importance of adequate nutritional intake before pregnancy. Theoretically, women of reproductive age with higher educational attainment are more likely to understand the significance of preconception nutrition and to demonstrate more positive attitudes toward healthy pregnancy preparation.

Education enhances individuals' ability to access, comprehend, and apply health-related information, thereby supporting informed decision-making regarding nutritional practices before conception (WHO, 2022). Based on these findings, the researchers conclude that education is an important determinant of preconception nutrition and healthy pregnancy planning. Higher educational attainment may contribute to improved nutritional awareness and healthier behaviors among women of reproductive age, ultimately supporting better maternal and fetal health outcomes.

The association between occupation and preconception nutrition among women of reproductive age

The results of this study showed that employed women of reproductive age were 3.12 times more likely to have a positive attitude toward preconception nutrition compared to unemployed women. This finding is supported by the study conducted by Mitran et al. (2024) reported that employed women may have better access to resources and nutrition education, enabling them to adopt healthier lifestyles and dietary practices. From a theoretical perspective, Green and Kreuter (2001) through the PRECEDE–PROCEED Model, explain that occupation is a social factor that can influence individual behaviors and attitudes. Employment status is associated with greater access to information, resources, experiences, and social interactions, all of which can enhance knowledge and contribute to the development of more positive attitudes toward health-related behaviors. Women who are employed may be more exposed to health promotion activities,

workplace health information, and broader social networks, which can strengthen their awareness of the importance of nutritional preparation before pregnancy. Based on these findings, the researchers conclude that occupation is an important enabling factor in the development of positive attitudes toward preconception nutrition among women of reproductive age. Employment may facilitate access to health-related information and resources, thereby supporting healthier attitudes and behaviors as part of healthy pregnancy preparation

The association between Monthly Income and preconception nutrition among women of reproductive age

The findings of this study indicated that higher income increased the likelihood of having a positive attitude toward preconception nutrition by 4.86 times, demonstrating a statistically significant association. This result is consistent with the study conducted by Lim et al. (2020) in United Kingdom, Singapore, and New Zealand, which highlighted the role of sociodemographic factors in shaping health behaviors. Their findings showed that older women with higher household incomes were more likely to adopt healthier dietary patterns, which positively influenced their attitudes toward nutrition before pregnancy. Furthermore, previous study identified income as a strong predictor of nutritional status and health-related behaviors, supporting the notion that better socioeconomic conditions facilitate greater access to nutritious foods and health-promoting resources (Mitran et al., 2024). Women with higher incomes are generally more capable of meeting nutritional requirements, accessing healthcare services, and obtaining health information that supports informed decision-making regarding preconception health. According to Green and Kreuter (2001), within the PRECEDE–PROCEED Model, income is classified as both a predisposing factor and an enabling factor that influences health attitudes and behaviors. Adequate financial resources can facilitate access to healthcare services, educational materials, and nutritious foods, thereby creating favorable conditions for the adoption of healthy behaviors. Based on these findings, the researchers assume that income influences the ability of women of reproductive age to utilize healthcare services and obtain the information necessary to make informed decisions regarding nutritional preparation before pregnancy. Therefore, higher income may contribute to the development of more positive attitudes toward preconception nutrition and support healthy pregnancy planning.

The association between Marital Status and preconception nutrition among women of reproductive age

The results of this study showed that married women were 3.54 times more likely to have a positive attitude toward preconception nutrition compared to unmarried women. This finding is consistent with the study conducted by Welshman et al. (2023) which reported that marital status can enhance awareness and foster positive attitudes toward nutritional preparation before pregnancy through increased motivation and family planning considerations. Similarly, Khafidhoh and Azizah (2024) found that the transition to married life encourages greater readiness and more favorable attitudes toward preconception nutrition. Marriage is often associated with increased responsibility for reproductive health and a stronger intention to prepare for pregnancy, which may motivate women to adopt healthier nutritional behaviors before conception. According to the Health Belief Model (HBM), individuals are more likely to develop positive attitudes toward a health behavior when they perceive that the

behavior provides benefits, reduces health risks, and is important for maintaining well-being (Alyafei and Easton-Carr, 2024). In the context of preconception health, women who perceive the benefits of adequate nutrition and recognize the potential risks associated with poor nutritional status are more likely to engage in health-promoting behaviors. Based on these findings, the researchers assume that married women generally have a greater perception of the benefits and risks associated with pregnancy health, which increases their motivation to optimize nutritional preparation before conception. Therefore, marital status may play an important role in shaping positive attitudes toward preconception nutrition as part of healthy pregnancy planning.

The association between Pregnancy History and preconception nutrition among women of reproductive age

Pregnancy history was also significantly associated with attitudes toward preconception nutrition. Women who had previously experienced pregnancy were 2.74 times more likely to have a positive attitude toward preconception nutrition compared to women who had never been pregnant. These findings are consistent with studies which reported that women with previous pregnancy experience tend to have greater awareness of health risks and the importance of adequate nutrition, thereby shaping more positive attitudes toward preconception nutrition (Setyowati and Ananta, 2020; Rachmawati et al. (2021). According to the *Health Belief Model* (HBM), previous experiences related to health conditions influence an individual's perceptions of susceptibility and the benefits of preventive actions (Alyafei and Easton-Carr, 2024). Women who have experienced pregnancy may have a better understanding of maternal and fetal health risks, which can enhance their awareness of the importance of nutritional preparation before conception. The researchers assume that women with a history of pregnancy are more likely to recognize the importance of maintaining adequate nutritional status before pregnancy because they have firsthand experience with the pregnancy process and its impact on both maternal and fetal health. Such experiences may strengthen their perception of the benefits of preconception nutritional preparation and contribute to the development of more positive attitudes toward preconception nutrition.

The association between Exposure to Health Information and preconception nutrition among women of reproductive age

The findings of this study showed that exposure to health information regarding preconception nutrition significantly increased the likelihood of having a positive attitude toward preconception nutrition by 5.12 times. This finding is consistent with the study conducted by Daly et al. (2022), which emphasized that access to health information, often more readily available among women with higher educational attainment, contributes to the development of attitudes that support reproductive health. Furthermore, Lukiana and Sugiatini (2022), reported that structured health education delivered through counseling effectively promoted more positive attitude toward adequate nutritional preparation before pregnancy. Similarly, Simanjuntak and Wahyudi (2021) found that educational interventions using the First 1000 Days of Life (1000 HPK) handbook significantly improved knowledge and attitudes among premarital women, including knowledge related to chronic energy deficiency, anemia, and stunting. These findings suggest that the provision of accurate and accessible health information plays an important role in shaping attitudes toward preconception

nutritional practices. According to health promotion theory, health information is one of the key factors influencing the development of an individual's knowledge and attitudes. The greater the exposure to health information through mass media, healthcare professionals, health education programs, and digital technology, the better an individual's knowledge becomes, which subsequently contributes to the formation of more positive attitudes toward health-related behaviors, including nutritional preparation before pregnancy (Fitzpatrick, 2023). The researchers assume that increasing access to health information through various methods and media is an effective strategy for fostering positive attitude among women of reproductive age regarding nutritional preparation for a healthy pregnancy. Frequent exposure to health information may enhance women's awareness and understanding of the importance of preconception nutrition, thereby increasing the likelihood of developing supportive attitudes toward optimal nutritional preparation during the preconception period.

The association between Partner Support and preconception nutrition among women of reproductive age

Partner support was strongly associated with a positive attitude toward preconception nutrition. This finding is consistent with the study conducted by Versele et al. (2022), which highlighted that support from partners and family members is essential in motivating women of reproductive age to maintain healthy dietary practices. Conversely, inadequate support may lead to neglect of preconception nutritional preparation. Similarly, Nakamura et al., (2020) reported that partner support during the preconception period and pregnancy had a positive impact on maternal health. High levels of partner support contributed to improved health behaviors and better decision-making related to pregnancy preparation. Furthermore, Alyafei and Easton-Carr (2024) found that women who received support from their partners were more motivated to optimize their health status before conception. Based on the findings of the present study, previous research, and existing theoretical evidence, the researchers assume that increasing partner involvement in preconception education and counseling is an important strategy for fostering positive attitudes among women of reproductive age toward meeting preconception nutritional requirements. Greater partner engagement may enhance women's awareness, motivation, and commitment to nutritional preparation, which is a fundamental component of achieving a healthy pregnancy.

The association between Knowledge Level and preconception nutrition among women of reproductive age

This study showed that knowledge was the most dominant factor associated with attitude toward preconception nutrition. Women of reproductive age who had good knowledge were 7.23 times more likely to have a positive attitude toward preconception nutrition than those with poor knowledge. This finding is consistent with the study conducted by Daly et al. (2022), which reported that women with better knowledge and understanding of preconception health demonstrated more positive attitude toward health practices before pregnancy. The strong association between knowledge and attitudes among women of reproductive age is also supported by Stephenson et al. (2018), who emphasized that adequate preconception nutrition knowledge is essential for healthy pregnancy planning. Better understanding promotes more supportive attitudes toward adopting healthy lifestyles and nutritional practices.

These findings also confirm the results reported by Yang et al. (2026), who found that inadequate knowledge may hinder preparation for a healthy pregnancy. Furthermore, a study by Syamsari et al. (2020) reported a significant association between nutritional knowledge and the nutritional status of preconception women. Another study by Simanjuntak & Wahyudi (2021) reported that education using the 1000 First Days of Life handbook improved knowledge and attitude scores among premarital women, including knowledge related to chronic energy deficiency, anemia, and stunting. According to the Health Belief Model (HBM), social support, including partner support, may serve as a reinforcing factor that encourages individuals to engage in health-related behaviors. Theoretically, knowledge is the result of a sensory and cognitive process that forms the foundation for attitude development. Adequate knowledge enhances an individual's understanding of the benefits of a health behavior, thereby encouraging the formation of attitudes that support such behavior. Similarly, Lin et al. (2025), identified knowledge as a key determinant influencing attitude formation and individual decision-making regarding health actions. Increased knowledge enhances awareness and perceived benefits, which in turn promotes the development of more positive attitudes toward health behaviors.

Based on the findings of the present study, previous empirical evidence, and existing theoretical perspectives, the researchers assume that knowledge plays a crucial role in shaping attitudes toward preconception nutrition among women of reproductive age. Women who possess better knowledge regarding nutrition before pregnancy are more likely to demonstrate positive attitudes toward preparing for a healthy pregnancy (Oladebo et al., 2025). Therefore, improving knowledge through effective health education and nutrition promotion programs may be an important strategy for fostering positive attitudes and encouraging optimal preconception nutritional practices.

The association between age and preconception nutrition among women of reproductive age

In this study, age differed from the other variables, as the age of women of reproductive age was not significantly associated with attitudes toward preconception nutritional preparation. Theoretically, increasing age is associated with greater cognitive maturity and improved decision-making abilities. Similarly, Daly et al. (2022) also reported that women of older reproductive age tend to have higher levels of awareness and more positive attitudes toward preconception health. The discrepancy between the findings of the present study and those reported in previous literature may be explained by the relatively homogeneous age distribution of women of reproductive age in the study area. The reproductive age range of the participants was not substantially different across groups, which may have resulted in comparable levels of cognitive maturity and understanding regarding the importance of nutritional preparation before pregnancy. Furthermore, women of reproductive age in the study area have access to various maternal and child health services through Community Health Centers (Puskesmas), Integrated Health Service Posts (Posyandu), and health education programs. These services provide similar health information across different age groups, potentially reducing age-related differences in attitudes toward preconception nutrition. Therefore, access to health information and educational interventions may play a more influential role than chronological age in shaping positive attitudes

toward preconception nutritional preparation.

Among the factors examined in this study, socioeconomic status, social support, past experiences, and cognitive factors (knowledge and access to information) were consistent with the framework proposed by Dieny et al. (2019), which classifies determinants of the nutritional status of women of reproductive age into external factors (income, education, occupation, social support, and culture) and internal factors (age, dietary intake, and infection). Among all variables investigated, knowledge emerged as the most dominant factor influencing the attitudes of women of reproductive age toward nutrition in preparation for a healthy pregnancy. Furthermore, Craig et al. (2025) emphasized that attitude toward preconception nutrition are shaped by cultural beliefs, family support, access to information, level of knowledge, socioeconomic conditions, and support from healthcare providers. The findings of the present study reinforce the importance of targeted public health interventions aimed at improving educational attainment and health literacy among women of reproductive age, particularly those from lower socioeconomic backgrounds. In addition, intervention strategies should actively involve husbands or partners to foster a supportive environment, as social support was identified as a highly significant determinant of positive attitudes. These combined efforts are essential for promoting favorable attitudes toward preconception nutrition, which serve as a foundation for the adoption of healthy nutritional behaviors before pregnancy. Such behaviors are crucial for optimizing the "window of opportunity" during the first 1,000 days from conception, a critical period for maternal and child health outcomes, as highlighted by (Dieny et al., 2019).

AUTHOR CONTRIBUTION

All authors have made significant contributions to the preparation of this final manuscript.

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CONFLICT OF INTEREST

There was no conflict of interest in this study.

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