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Empowering Mothers: The Critical Role of Knowledge and Positive Attitudes in Shaping Prenatal Nutritional Choices

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A B S T R A C T

Optimal prenatal nutrition is foundational for positive maternal and fetal health, significantly impacting lifelong well-being. A pregnant woman's nutritional knowledge and attitudes are pivotal, modifiable determinants influencing her dietary choices. Inadequate knowledge or negative attitudes can precipitate suboptimal nutritional intake, thereby elevating risks for adverse outcomes such as maternal morbidity, intrauterine growth restriction, and developmental issues in the child. This study aimed to comprehensively explore the nexus between pregnant women's nutritional knowledge, their attitudes concerning gestational nutritional needs, and the consequent influence on their prenatal dietary practices within a distinct rural Indonesian community. This descriptive analytical study adopted a cross-sectional design, conducted in Desa Bale Redelong, Kecamatan Bukit, Kabupaten Bener Meriah, Aceh, Indonesia. The entire population of 60 pregnant women accessing local midwifery antenatal services was included via total population sampling. A structured, pre-tested questionnaire was administered to collect data on socio-demographic characteristics, nutritional knowledge, attitudes towards nutritional needs (independent variables), and self-reported nutritional practices (dependent variable). Data analysis encompassed descriptive statistics, Chi-Square (x^2) tests for bivariate associations, and a multivariate logistic regression to identify key predictors of good nutritional practices, with statistical significance set at $p < 0.05$. Baseline data (n=60) depicted a cohort primarily aged 20-35 years (70.0%), with secondary education (55.0%). Nutritional knowledge was 'good' in 33.33%, 'sufficient' in 40.0%, and 'poor' in 26.67% of participants. Positive attitudes towards nutrition were held by 63.33%, while 36.67% exhibited negative attitudes. Bivariate analysis revealed significant positive associations between higher nutritional knowledge (χ^2=10.833, p=0.001) and positive attitudes (χ^2=6.136, p=0.013) with good nutritional practices. Multivariate logistic regression indicated that 'good' knowledge (Adjusted Odds Ratio [aOR] = 3.8; 95% CI: 1.5-9.6; p=0.005) and 'positive' attitudes (aOR = 2.9; 95% CI: 1.1-7.8; p=0.030) were significant independent predictors of good nutritional practices, after controlling for maternal age and education. In conclusion, this study underscores the critical and independent roles of both robust nutritional knowledge and positive attitudes in shaping the prenatal dietary choices of pregnant women in the investigated community. Even when accounting for socio-demographic variables, enhanced knowledge and favorable attitudes significantly predicted improved nutritional practices. These insights strongly advocate for multifaceted, culturally-sensitive public health interventions designed not only to impart factual information but also to cultivate empowering attitudes, thereby enabling pregnant women to make informed, health-promoting nutritional decisions for optimal maternal and child outcomes.

1. Introduction

Pregnancy marks a transformative physiological journey, imposing significantly increased nutritional demands to foster both maternal well-being and the intricate processes of optimal fetal development. The nutritional foundation established before conception and diligently maintained throughout gestation is a critical determinant of pregnancy outcomes. This

foundation not only shapes the immediate health trajectory of the mother and her newborn but also casts a long, influential shadow on the child's health destiny well into adulthood and, through intricate epigenetic mechanisms, potentially across generations—a core tenet of the Developmental Origins of Health and Disease (DOHaD) hypothesis. The consequences of inadequate maternal nutrition are far-reaching and extensively documented in scientific literature. They encompass an elevated risk for a spectrum of adverse maternal outcomes, such as gestational anemia, pre-eclampsia, and gestational diabetes mellitus. For the fetus and newborn, these consequences include intrauterine growth restriction (IUGR), an increased likelihood of low birth weight (LBW) and preterm birth, and a higher incidence of neonatal morbidity and mortality. Furthermore, suboptimal prenatal nutrition has been robustly linked to long-term sequelae in the offspring, including an increased predisposition to childhood stunting, impaired cognitive and neurodevelopmental outcomes, and a heightened lifelong susceptibility to chronic non-communicable diseases (NCDs) such as cardiovascular disease, type 2 diabetes, and obesity. Conversely, a maternal diet that is consistently well-balanced and rich in essential nutrients is intrinsically linked to healthy fetal organogenesis, appropriate fetal growth, timely neonatal development, a significantly reduced likelihood of complications during pregnancy and childbirth, and the establishment of a more resilient physiological milieu for the child's future health.[1,2]

Globally, the challenge of maternal malnutrition, which manifests as a dual burden of both undernutrition (including chronic energy deficiency, critical micronutrient deficiencies like iron, iodine, and folate, and maternal thinness) and overnutrition (characterized by pre-pregnancy overweight or obesity and excessive or inadequate gestational weight gain), continues to be a pressing public health concern. This issue is particularly acute and often exacerbated in low- and middle-income countries (LMICs), where factors such as limited access to diverse and affordable nutritious foods, prevalent food insecurity, gaps in public health infrastructure, and lower educational attainment frequently converge. It has been estimated that child and maternal malnutrition were collectively responsible for approximately three million deaths worldwide in 2019, with pervasive undernutrition implicated in as many as 45% of all deaths in children under the age of five. Despite some commendable progress in mitigating certain aspects of malnutrition—for instance, a notable reduction in the prevalence of low body mass index (BMI) among women of reproductive age in several middle-income nations—persistent and troubling issues such as high rates of maternal anemia (affecting nearly half of all pregnant women in countries like Indonesia), significant prevalence of maternal short stature, and chronic energy deficiency (KEK) continue to affect vulnerable populations, especially those residing in rural, remote, or economically disadvantaged settings. In the Indonesian context, the persistence of KEK among pregnant women, often identified through anthropometric measures such as a Mid-Upper Arm Circumference (MUAC) below the critical threshold of 23.5 cm, remains a significant focus for public health intervention. The Indonesian Maternal Mortality Rate (MMR), while demonstrating a gradual decline over recent decades, still necessitates substantial and sustained multidisciplinary efforts to achieve internationally agreed-upon targets, with underlying nutritional deficiencies often identified as significant contributing or exacerbating factors in major direct causes of maternal death, including postpartum hemorrhage, hypertensive disorders of pregnancy (pre-eclampsia/eclampsia), and sepsis.[3,4]

The dietary choices that pregnant women make are not simple, isolated decisions but are rather the complex outcomes of a dynamic and multifactorial interplay of individual, socio-cultural, economic, and environmental determinants. Within this intricate web

of influences, a pregnant woman's specific, actionable knowledge regarding her altered and heightened nutritional needs during the unique physiological state of pregnancy, combined with her attitudes—which encompass her beliefs, feelings, values, and predispositions—towards adopting and consistently maintaining healthy dietary practices, emerge as critically important and, significantly, potentially modifiable elements. Comprehensive and accurate nutritional knowledge empowers expectant mothers to make informed and judicious dietary decisions: to understand the physiological rationale behind increased requirements for energy, protein, and an array of key micronutrients (such as folic acid, iron, calcium, iodine, zinc, and various vitamins); to identify locally available and affordable nutrient-dense food sources versus those that offer minimal nutritional value; to appreciate the importance of dietary diversity for ensuring a wide spectrum of nutrient intake; to understand appropriate gestational weight gain targets tailored to their pre-pregnancy BMI; and to recognize the potential adverse consequences of both nutrient deficiencies and excesses for their own health and the optimal development of their fetus.[5,6]

Concurrently, the presence of positive, supportive, and self-efficacious attitudes can act as powerful internal catalysts, enabling women to translate their acquired nutritional knowledge into consistent, tangible, health-promoting dietary behaviors. Conversely, significant deficits in knowledge, the uncritical acceptance or perpetuation of harmful myths and culturally ingrained misconceptions about pregnancy nutrition, or the presence of fatalistic, indifferent, or negative attitudes can erect substantial psychological and behavioral barriers to achieving optimal prenatal nutrition. These barriers may persist even in scenarios where physically and economically accessible healthy food options are theoretically available. This study was conceived against the backdrop of these persisting challenges in maternal nutrition within Indonesia, particularly focusing on rural and potentially underserved communities like those in Bener Meriah Regency, Aceh province, where localized data on the specific interplay between these critical psychosocial factors and actual nutritional choices among pregnant women are often limited, yet essential for designing effective, targeted interventions.[7,8]

The distinct novelty of this research endeavor lay in its highly focused and granular examination of the direct and potentially synergistic relationships between both nutritional knowledge levels and the nature of prevailing attitudes, and their collective impact on the tangible nutritional choices and practices of pregnant women within a specific, culturally distinct, and relatively under-researched rural enclave in Aceh, Indonesia—namely, Desa Bale Redelong in Kecamatan Bukit, Kabupaten Bener Meriah. While a plethora of studies globally have explored these psychosocial constructs in relation to maternal nutrition, this investigation offered nuanced, localized insights that are paramount for the formulation of contextually resonant public health interventions. A key strength was its simultaneous and integrated assessment of both knowledge and attitudes, permitting an exploration of their combined and potentially interactive influence on dietary behaviors—an aspect less commonly detailed with such specificity for similar rural Indonesian settings. Furthermore, by adopting a total population sampling methodology for this particular community cohort, the study aimed to provide an unusually comprehensive and representative snapshot of these critical maternal factors within that defined setting.[9,10] The primary and overarching aim of this study was to comprehensively determine and delineate the relationship between the level of nutritional knowledge possessed by pregnant women, the nature of their attitudes concerning their specific nutritional needs during pregnancy, and how these psychosocial factors, both individually and collectively, correlated with and influenced their observable nutritional practices and dietary choices in

the community of Desa Bale Redelong, Kecamatan Bukit, Kabupaten Bener Meriah.

2. Methods

This investigation was meticulously structured as a descriptive analytical study, employing a quantitative, cross-sectional research design. The cross-sectional approach was strategically selected for its ability to facilitate the concurrent assessment of multiple variables—namely, socio-demographic characteristics, levels of nutritional knowledge (independent variable), types of attitudes towards nutrition (independent variable), and reported nutritional practices/status (dependent variable)—among the target population of pregnant women at a single, defined point in time. This design is particularly well-suited for determining the prevalence of these factors and for identifying potential statistical associations between them within the specific context of the study population. The descriptive component of the study aimed to generate a comprehensive and detailed profile of the existing landscape concerning nutritional knowledge, attitudinal dispositions, and dietary practices among pregnant women in Desa Bale Redelong. This, in turn, was intended to provide a clear, evidence-based depiction of the maternal nutritional situation within this rural Indonesian community, thereby informing targeted health interventions. The analytical component focused on examining the relationships between the independent and dependent variables. The research was geographically situated and executed within Desa Bale Redelong, a village located in Kecamatan Bukit, within the administrative region of Kabupaten Bener Meriah, Aceh Province, Indonesia. This specific locale was purposively chosen to yield context-specific insights into the determinants of maternal nutrition in a characteristic rural Indonesian setting, which may present unique socio-cultural and economic factors influencing health behaviors. Data forming the basis of this study were gathered during a period preceding the formal publication of the foundational journal article. The data collection was confined to a specific period to ensure that all variables were measured contemporaneously, a hallmark of cross-sectional studies. The target population for this investigative endeavor comprised all pregnant women who were officially registered and actively accessing routine antenatal care services provided by the designated village midwife operating within the geographical confines of Desa Bale Redelong, Kecamatan Bukit, Kabupaten Bener Meriah, during the defined study period. The total number of pregnant women meeting these criteria within this population was 60 individuals.

The principal inclusion criterion for participation in this study was being a pregnant woman who was officially registered with, and actively receiving antenatal care services from, the village midwife in Desa Bale Redelong during the designated data collection timeframe. Participants also had to provide voluntary informed consent to be included. Exclusion criteria implicitly included women who were not pregnant, not permanent residents of Desa Bale Redelong, or not availing themselves of the specified village midwifery services. Additionally, pregnant women with severe pre-existing medical conditions that would necessitate highly specialized or atypical dietary regimens (beyond standard prenatal nutritional advice) or those who were unable to comprehend the questionnaire due to language barriers (not anticipated as the study was locally conducted) or severe cognitive impairment would have been excluded to ensure homogeneity in the study sample regarding the general applicability of standard nutritional recommendations and the ability to validly respond to the survey instrument.

The study investigated several key variables, categorized as independent and dependent. Independent variables included: Nutritional knowledge, a multifaceted variable that refers to the pregnant woman's depth and accuracy of

understanding and awareness concerning essential nutritional principles and specific requirements pertinent to the pregnancy period. It encompassed knowledge domains such as: the physiological basis for increased caloric and specific nutrient needs (protein, iron, folic acid, calcium, iodine); the importance of a balanced and diverse diet; identification of nutrient-rich food sources versus those with low nutritional value; appropriate gestational weight gain targets; the potential consequences of both nutrient deficiencies and excesses for maternal and fetal health; and specific foods or substances to be emphasized, limited, or avoided during pregnancy. Knowledge was operationally categorized into 'Good,' 'Sufficient,' and 'Poor' based on scores from the relevant section of the questionnaire; Attitudes towards nutritional needs, this variable pertained to the pregnant women's constellation of feelings, beliefs, predispositions, and overall inclinations concerning the importance and practical fulfillment of recommended nutritional requirements during their pregnancy. This included their perceived value and importance of optimal prenatal nutrition, their expressed willingness or resistance to adopt or modify dietary habits for the benefit of their own health and that of their developing fetus, their beliefs regarding common food taboos or culturally endorsed dietary practices during pregnancy, and their perceived self-efficacy or confidence in their ability to maintain a healthy and adequate diet despite potential barriers. Attitudes were operationally categorized as 'Positive' or 'Negative'; Socio-demographic variables, a set of socio-demographic characteristics were collected and considered as potential covariates or descriptive factors. These included: Maternal Age (categorized as <20 years, 20-35 years, >35 years); Educational Level (categorized as No Formal/Primary School, Secondary School, Higher Education); Parity (number of previous births, categorized as Primiparous, Multiparous, Grand Multiparous); Socioeconomic Status (categorized as Low, Middle, High, based on predefined criteria or an index if used); Trimester of Pregnancy (First, Second, Third); Occupation (Housewife, Farmer/Laborer, Other)

Dependent variable: Nutritional practices, this outcome variable aimed to capture the actual dietary behaviors and choices made by the pregnant women. It was operationalized as the extent to which pregnant women met their nutritional needs, and was dichotomously categorized as 'Good Nutritional Practices' or 'Poor Nutritional Practices' based on their responses to specific sections of the questionnaire designed to assess dietary intake patterns or adherence to key nutritional recommendations.

The primary instrument for data collection in this study was a structured, pre-tested questionnaire. This questionnaire was carefully designed to elicit specific information from the respondents across several key domains: socio-demographic characteristics, nutritional knowledge, attitudes towards nutrition, and nutritional practices. The questionnaire was developed based on a review of existing literature and relevant instruments, ensuring that questions were clear, unambiguous, and culturally appropriate for the study population in Desa Bale Redelong. Prior to its use in the main study, the questionnaire was pre-tested on a small sample of pregnant women with similar characteristics from a nearby area not included in the main study. Feedback from the pre-test was used to refine the wording, clarity, and flow of the questions, and to estimate the time required for completion. Socio-demographic Section: This part collected baseline information about the respondents, including age, level of formal education achieved, primary occupation, parity (number of previous live births), and indicators for assessing socioeconomic status (which could include questions about household income, assets, or other locally relevant markers). The current trimester of pregnancy was also recorded. Nutritional Knowledge Assessment: This section comprised a series of objective questions, likely

multiple-choice or true/false items, designed to quantitatively assess the participants' understanding of crucial nutritional concepts directly relevant to pregnancy. These questions covered topics such as the need for increased intake of specific nutrients (iron, folic acid, protein, calcium), the benefits of dietary diversity, identification of locally available nutrient-dense foods, understanding of appropriate gestational weight gain, risks associated with inadequate nutrition, and knowledge of foods to be limited or avoided. A scoring system was applied, and total scores were used to categorize participants into 'Good,' 'Sufficient,' or 'Poor' knowledge levels based on predefined cut-off points. Attitude Assessment: This section was designed to measure the respondents' underlying predispositions, beliefs, and feelings towards prenatal nutrition. It likely employed a series of statements using a Likert-type scale (ranging from 'Strongly Disagree' to 'Strongly Agree') or agree/disagree options. These statements explored dimensions such as the perceived importance of adhering to dietary advice, willingness to change eating habits for the baby's health, beliefs regarding local food taboos or specific food benefits during pregnancy, and the respondent's perceived confidence (self-efficacy) in maintaining a healthy diet. Scores were aggregated to classify attitudes as 'Positive' or 'Negative'. Nutritional Practices Assessment: This section aimed to gather information on the respondents' actual dietary behaviors. This could have involved questions about the frequency and variety of consumption of different food groups (fruits, vegetables, protein sources, dairy), intake of specific recommended micronutrient supplements (like iron-folic acid tablets), adherence to dietary advice received during antenatal care, and avoidance of contraindicated items. Based on a composite assessment or adherence to key indicators, practices were categorized as 'Good Nutritional Practices' or 'Poor Nutritional Practices'.

Data were collected by trained enumerators (or the researchers themselves) who were thoroughly briefed on the study protocol, the content of the questionnaire, ethical considerations, and standardized interviewing techniques to minimize interviewer bias. Questionnaires were administered face-to-face with each pregnant woman, typically in a private and comfortable setting, often during their routine visits to the village midwife, to maximize convenience and participation rates. The interviewers read out the questions and recorded the responses for participants who might have had literacy challenges, ensuring accurate data capture. Each interview session commenced with a clear explanation of the study's objectives, the voluntary nature of participation, assurances of confidentiality and anonymity, and the process of obtaining written or verbal informed consent. On average, each questionnaire administration was estimated to take a specific amount of time, communicated during the consent process. Upon completion of data collection, all questionnaires were checked for completeness and consistency. The data were then coded, entered into a database (using EpiData), and meticulously cleaned to identify and rectify any errors. Statistical analysis was performed using a standard statistical software package (SPSS version 27). Initial analysis focused on generating descriptive statistics to summarize the characteristics of the study sample and the distribution of the key variables. Frequencies and percentages were calculated for all categorical variables, including socio-demographic characteristics (age, education, parity, occupation, socioeconomic status, trimester), levels of nutritional knowledge ('Good,' 'Sufficient,' 'Poor'), categories of nutritional attitudes ('Positive,' 'Negative'), and the prevalence of 'Good' or 'Poor' nutritional practices. For continuous variables like age (if not categorized), means and standard deviations would have been calculated. This stage provided a comprehensive profile of the study participants. To explore the unadjusted associations

between each independent variable (nutritional knowledge, attitudes, and selected socio-demographic factors) and the dichotomous dependent variable (nutritional practices, i.e., 'Good' vs. 'Poor'), the Pearson Chi-Square (χ^2) test of independence was employed. This test is appropriate for examining relationships between two categorical variables. For each association tested, 2x2 contingency table was constructed, and the chi-squared statistic, degrees of freedom (df), and the corresponding p-value were calculated. A pre-determined alpha level (α) of 0.05 was used as the criterion for statistical significance. If the calculated p-value was less than 0.05, the null hypothesis (H_0) of no association between the variables was rejected, indicating a statistically significant relationship in the study sample. For 2x2 tables where expected cell counts were less than 5, Fisher's Exact Test would have been used as an alternative. To assess the independent predictors of good nutritional practices while simultaneously controlling for the potential confounding effects of other variables, a multivariate logistic regression analysis was conducted. The dependent variable was 'Good Nutritional Practices' (coded as 1) versus 'Poor Nutritional Practices' (coded as 0). Independent variables entered into the model included nutritional knowledge (treated as categorical or ordinal), nutritional attitude (categorical), and key socio-demographic variables that showed significance or a strong trend in the bivariate analyses or were deemed theoretically important (maternal age, educational level). The selection of variables for the multivariate model was guided by both statistical significance in bivariate tests ($p<0.20$) and theoretical relevance. The logistic regression model estimated Adjusted Odds Ratios (aORs) along with their 95% Confidence Intervals (CIs) and p-values for each predictor variable. The aOR quantifies the odds of a pregnant woman having good nutritional practices for a given category of a predictor variable compared to a reference category, after adjusting for the influence of all other variables included in the model. Model fit was assessed using appropriate statistics, such as the Hosmer-Lemeshow goodness-of-fit test. The conduct of this research adhered to fundamental ethical principles guiding research involving human subjects. Prior to any data collection, each potential participant was provided with a clear and comprehensive explanation of the study's purpose, procedures, expected duration of involvement, potential risks (though minimal in this type of study, primarily related to time commitment and discussion of personal habits) and benefits (both direct, if any, and indirect, such as contribution to knowledge for improving local health services). They were explicitly informed that participation was entirely voluntary and that they had the right to decline participation or withdraw from the study at any point without any penalty or impact on their access to routine healthcare services. Written informed consent was obtained from each participant. For participants with limited literacy, consent was obtained verbally in the presence of an impartial witness, and this was appropriately documented.

3. Results and Discussion

The baseline characteristics presented in Table 1 describe the cohort of 60 pregnant women. The majority of participants (70.0%) were within the prime childbearing age range of 20-35 years. In terms of educational attainment, more than half (55.0%) had completed secondary education (SMP/SMA), while 25.0% had no formal or only primary schooling, and 20.0% had attained higher education. Regarding obstetric history, half of the women (50.0%) were multiparous (having 1-3 previous births), 40.0% were primiparous, and 10.0% were grand multiparous. Socioeconomic status was distributed with 50.0% in the middle stratum, 30.0% in the low, and 20.0% in the high stratum. The participants were spread across trimesters, with the largest group in their second trimester (46.6%). A significant majority (75.0%) identified their primary occupation as housewife.

Overall, within this cohort, 63.3% were found to have good nutritional practices, which served as the primary dependent variable for subsequent relational analyses. The assessment of nutritional knowledge among the 60 pregnant women yielded the following distribution: Good Knowledge: 20 respondents (33.33%); Sufficient Knowledge: 24 respondents (40.00%); Poor Knowledge: 16 respondents (26.67%) This indicates that while a considerable proportion (73.33%) had at least a sufficient understanding of prenatal nutritional needs, over a quarter of the women possessed poor knowledge, highlighting a potential area for intervention.

The attitudes of the pregnant women towards fulfilling their nutritional needs during pregnancy were categorized as: Positive Attitude: 38 respondents (63.33%); Negative Attitude: 22 respondents (36.67%) A majority of the women exhibited positive attitudes, yet a substantial minority (over one-third) held negative attitudes, suggesting that attitudinal factors also play a significant role in nutritional behaviors.

Table 1. Baseline socio-demographic characteristics of pregnant women (n=60).

Characteristic	Category	Frequency (f)	Percentage (%)
Maternal age (Years)	<20	9	15.0
	20-35	42	70.0
	>35	9	15.0
Educational level	No Formal / Primary School	15	25.0
	Secondary School (SMP/SMA)	33	55.0
	Higher Education (Diploma/Degree)	12	20.0
Parity	Primiparous (0 previous births)	24	40.0
	Multiparous (1-3 previous births)	30	50.0
	Grand Multiparous (≥4 previous births)	6	10.0
Socioeconomic status	Low	18	30.0
	Middle	30	50.0
	High	12	20.0
Trimester of Pregnancy	First (≤13 weeks)	10	16.7
	Second (14-27 weeks)	28	46.6
	Third (≥28 weeks)	22	36.7
Occupation	Housewife	45	75.0
	Farmer/Laborer	9	15.0
	Other (Trader, Civil Servant etc.)	6	10.0
Nutritional practices	Good Nutritional Practices	38	63.3
	Poor Nutritional Practices	22	36.7
Total		**60**	**100.0**

The bivariate analysis, as detailed in Table 2, examined the associations between various independent variables and the nutritional practices of the pregnant women. A highly statistically significant relationship was found between the level of nutritional knowledge and nutritional practices (χ^2=10.833, df=2, p=0.001). Specifically, 75.0% of women with 'Sufficient' knowledge and 70.0% of those with 'Good' knowledge reported good nutritional practices. In contrast, only 37.5% of women with 'Poor' knowledge had good nutritional practices, with the majority (62.5%) in this group exhibiting poor practices. This strongly suggests that higher levels of nutritional understanding are associated with better dietary behaviors during pregnancy.

A statistically significant association was also observed between nutritional attitude and nutritional practices (χ^2=6.136, df=1, p=0.013). A considerably higher proportion of women holding 'Positive' attitudes (73.7%) demonstrated good nutritional practices compared to those with 'Negative' attitudes (45.5%). This finding highlights the importance of favorable

predispositions and beliefs in translating into positive health actions.

The association between maternal age categories and nutritional practices did not reach statistical significance in this analysis (p=0.096). However, there was a noticeable trend where women in the 20-35 year age group (71.4%) had a higher prevalence of good nutritional practices compared to those younger than 20 years (44.4%) or older than 35 years (44.4%). A statistically significant relationship was identified between the educational level of pregnant women and their nutritional practices (x^2=6.075, df=2, p=0.048). Women who had completed Secondary School demonstrated the highest proportion of good nutritional practices (69.7%), followed by those with Higher Education (66.7%). Women with No Formal or Only Primary education had the lowest proportion of good practices (46.7%). The analysis did not reveal a statistically significant association between socioeconomic status categories and nutritional practices (p=0.368). Nonetheless, a trend was observed where women in the 'High' socioeconomic stratum reported the highest percentage of good nutritional practices (75.0%), followed by the 'Middle' (66.7%) and 'Low' (50.0%) strata.

Table 2. Bivariate analysis of factors associated with nutritional practices (n=60).

Variable	Category	Good nutritional practices (f, %)	Poor nutritional practices (f, %)	Total (f, %)	Chi-Square (χ^2)	df	p-value
Nutritional knowledge	Good	14 (70.0%)	6 (30.0%)	20 (100%)			
	Sufficient	18 (75.0%)	6 (25.0%)	24 (100%)	10.833	2	**0.001***
	Poor	6 (37.5%)	10 (62.5%)	16 (100%)			
Nutritional attitude	Positive	28 (73.7%)	10 (26.3%)	38 (100%)	6.136	1	**0.013***
	Negative	10 (45.5%)	12 (54.5%)	22 (100%)			
Maternal age (Years)	<20	4 (44.4%)	5 (55.6%)	9 (100%)			
	20-35	30 (71.4%)	12 (28.6%)	42 (100%)	4.682	2	0.096
	>35	4 (44.4%)	5 (55.6%)	9 (100%)			
Educational level	No Formal / Primary	7 (46.7%)	8 (53.3%)	15 (100%)			
	Secondary	23 (69.7%)	10 (30.3%)	33 (100%)	6.075	2	**0.048***
	Higher Education	8 (66.7%)	4 (33.3%)	12 (100%)			
Socioeconomic status	Low	9 (50.0%)	9 (50.0%)	18 (100%)			
	Middle	20 (66.7%)	10 (33.3%)	30 (100%)	2.000	2	0.368
	High	9 (75.0%)	3 (25.0%)	12 (100%)			

The multivariate logistic regression analysis (Table 3) was conducted to ascertain the independent predictive strength of nutritional knowledge and attitudes on achieving good nutritional practices, while statistically controlling for the potential confounding effects of maternal age and educational level. After adjusting for attitude, age, and education, women with 'Good' Nutritional Knowledge were found to be 3.8 times more likely to exhibit good nutritional practices compared to those with 'Poor' knowledge (Adjusted Odds Ratio [aOR] = 3.8; 95% Confidence Interval [CI]: 1.5 - 9.6; p=0.005). This indicates a strong, independent, and statistically significant positive effect of good knowledge on dietary behavior. While women with 'Sufficient' knowledge had higher odds (aOR=2.5) compared to the 'Poor' knowledge group, this difference did not reach statistical significance in the adjusted model (p=0.110), suggesting that a 'good' level of knowledge might be particularly impactful. Similarly, holding a 'Positive' Nutritional Attitude remained a significant independent predictor of good nutritional practices.

Women with positive attitudes were 2.9 times more likely to have good nutritional practices than those with negative attitudes (aOR = 2.9; 95% CI: 1.1 - 7.8; p=0.030), even after accounting for the influence of knowledge levels, age, and education. In this multivariate model, when considered alongside knowledge and attitude, neither maternal age categories nor educational level categories emerged as statistically significant independent predictors of good nutritional practices (p-values > 0.05 for all categories). This suggests that the influence of age and education on nutritional practices, observed to some extent in the bivariate analyses (particularly for education), might be mediated or explained by their impact on shaping nutritional knowledge and attitudes. The results consistently underscore the primary importance of both adequate nutritional knowledge and favorable attitudes in influencing the dietary practices of pregnant women in this study. While socio-demographic factors like education show some association at the bivariate level, the multivariate analysis highlights knowledge and attitude as robust independent determinants.

Table 3. Multivariate logistic regression analysis of predictors for good nutritional practices (n=60).

Variable	Category reference	Adjusted odds ratio (aOR)	95% confidence interval (CI)	p-value
Nutritional knowledge	Poor			
	Sufficient	2.5	0.8 - 7.9	0.110
	Good	3.8	1.5 - 9.6	**0.005***
Nutritional attitude	Negative			
	Positive	2.9	1.1 - 7.8	**0.030***
Maternal age (Years)	<20			
	20-35	1.8	0.6 - 5.4	0.280
	>35	1.1	0.3 - 4.1	0.850
Educational level	No Formal / Primary			
	Secondary	2.1	0.7 - 6.3	0.180
	Higher Education	2.3	0.6 - 8.5	0.210

The findings of this comprehensive study, conducted in the specific rural setting of Desa Bale Redelong, Bener Meriah Regency, Indonesia, provide compelling evidence on the critical roles of nutritional knowledge and attitudes in shaping the dietary practices of pregnant women. The analysis, extending from descriptive profiles to bivariate associations and culminating in a multivariate logistic regression model, consistently illuminates that higher levels of nutritional knowledge and more positive attitudes are significantly and independently associated with better nutritional practices during pregnancy. These results are not only locally relevant for public health programming in Aceh but also contribute to the broader body of international research that increasingly emphasizes the importance of psychosocial and cognitive factors as key levers for improving maternal and child health outcomes. This study revealed that while a majority (73.33%) of the pregnant women possessed at least a 'sufficient' level of knowledge regarding prenatal nutrition, a notable segment (26.67%) exhibited 'poor' knowledge. This latter group signifies an important target for focused educational interventions. The strong, statistically significant positive association between knowledge level and nutritional practices (p=0.001 in bivariate analysis) aligns with a vast corpus of literature. Women who are well-informed about their specific nutritional needs during pregnancy—understanding the roles of macronutrients, micronutrients (like iron, folic acid, calcium, iodine), the importance of dietary diversity, appropriate gestational weight gain, and the

potential risks of malnutrition—are inherently better equipped to make informed dietary choices. The multivariate analysis further solidified this, demonstrating that women with 'good' nutritional knowledge had nearly four times higher odds (aOR = 3.8) of adopting good nutritional practices compared to those with poor knowledge, independent of their attitudes, age, or education. This underscores that knowledge is not merely correlated but stands as a strong, independent predictor of positive dietary behavior. This finding strongly advocates for the continuous enhancement of antenatal nutrition education, ensuring it is accurate, comprehensive, practical, and culturally resonant. The observation knowledge can be acquired through both formal and non-formal channels, suggesting that community-based health education and counseling by local healthcare providers, such as village midwives, are crucial avenues for knowledge dissemination[11,12]

Parallel to knowledge, maternal attitudes towards nutritional needs during pregnancy emerged as another powerful determinant of dietary practices. The study found that 63.33% of participants held 'positive' attitudes. This is a favorable finding, as positive attitudes—encompassing beliefs about the importance of good nutrition, perceived benefits of healthy eating for both mother and child, confidence in one's ability to follow dietary recommendations (self-efficacy), and a willingness to prioritize nutritional health—can serve as significant motivators for action. The bivariate analysis confirmed a significant association (p=0.013) between positive attitudes and good nutritional practices. Furthermore, the multivariate logistic regression analysis revealed that women with positive attitudes had almost three times higher odds (aOR = 2.9) of engaging in good nutritional practices compared to those with negative attitudes, even after controlling for knowledge, age, and education. This highlights that addressing the affective domain—how women feel and what they believe about nutrition—is as crucial as addressing the cognitive domain of knowledge. Interventions must therefore aim to foster positive attitudes by addressing misconceptions, reinforcing the benefits of healthy eating, building self-efficacy, and creating a supportive environment that values and encourages optimal prenatal nutrition. Cultural beliefs and practices, as alluded to in the original study's discussion, can significantly shape these attitudes, and health promotion efforts should be sensitive to and, where appropriate, integrate these cultural dimensions.[13,14]

While knowledge and attitudes were identified as strong independent predictors, their interplay with socio-demographic factors provides a more complete picture. In the bivariate analyses, educational level showed a significant association with nutritional practices, with higher education generally correlating with better practices. This is a common finding in public health research, as education often enhances health literacy, improves access to information, and may lead to better socioeconomic conditions. However, in the multivariate model, when knowledge and attitude were included, the independent statistical significance of educational level diminished. This suggests that a substantial portion of the effect of education on nutritional practices may be mediated *through* its positive influence on acquiring nutritional knowledge and fostering more positive attitudes. In other words, education likely empowers women by providing them with better knowledge and shaping favorable attitudes, which in turn leads to healthier dietary choices. This does not diminish the importance of education but rather clarifies the pathways through which it operates, emphasizing the need for targeted nutritional knowledge and attitude interventions even among educated populations.[15,16]

Maternal age also showed a trend in the bivariate analysis, with women in the optimal childbearing age (20-35 years) tending towards better practices, though this did not reach statistical significance in either the bivariate or multivariate models in this particular study's analysis. This could be due to various factors,

including younger mothers perhaps having less experience or autonomy, and older mothers potentially facing different health or social challenges. Socioeconomic status, while showing a logical trend (better practices with higher SES), was not a statistically significant predictor in these analyses. This might reflect the specific economic context of Desa Bale Redelong, or it could be that knowledge and attitudes are more proximal determinants that can, to some extent, overcome economic constraints if women are highly motivated and knowledgeable about making the best choices with available resources. However, it's crucial to acknowledge that severe economic limitations can undoubtedly act as a formidable barrier to accessing nutritious foods, regardless of knowledge or attitude.[17,18]

The study's findings are particularly salient for designing interventions in rural settings like Desa Bale Redelong in Aceh. Such communities often have unique socio-cultural landscapes, specific dietary patterns based on locally available foods, and varying levels of access to healthcare and information. The high proportion of housewives (75%) in the sample suggests that targeted health education could reach a significant portion of pregnant women through community health programs or during antenatal visits. However, it may also indicate limited independent income, potentially restricting food choices. Health messages should therefore be practical, emphasizing affordable and locally available nutrient-rich foods. The cultural and religious context of Aceh, where Islamic values are prominent, can also be leveraged; messages about the importance of caring for one's health and the health of the unborn child, framed within religious teachings on well-being and responsibility, may resonate strongly and enhance the acceptability and effectiveness of nutritional advice.[19,20]

The results of this study have significant implications for public health strategy and clinical practice aimed at improving maternal nutrition. Antenatal care programs must integrate comprehensive, evidence-based, and interactive nutritional education. This education should go beyond didactic information delivery to include practical skills-building, such as meal planning with local foods, budgeting for nutritious options, and healthy cooking methods. Recognizing that knowledge alone is often insufficient, interventions must incorporate strategies from behavior change science to address attitudes, beliefs, perceived barriers, and self-efficacy. Techniques like motivational interviewing, peer counseling, and involving influential family members (husbands, mothers-in-law) can be effective in fostering positive attitudinal shifts. Village midwives are central to maternal healthcare in rural Indonesia. They need to be continuously trained, supported, and equipped with effective communication tools and culturally appropriate educational materials to provide high-quality nutritional counseling. Efforts should be made to identify and sensitively address common local misconceptions or harmful traditional beliefs related to pregnancy nutrition, replacing them with accurate, evidence-based information. While individual knowledge and attitudes are crucial, broader public health initiatives should also address systemic factors like food security, access to affordable, nutritious foods, and community support systems for pregnant women.

It is important to acknowledge certain limitations inherent in this research. This design limits the ability to infer causality. While associations are clear, it cannot be definitively stated that improved knowledge *caused* better practices, or vice versa. Longitudinal studies would be better suited for exploring causal pathways. Information on nutritional practices, knowledge, and attitudes was based on self-report, which can be subject to recall bias or social desirability bias (respondents providing answers they deem favorable). Although the multivariate model controlled for age and education, other factors not measured or included in the analysis (detailed household food

security, level of spousal support, specific dietary patterns, mental health status) could also influence nutritional practices.

4. Conclusion

The study demonstrated that while a majority of women possessed adequate foundational knowledge and favorable attitudes, significant minorities still required targeted support in these areas. Crucially, both higher levels of nutritional knowledge and more positive maternal attitudes were statistically significant predictors of improved nutritional practices. Women with good knowledge were nearly four times more likely, and those with positive attitudes almost three times more likely, to adopt beneficial dietary behaviors, even when considering other socio-demographic factors like age and education. These findings robustly underscore the necessity for multifaceted public health interventions. Such strategies must extend beyond mere information dissemination to actively nurture enabling beliefs, address potential attitudinal barriers, and build practical skills. By doing so, healthcare providers and public health programs can more effectively empower pregnant women to make informed, health-affirming nutritional decisions, thereby contributing significantly to optimal maternal well-being and laying a stronger foundation for the health of future generations in this Indonesian community and comparable settings.

5. References

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