

Knowledge and Practices Regarding Nutrition Among Antenatal Mothers: A Survey-Based Analysis

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ABSTRACT

Through a structured survey, this study investigates the knowledge and dietary practices related to nutrition among antenatal mothers. Proper antenatal nutrition is essential for both maternal and foetal health, influencing pregnancy outcomes and long-term health. Despite the established importance of specific nutrients such as folic acid, iron, and calcium, gaps remain in the practical application of nutritional knowledge among pregnant women. This study utilises the "Pregnancy Nutrition Knowledge and Practices Questionnaire" to assess antenatal mothers' understanding and adherence to nutritional guidelines. Findings reveal a general awareness of key nutrients but highlight significant gaps in knowledge, particularly regarding iron intake. Dietary practices also show discrepancies, with lower adherence to recommended guidelines for certain food groups. The study underscores the need for targeted educational interventions to bridge these gaps and improve maternal and foetal health outcomes. Recommendations include enhanced educational programmes, community-based initiatives, and tailored support to address identified deficiencies.

Keywords: Antenatal Nutrition, Nutritional Knowledge, Dietary Practices, Pregnant Women, Folic Acid, Iron, Calcium, Educational Interventions, Health Outcomes

Introduction

Antenatal nutrition is a critical component of maternal and foetal health, influencing outcomes for both the mother and the unborn child. Proper nutrition during pregnancy is essential to support the physiological changes that occur, including increased blood volume, metabolic rate, and foetal growth (Institute of Medicine, 2009). Adequate intake of essential nutrients such as folic acid, iron, calcium, and protein is crucial for preventing complications such as neural tube defects, anaemia, and preterm birth (World Health Organisation, 2016). The quality of a mother's diet directly impacts the foetus's development, affecting birth weight and long-term health outcomes (Siega-Riz et al., 2004).

Nutrition plays a significant role in managing and preventing pregnancy-related conditions like gestational diabetes and hypertension (Mello et al., 2014). Inadequate nutrition can lead to poor birth outcomes, including low birth weight and preterm delivery, and may also impact the mother's health postpartum (Rees et al., 2013). Given the importance of antenatal nutrition, understanding and improving dietary practices among pregnant women is vital.

Rationale for the Study

Despite the well-documented importance of nutrition during pregnancy, there remains a significant gap in the practical knowledge and dietary practices among antenatal mothers.

Previous studies have highlighted various deficiencies in nutritional knowledge and adherence to dietary guidelines, which can contribute to suboptimal maternal and foetal health (Pomerleau et al., 2009; Liu & Ma, 2019). The gaps in knowledge often stem from inadequate nutrition education, which can hinder the effective implementation of dietary recommendations.

The need for assessing dietary practices among pregnant women is underscored by the increasing prevalence of pregnancy-related complications linked to poor nutrition. Research has shown that while many women know the general importance of a healthy diet, their specific knowledge about their nutritional needs during pregnancy is often lacking (Gentile et al., 2011). This study aims to bridge this gap by evaluating antenatal mothers' nutritional knowledge and practices through a structured questionnaire, providing insights into current deficiencies and informing targeted educational interventions.

Research Objectives

1. To Evaluate Antenatal Mothers' Knowledge About Nutrition.
2. To assess the alignment of dietary practices with nutritional recommendations.

Research Questions

1. What is the Level of Nutritional Knowledge Among Antenatal Mothers?
2. How Do Antenatal Mothers' Dietary Practices Compare to Recommended Nutritional Guidelines?

The study's focus on these research questions will provide a comprehensive understanding of antenatal mothers' nutritional knowledge and practices. By addressing these areas, the research aims to contribute valuable insights into improving nutritional education and dietary behaviours among pregnant women, ultimately supporting better maternal and foetal health outcomes.

Literature Review

Antenatal nutrition is crucial for ensuring the mother's and developing foetus's health and well-being. During pregnancy, a woman's nutritional needs change significantly to support the growing foetus and accommodate physiological changes in her own body. Proper nutrition during this period is essential for preventing complications and promoting healthy pregnancy outcomes (Institute of Medicine, 2009). This period of increased nutritional demand underscores the importance of understanding and adhering to dietary recommendations.

Key nutritional requirements during pregnancy

Several key nutrients are particularly critical during pregnancy due to their roles in foetal development and maternal health.

- **Folic Acid:** Folic acid is essential for DNA synthesis and cell division, making it crucial for foetal growth. Adequate folic acid intake helps prevent neural tube defects and is recommended at 400 to 800 micrograms daily (Institute of Medicine, 2009). Studies have shown that insufficient folic acid intake is associated with a higher risk of congenital anomalies (Reddy et al., 2014).
- **Iron:** Iron is necessary to increase blood volume and prevent anaemia. Pregnant women require approximately 27 milligrammes of iron daily, compared to 18 milligrammes in non-pregnant women (World Health Organisation, 2016). Iron deficiency during pregnancy can

lead to fatigue, impaired cognitive development in the infant, and preterm birth (Siega-Riz et al., 2004).

- **Calcium:** Calcium is vital for developing the foetal skeleton and teeth. Pregnant women should consume about 1,000 milligrammes of calcium daily. Adequate calcium intake is associated with a reduced risk of preeclampsia and bone health issues (Mello et al., 2014).

Recommended dietary guidelines for pregnant women

The Institute of Medicine (2009) and the World Health Organisation (2016) provide comprehensive guidelines for nutritional intake during pregnancy. These guidelines emphasise the importance of a balanced diet that includes a variety of food groups to meet the increased nutrient needs. The dietary guidelines recommend:

- **A balanced intake of macronutrients:** ensuring adequate amounts of carbohydrates, proteins, and fats to support foetal growth and maternal health.
- **Increased intake of fruits and vegetables:** providing essential vitamins, minerals, and dietary fibre.
- **Adequate hydration:** ensuring sufficient fluid intake to increase blood volume and prevent dehydration.
- **Limiting intake of caffeine and avoiding alcohol:** To reduce the risk of adverse pregnancy outcomes.

Previous Studies on Antenatal Nutritional Knowledge and Practices

Several studies have investigated antenatal nutritional knowledge and practices, revealing significant gaps and variations in dietary habits among pregnant women.

- **Knowledge Gaps:** Pomerleau et al. (2009) found that while many pregnant women understand the general importance of a healthy diet, specific knowledge about nutritional requirements often remains inadequate. Their study highlighted gaps in understanding regarding the need for increased intake of specific nutrients such as folic acid and iron.
- **Practices and Outcomes:** Reddy et al. (2014) explored dietary practices and their impact on pregnancy outcomes. They observed that despite some awareness of nutritional guidelines, many women failed to implement these recommendations consistently, leading to potential risks such as gestational diabetes and anaemia.

Research on dietary practices and their impact on pregnancy outcomes

Dietary practices during pregnancy have a profound impact on both maternal and foetal health.

- **Impact on Maternal Health:** Siega-Riz et al. (2004) demonstrated that poor dietary habits, such as low intake of fruits and vegetables and high consumption of processed foods, are associated with adverse maternal outcomes, including gestational hypertension and diabetes. Their research underscores the need for improved dietary practices to mitigate these risks.
- **Foetal Development:** Mello et al. (2014) examined the effects of maternal diet on foetal development. Their study found that a diet rich in essential nutrients, including adequate folic acid, iron, and calcium, is associated with better foetal growth and development outcomes, including higher birth weights and reduced risk of preterm birth.

Importance of educational interventions

Educational interventions are critical in improving antenatal nutrition by enhancing mothers' knowledge and promoting healthier dietary practices.

- **Effectiveness of Nutritional Education Programmes:** Gielen et al. (2007) reviewed various nutritional education programmes and found that tailored interventions, such as those delivered through healthcare providers and community-based programmes, significantly improved dietary practices among pregnant women. These programmes often include personalised dietary counselling and education about the importance of specific nutrients.
- **Evidence-Based Strategies:** Rees et al. (2013) conducted a systematic review of nutritional education programmes and concluded that integrating educational efforts into routine prenatal care can effectively address knowledge gaps and encourage adherence to dietary guidelines. Their findings suggest that continuous support and education are crucial for maintaining healthy dietary habits throughout pregnancy.

Strategies for Improving Antenatal Nutrition

To address the gaps identified in nutritional knowledge and practices, several strategies can be employed:

- **Community-Based Programmes:** Implementing community-based nutrition programmes can provide targeted education and support to pregnant women. These programmes often involve collaboration with local health services and community organisations to deliver practical advice and resources (Gielen et al., 2007).
- **Healthcare Provider Education:** Training healthcare providers to deliver consistent and accurate nutritional advice is essential. Providers can play a pivotal role in educating pregnant women about the importance of nutrition and how to meet their dietary needs (Rees et al., 2013).
- **Public Health Campaigns:** Public health campaigns to raise awareness about antenatal nutrition can complement individual educational efforts. These campaigns can help disseminate information through various media and outreach activities, increasing overall knowledge and engagement (Institute of Medicine, 2009).

Methodology

The study employed the "Pregnancy Nutrition Knowledge and Practices Questionnaire" (Smith et al., 2018) to assess antenatal mothers' nutritional knowledge and dietary practices. This validated tool was specifically designed to evaluate the extent of nutritional knowledge and its translation into dietary practices among pregnant women. The questionnaire's reliability and validity were established through rigorous testing, including pilot studies and expert reviews. Smith et al. (2018) developed and validated the instrument to ensure it accurately reflects the nutritional knowledge and practices pertinent to pregnancy.

Source and Validation of the Questionnaire

The "Pregnancy Nutrition Knowledge and Practices Questionnaire" was sourced from Smith et al. (2018), who conducted extensive research to validate the tool. The validation process involved a comprehensive review of existing literature, expert consultations, and pilot testing with a sample of pregnant women. The questionnaire demonstrated high internal consistency

(Cronbach's $\alpha = 0.87$) and test-retest reliability ($r = 0.82$) (Smith et al., 2018). It was further refined based on feedback from health professionals and researchers in the field of maternal nutrition.

Structure and Content of the Questionnaire

The questionnaire is divided into three main sections:

1. **Nutritional Knowledge:** This section assesses participants' understanding of key nutritional requirements during pregnancy, including recommended intake of folic acid, iron, and calcium. It comprises multiple-choice and true/false questions designed to evaluate knowledge accuracy (Smith et al., 2018).
2. **Dietary Practices:** This section examines actual dietary behaviours, including the frequency of consumption of specific food groups and adherence to nutritional guidelines. It uses a combination of Likert scale items and frequency-based questions to capture dietary patterns (Smith et al., 2018).
3. **Demographic Information:** Participants provide information on age, education level, socioeconomic status, and other relevant demographics. This section helps contextualise the results and identify potential correlations between demographic factors and nutritional knowledge or practices (Smith et al., 2018).

Participant Selection

Criteria for Inclusion: The study targeted pregnant women attending antenatal clinics. Inclusion criteria were: (1) currently pregnant, (2) attending an antenatal clinic, and (3) able to understand and complete the questionnaire in English.

Sample Size and Recruitment Process: A sample of 200 antenatal mothers was selected to ensure a representative and statistically significant sample. Participants were recruited from multiple antenatal clinics across a metropolitan area. Recruitment was facilitated through clinic staff who provided information about the study and sought voluntary participation from eligible women.

Data Collection Process

Administration of the Questionnaire: The questionnaire was administered both in-person and online to accommodate participants' preferences and ensure accessibility. In-person administration occurred at the clinics, where participants completed the questionnaire on paper. The online version was distributed to those who preferred this mode via a secure survey platform. Both versions of the questionnaire were identical in content and format.

Duration of Data Collection: Data collection spanned four weeks. This period was chosen to balance the need for sufficient time to recruit participants with the need to maintain data relevance and accuracy.

Data Analysis Methods

Techniques for Analysing Responses:

1. **Descriptive Statistics:** Descriptive statistics were used to summarise participants' demographic characteristics, nutritional knowledge, and dietary practices. Measures such as mean, standard deviation, and frequency distributions were calculated.

2. **Inferential Statistics:** To assess relationships between variables, inferential statistics were employed. Correlation analyses determined the strength and direction of relationships between nutritional knowledge and dietary practices. Chi-square tests were used to compare categorical variables, such as adherence to nutritional recommendations.
3. **Statistical Software:** Data were analysed using SPSS version 25.0. This software provided comprehensive tools for statistical analysis, including descriptive and inferential statistics, to interpret the data accurately.

Results

Demographic Characteristics of Participants

Table 1 presents the demographic characteristics of the participants.

Characteristic	N	%
Age		
18-24	50	25%
25-34	100	50%
35-44	40	20%
45+	10	5%
Education Level		
High School	30	15%
College Degree	120	60%
Graduate Degree	50	25%
Socioeconomic Status		
Low	40	20%
Middle	120	60%
High	40	20%

Key Findings on Nutritional Knowledge

Table 2 summarises participants' knowledge about key nutrients.

Nutrient	Correct Responses (%)
Folic Acid	78%
Iron	65%
Calcium	70%

Common Areas of Strength and Weakness

- **Strengths:** High knowledge levels regarding folic acid, with 78% of participants correctly identifying its recommended intake. Knowledge of calcium was also relatively strong (70%).
- **Weaknesses:** Lower levels of knowledge about iron, with only 65% of participants accurately reporting its recommended intake.

Comparison of Knowledge Levels with Recommended Guidelines

The findings indicate that while general knowledge about nutritional needs during pregnancy is relatively high, there are gaps in specific areas, such as iron intake. This discrepancy suggests a need for targeted educational interventions to address these gaps.

Table 3 details the frequency of consumption of key food groups.

Food Group	Daily Intake (%)	Weekly Intake (%)
Fruits and Vegetables	45%	75%
Dairy Products	55%	70%
Red Meat	25%	60%
Whole Grains	40%	65%

Adherence to nutritional recommendations

- **High Adherence:** Daily consumption of fruits and vegetables was reported by 45% of participants, which aligns with recommendations for a balanced diet.
- **Low Adherence:** Lower adherence was noted in red meat and whole grains consumption, which may reflect gaps in dietary practices.

Identification of Gaps and Discrepancies

- **Knowledge-Practice Gap:** Despite adequate knowledge of certain nutrients, such as folic acid and calcium, the practical application in dietary practices was inconsistent. For instance, while 78% of participants were aware of the importance of folic acid, only 45% consistently included fruits and vegetables in their daily diet.
- **Dietary Deviations:** Specific dietary practices that deviated from recommendations included lower than recommended intake of red meat and whole grains, highlighting areas where dietary adjustments could be beneficial.

Analysis

Interpretation of Results

The data analysis from the "Pregnancy Nutrition Knowledge and Practices Questionnaire" reveals several significant findings about antenatal mothers' nutritional knowledge and practices. The study assessed 200 participants, primarily focusing on understanding their awareness of nutritional requirements during pregnancy and aligning their dietary practices with recommended guidelines.

Correlation Between Knowledge Levels and Dietary Practices

The data analysis highlights a notable correlation between nutritional knowledge and dietary practices among antenatal mothers. Table 1 summarises the correlation coefficients between knowledge levels of key nutrients and dietary practices.

Table 1: Correlation Between Knowledge Levels and Dietary Practices

Nutrient	Knowledge Level (r)	Dietary Practice (r)
Folic Acid	0.75	0.68
Iron	0.60	0.55
Calcium	0.70	0.63

Note: r = Pearson correlation coefficient.

Findings:

- **Folic Acid:** Strong correlation between knowledge level ($r = 0.75$) and dietary practice ($r = 0.68$). Higher knowledge of folic acid is associated with better adherence to dietary recommendations.
- **Iron:** Moderate correlation between knowledge level ($r = 0.60$) and dietary practice ($r = 0.55$). While there is a positive relationship, it is weaker compared to folic acid.
- **Calcium:** Strong correlation between knowledge level ($r = 0.70$) and dietary practice ($r = 0.63$). Similar to folic acid, higher knowledge correlates with better dietary practices.

These correlations indicate that antenatal mothers who have a better understanding of nutritional needs tend to follow dietary guidelines more closely. However, the strength of this relationship varies by nutrient.

Factors Influencing Nutritional Knowledge and Practice

Education Level: Table 2 presents the relationship between education level and nutritional knowledge.

Table 2: Nutritional Knowledge by Education Level

Education Level	Mean Knowledge Score	Standard Deviation
High School	65%	10%
College Degree	75%	8%
Graduate Degree	85%	6%

Note: Scores represent percentage correct responses on knowledge questions.

Findings:

- **High School:** lower mean knowledge score (65%) and greater variability.
- **College Degree:** Higher mean knowledge score (75%) and less variability.
- **Graduate Degree:** highest mean knowledge score (85%) and least variability.

Higher educational attainment is associated with better nutritional knowledge. This aligns with previous research suggesting that education enhances understanding of dietary needs (Smith et al., 2018; Rees et al., 2013).

Socioeconomic Status: Table 3 illustrates the impact of socioeconomic status on dietary practices.

Table 3: Dietary Practices by Socioeconomic Status

Socioeconomic Status	Daily Intake of Recommended Foods (%)	Adherence to Guidelines (%)
Low	40%	45%
Middle	60%	70%
High	75%	80%

Findings:

- **Low Socioeconomic Status:** Lower adherence to dietary guidelines and intake of recommended foods.
- **Middle Socioeconomic Status:** Moderate adherence and intake.
- **High socioeconomic status:** highest adherence and intake.

Socioeconomic factors significantly impact dietary practices, and higher socioeconomic status is associated with better adherence to nutritional recommendations. This is consistent with

previous studies indicating that socioeconomic status influences access to and consumption of healthy foods (Mello et al., 2014; Pomerleau et al., 2009).

Comparison with Previous Studies

The findings from this study align with existing literature in several respects:

- **Nutritional Knowledge:** Consistent with Smith et al. (2018), the study found that higher knowledge levels correlated with better dietary practices. This underscores the importance of effective nutritional education during pregnancy.
- **Dietary Practices:** The study confirms previous findings by Rees et al. (2013) that socioeconomic status affects dietary adherence. Pregnant women from higher socioeconomic backgrounds tend to follow nutritional guidelines more closely, likely due to better access to resources.

Contrasts and Potential Reasons:

- **Iron Knowledge:** The weaker correlation between knowledge and practice for iron compared to folic acid and calcium may reflect differences in the perceived importance or complexity of iron intake. Previous research by Siega-Riz et al. (2004) suggests that iron may be less emphasised in some educational materials, leading to less consistent dietary practices.

Implications for Antenatal Nutrition Education

Recommendations for targeted educational interventions:

1. **Enhanced Education Programmes:** Based on the findings, more comprehensive education programmes are needed to focus on all key nutrients, especially iron. Tailored educational interventions could address specific gaps in knowledge and practice (Gielen et al., 2007).
2. **Socioeconomic Considerations:** Educational programmes should consider socioeconomic factors to ensure they are accessible and relevant to all pregnant women. Community-based initiatives may help bridge gaps in knowledge and practice among lower socioeconomic groups (Mello et al., 2014).
3. **Educational Materials:** The development of more engaging and accessible educational materials could improve knowledge and adherence to dietary recommendations. Interactive tools and practical guidance may enhance the effectiveness of nutrition education (Rees et al., 2013).

Importance of Addressing Identified Gaps:

Addressing gaps in nutritional knowledge and practices is crucial for improving maternal and foetal health outcomes. Effective education and targeted interventions can help ensure that all antenatal mothers receive the information and support they need to maintain a healthy diet during pregnancy.

Conclusion

Summary of Key Findings

This study provides a comprehensive assessment of antenatal mothers' knowledge and practices regarding nutrition, revealing critical insights into their understanding and dietary habits. Key findings from the analysis are summarised below:

1. **Overall Level of Nutritional Knowledge:** The study found that antenatal mothers possess varying levels of nutritional knowledge, with higher education levels generally associated with a better understanding of key nutrients such as folic acid, iron, and calcium. The average knowledge score was significantly higher among those with graduate degrees than those with only high school education. However, gaps in knowledge were evident, particularly concerning iron intake, which was less understood than folic acid and calcium.
2. **Alignment of Dietary Practices with Recommended Guidelines:** The correlation between nutritional knowledge and dietary practices indicates that more informed mothers tend to adhere better to dietary recommendations. For example, there was a strong correlation between knowledge of folic acid and its dietary practice. Nevertheless, discrepancies between knowledge and practice were noted, with some participants not fully implementing recommended dietary guidelines despite having adequate knowledge.

Implications for healthcare providers and educators

1. **Need for Improved Educational Programmes:** The study highlights the importance of targeted educational interventions to address the gaps in nutritional knowledge among antenatal mothers. Healthcare providers and educators must focus on delivering comprehensive, accessible, and practical nutritional education. Programmes should be tailored to various educational backgrounds and incorporate interactive elements to enhance engagement and retention.
2. **Strategies for Enhancing Nutritional Practices:** To improve adherence to nutritional recommendations, several strategies are recommended:
 - **Community-Based Programmes:** Implementing community outreach programmes that provide practical dietary advice and support can help bridge gaps in knowledge and practice (Gielen et al., 2007).
 - **Healthcare Provider Education:** Training healthcare providers to offer clear, actionable nutritional advice and support during antenatal visits can reinforce the importance of dietary adherence (Rees et al., 2013).
 - **Enhanced Educational Materials:** Developing engaging and culturally relevant educational materials can facilitate better understanding and application of nutritional guidelines (Mello et al., 2014).

Recommendations for Future Research

1. **Areas for Further Investigation:** Future research should explore the following areas to build on the findings of this study:
 - **Longitudinal Studies:** Conducting longitudinal studies to track changes in nutritional knowledge and practices over time can provide insights into how dietary habits evolve throughout pregnancy and postpartum periods.
 - **Intervention Trials:** Evaluating the effectiveness of specific educational interventions and dietary programmes through controlled trials can determine the best approaches for improving antenatal nutrition (Pomerleau et al., 2009; Siega-Riz et al., 2004).
2. **Potential Improvements in Questionnaire Design and Data Collection Methods:** Future studies could benefit from:

- **Refining Questionnaire Design:** Improving the clarity and relevance of questionnaire items to capture nuances in dietary practices better and knowledge can enhance data accuracy. Incorporating validated scales and including more comprehensive questions on dietary practices and barriers can provide deeper insights.
- **Utilising mixed methods approaches:** Combining quantitative surveys with qualitative interviews or focus groups may offer a more nuanced understanding of the factors influencing nutritional knowledge and practices.

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