

Chapter One

Introduction

1.1 Background to the Study

The promotion of pregnant women and community's health depend heavily on nutrition. Pregnant women should consume a variety of foods that are high in energy, protein, vitamins, minerals, and water because women have increased physiological needs for energy and nutrients to support fetal growth and development. A person must be well-nourished in order to be healthy, and nutritional status can be impacted by bad health. The main elements of optimum nutrition and health are encouraging a supportive lifestyle and care, micronutrient supplementation (commonly iron and folate), disease prevention and treatment measures (top priorities for malaria and deworming), and consumption of a variety of foods from both plant and animal origins. Additionally, eating more frequently and in larger quantities with gestational age, using iodized salt for the entire family, and avoiding any foods due to taboos are also important¹.

Pregnancy is a thing of joy that every family is looking forward to seeing the fruitful outcome of, and having a normal and bouncing baby as a reward of blissful marriage. Pregnant woman is a woman carrying a growing fetus in her womb that takes approximately forty (40) weeks starting from the last day of menstrual period till the two weeks before or after the expected date of delivery². During the antenatal period, the community health nurse should be able to let the pregnant women have knowledge of the dietary patterns, their attitude towards and the choice of food on the dietary patterns, so that the effect of Nutritional education intervention will improve and empower them with the knowledge and other necessary resources to adopt in order to change the previous attitude towards a healthy living and their choice of food, that will benefit both the mother and baby.

In order to ensure that pregnant women receive adequate nutrition and proper health, nutrition knowledge is crucial. Malnutrition and poor health are said to be caused immediately by a lack of knowledge and attitude. Evidence has demonstrated that attitudes and knowledge about nutrition and health are indicators of dietary habit modification and are one of the elements that go into having a healthier nutritional practice. Therefore, pregnant women are expected to have the necessary knowledge and attitude to maintain optimal nutrition and health during pregnancy¹.

Nutritional Education is a vital health promotion tool that involves informing and empowering individuals with the knowledge and skills needed to make informed dietary decisions. For pregnant women, it means understanding the significance of nutrient-dense foods, how to plan balanced meals, and how to avoid cultural myths surrounding food². Nutritional education programs delivered during antenatal care have been shown to improve diet quality, increase micronutrient intake, and support healthy pregnancy outcomes, particularly in low-resource settings like semi-urban Nigeria³.

Nutritional Knowledge refers to a person's understanding of the role of nutrients in supporting both maternal and fetal health. This includes knowledge of food sources, dietary requirements during pregnancy, and the effects of malnutrition. Poor nutritional knowledge among pregnant women is a recognized barrier to achieving optimal dietary practices and can contribute to maternal anemia, poor weight gain, and complications during childbirth⁴. In contrast, adequate knowledge is positively correlated with improved dietary behaviors and better birth outcomes⁵.

Attitude encompasses an individual's beliefs, perceptions, and values toward nutrition and dietary practices. In pregnancy, attitudes can be shaped by cultural practices, religious beliefs, personal experiences, and misinformation. For example, some pregnant

women avoid eggs or fish due to fear of having large babies, despite the nutritional importance of such foods. Studies indicate that nutritional education can reshape negative attitudes and promote healthier choices when delivered in culturally sensitive ways⁶. Thus, improving attitude through health education is vital to translate knowledge into action.

Food Choices refer to the decisions pregnant women make regarding what, when, and how much to eat. These choices are influenced by knowledge, attitude, food accessibility, cultural beliefs, and socioeconomic factors. In many Nigerian communities, traditional beliefs and economic constraints significantly shape food preferences, often resulting in poor dietary diversity⁷. Interventions that improve knowledge and correct misconceptions have been shown to increase dietary diversity and intake of critical micronutrients like folic acid, iron, calcium, and iodine⁸.

Globally, Community Health Nurses (CHNs) are instrumental in maternal health programs, focusing on providing holistic care through education, counseling and advocacy. They work within the community to identify and address barriers to optimal health behaviours. The educational interventions are tailored to meet the unique needs of their community ensuring, cultural and contextual relevance. CHNs engaged in programmes that educate pregnant women on the importance of balance diet and micronutrient supplementation. For instance, in the United States, community health programmes led by CHN include tailored nutritional counseling based on the U.S Dietary Guideline for Americans. These programmes emphasize the importance of folic-acid, iron, and calcium intake and the avoidance of harmful substances like alcohol and tobacco during pregnancy⁹. Similarly, in India, health nurses delivered nutrient education through community workshops, helping pregnant women understand the importance of micro-

nutrients like iodine and zinc, especially in rural areas where traditional diets may lack diversity¹⁰.

In Africa, where maternal malnutrition and adverse pregnancy outcomes are prevalent. They focus on education, knowledge, attitude and advocacy to improve dietary pattern among pregnant women, often addressing social-cultural economic and knowledge barriers unique to the region. In Kenya, health nurses implemented community-led nutrition groups, focusing on improving maternal and child health. Pregnant women are educated on the importance of balanced diets, food safety and supplementation through peer support and counselling sessions. These programmes not only improved knowledge and attitude but also fostered community support for healthier dietary choices¹¹. In South Africa, dietary education was integrated at routine antenatal visits, pregnant woman received individualized counselling on nutrient - rich diets and the importance of maintaining a healthy weight during pregnancy, which reduced the prevalence of low birth weight and anaemia¹².

In rural Nigeria, traditional food taboos has been addressed through health educations and dialogue. Programmes that focused on demystifying harmful cultural beliefs, such as the avoidance of fish or dairy products during pregnancy, showed significant improvement in dietary diversity and maternal health outcomes. In Oyo state, addressing dietary patterns among pregnant women is a big challenge. The region faces unique challenges, including widespread poverty, food insecurity, lack of knowledge, attitude and deeply rooted cultural practices that influence dietary patterns. Oluyole local government area PHC in Oyo state integrates dietary education into antenatal care services. Pregnant women attending clinics are counselled on the importance of micronutrients like folic acid and iron especially folic acid that prevents neural tube defect as well as the benefits of consuming protein-rich foods such as fish, beans, and eggs.

A study conducted in Ona-Ara Local Government Area of Oyo State revealed that many pregnant women lacked knowledge about the nutritional value of their diets until they participated in Nutritional education intervention programs¹³. A study confirms that various micronutrient deficiencies during pregnancy have a link with increased risk of maternal morbidity and mortality. Furthermore, a healthy diet during pregnancy, which is characterized by adequate intakes of essential nutrient, reduce the risk of pregnancy complications¹⁴. Nutritional education interventions can significantly influence the knowledge, attitude and choice of food on dietary pattern of pregnant women. These interventions typically aim to improve maternal nutrition, enhance healthy outcomes for both mother and child, provide education and support.

There is need to refocus efforts on the diet of the pregnant women in order to improve their knowledge, attitude and choice of food to prevent complications that may ensue during pregnancy and delivery process. Especially in this dispensation that food items and fruits prices are expensive. It is on this note that this study investigates the effectiveness of nutritional education intervention on knowledge, attitude and food choices regarding diet among pregnant women in Ibadan Semi-urban Areas, Oyo-state with the aim of imparting knowledge of the importance of diet that are beneficial to the pregnant women and to change their previous attitude towards the diet and the choice of food in order to have good pregnancy outcomes worldwide.

1.2 Statement of the Problem

The problems of dietary patterns among pregnant women are underestimated as critical global health issue, which affects the babies, this contribute significantly to disease conditions like anaemia, malnutrition complications during delivery, growth retardation in babies, congenital mal-formation, morbidity and mortality in some cases due to lack of knowledge of pregnant women on dietary patterns, negative attitude towards dietary

patterns and social economic factors that influence the pregnant women food choices. Some pregnant women do not know the importance of folic acid prenatally can prevent neural tube defects. Inadequate knowledge of pregnant women on the nutrition may lead to excessive weight or obesity that can affect them during pregnancy and the newborn, intake of excessive carbohydrate diets, drinking alcohol, beverages, and smoking cigarettes. Some do not attend the clinic regularly just to mention a few².

A study in Benin reported that a significant percentage 65% (235) of pregnant women were unaware of the consequences of their nutritions, indicating a gap in nutritional education, the findings underscore the need for targeted educational interventions to enhance nutritional knowledge and subsequently improve dietary choices¹⁵. If the importance of education is stressed, the orientation and attitudes of some pregnant women will change towards the dietary patterns. Researcher, witnessed a pregnant woman who asked questions about a fruit (cherry), that if one cannot drink the maggots coming from the cherry fruit, one cannot enjoy the fruit very well, which means education intervention about washing fruit thoroughly before eating is yet to be understood by such woman, this case happened in one of the study settings in Ibadan Semi-urban Areas. On dietary patterns and associated factors among women in Ibadan, Nigeria.

The finding concluded that (831/47.6%) of the respondents, consumed plain vegetable soup without dried fish, locus beans or crayfish that can boost the immunity of the mother. There is still a gap in educational intervention to improve the knowledge, attitude and dietary choices¹⁶. Inadequate or imbalanced diets can lead to complications like pre-eclampsia, gestational diabetes, low birth weight and increased risk of chronic diseases later in life, identifying and addressing these dietary patterns is crucial for improving maternal and child health¹⁷.

The dietary patterns of pregnant women are influenced by complex interplay of knowledge, attitudes, and social economic factors. Addressing these issues, through comprehensive educational intervention program and social economic support are essential for improving the nutritional status of pregnant women and ensuring better health outcomes for both mothers and their babies. This study examined the effectiveness of nutritional education on knowledge, attitude, and food choices regarding diet among pregnant women in Ibadan Semi-urban Areas, Oyo State.

1.3 Justification of the Study

The study of effectiveness of nutritional education on knowledge, attitude and food choices regarding diet among the pregnant women is essential for several compelling reasons and outcomes that have the profound impact on maternal and fetal health outcomes, addressing nutritional deficiencies, understanding educational level and economic status (Income) of the pregnant women, supporting healthcare providers, empowering women, and so on. The effects of nutritional education intervention on knowledge, attitude, and food choices regarding diet among pregnant women make the above outcomes have the potential to improve overall maternal and child health outcomes and contributes to broader society.

1.4 Aim and Objectives of the Study

The aim of this study is to determine the effectiveness of nutritional education on knowledge, attitude and choice of food regarding diet among pregnant women in Ibadan Semi-urban LGAs, Oyo State.

The Objectives were to:

- i. examine the main effect of nutritional education on knowledge regarding diet among pregnant women in Ibadan Semi-urban Areas, Oyo State;

- ii. determine the main effect of nutritional education on attitude towards diet among pregnant women in Ibadan Semi-urban Areas, Oyo state ;
 - iii. examine the main effect of nutritional education on food choices regarding diet among pregnant women in Ibadan Semi-Urban Areas, Oyo state ;
 - iv. assess the mean score to compare the pre and post test of knowledge, attitude and food choices regarding diet among pregnant women in Ibadan Semi-urban Areas, Oyo state ;
- and
- v. assess the difference between pre and post test on knowledge, attitude and food choices regarding diet among pregnant women in Ibadan Semi-urban Areas Oyo state.

1.5. Research Questions

1. What is the main effect of nutritional education on knowledge regarding diet among pregnant women in Ibadan Semi-urban Areas, Oyo state ?
2. What is the main effect of nutritional education on attitude towards diet among pregnant women in Ibadan Semi-urban Areas, Oyo state.?
3. What is the main effect of nutritional education on food choices regarding diet among pregnant women in Ibadan Semi-urban Areas, Oyo state ?
4. What is the mean score to compare pre and post test on knowledge, attitude and food choices regarding diet among pregnant women.?
5. What is the difference between pre and post test on knowledge, attitude and food choices regarding diet among pregnant women.?

1.6 Hypotheses

- Ho1. There is no significant main effect of nutritional education on knowledge regarding diet among pregnant women.
- Ho2. There is no significant main effect of nutritional education on attitude regarding diet among pregnant women.

Ho3. There is no significant main effect of nutritional education on food choices regarding diet among pregnant women.

Ho4. There will be no significant difference between the mean score of pre and post test of knowledge, attitude and food choices regarding diet among pregnant women.

1.7 Significance of the Study

The finding of this study aims to contribute to the body of education, knowledge, attitude towards maternal diet and choices of food on dietary pattern among pregnant woman in Ibadan Semi-urban LGAs. The study findings may increase the knowledge of the pregnant women on the importance of iron, folic acid and micro nutrients present in the diet. Subsequently, the finding may improve patients utilization of health services and becoming aware of the quality of services being rendered during ante-natal visits by the community health nurses.

The findings of the study may provide information on the contribution of the effectiveness of nutritional education on knowledge regarding diet, attitude towards diet, and food choices on diet among pregnant women in Ibadan Semi-urban LGAs. This finding can inform healthcare providers, policy makers, and public health/community health nurses in developing targeted strategies to support health, pregnancies and babies by acquiring adequate knowledge and helping the economic status of the pregnant women. Finally, the effects of nutritional education intervention can contribute significantly to global efforts in improving the knowledge, attitude, and food choices on diet among the pregnant women to boost their immunity against any infection during pregnancy and to prevent complications during delivery so as to ensure live and normal babies.

1.8 Scope of the Study

The scope of this study is focused on Effectiveness of Nutritional education on knowledge, attitude and food choices regarding diet among pregnant women in the three (3) selected Local Government Areas: Ona - Ara L. G.As, Egbeda Local Government Areas and Oluyole LGAs of Oyo state

1.9. Limitation of the Study

Despite its contributions, this study was not without limitations. It was conducted within selected local government areas in Ibadan, which may limit the generalizability of findings to other regions of Nigeria or Sub-Saharan Africa. The short follow-up period restricted the ability to assess long-term effects of the intervention on maternal and neonatal outcomes. Additionally, reliance on self-reported responses in assessing dietary practices could introduce social desirability bias, as participants may have overstated positive behaviors. The study was also limited by sample size constraints, which may affect statistical power in detecting smaller effects.

1.10. Operational Definition of Terms.

Attitude towards Diet: what a pregnant woman feels, thinks and should do towards the diet.

Effectiveness: a good change that is expected to occur in knowledge, attitude, and choice of food on dietary patterns.

Food Choices: The selection of food and dietary practices by pregnant women.

Ibadan Semi-Urban LGAs: Ibadan Semi-Urban Local government areas. They are 6 in numbers: Akinyele, Egbeda, Oluyole, Ona-Ara, Lagelu, and Ido

Knowledge of Dietary Pattern: in this study, it is referred to as the level of understanding of pregnant women in response to specific questions related to dietary pattern.

Nutritional Education: this is an information on nutrition put together to impact knowledge directly to the pregnant woman.

Pregnant Women: These are women who are having their first or subsequent pregnancies in their first and second trimesters improving the characters from old behavior to new one as regards the diet.

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Endnotes

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Chapter Two

Literature Review

2.1 Conceptual Review

Pregnancy is a critical period characterized by increased nutritional needs to support maternal health, fetal growth, and development. Inadequate dietary patterns during pregnancy can lead to adverse maternal and neonatal outcomes, including anemia, low birth weight, and preterm delivery¹. Community health nurse-led interventions have emerged as a pivotal strategy for promoting optimal dietary behaviors among pregnant women, especially in low-resource settings². This literature review evaluates the evidence surrounding the effectiveness of nutritional education intervention on dietary patterns, the common dietary patterns observed among pregnant women, barriers to optimal nutrition, and evidence-based strategies to address these issues. The importance of dietary patterns during pregnancy cannot be overstated, as maternal nutrition significantly influences the health outcomes of both the mother and the fetus. Proper nutrition plays a critical role in preventing adverse outcomes such as low birth weight, preterm delivery, and congenital abnormalities. Furthermore, maternal nutrition is essential for adequate fetal growth, maternal health, and effective breastfeeding postpartum³.

2.1.1 Nutritional Education

Nutritional Education: “Proper nutrition can prevent birth defects and allow neonates to start life at a healthy weight, reducing later risks of disease” A pregnant women should prepare her meals and snacks in a way that can fulfil her daily energy requirement of 2200 kcal. This is believed to achieve the recommended weight gain in pregnancy which is 11.5 to 16 kg; on average is 12.5 kg for women with normal pre pregnancy body mass index (BMI)¹³⁹.

Nutritional education plays a vital role in promoting healthy dietary habits among pregnant women, ultimately benefiting both mother and fetus. Research highlights the significance of nutrition education in improving pregnancy outcomes.

Benefits of Nutritional Education:

Improved Knowledge: Studies have shown that nutritional education significantly increases pregnant women's knowledge about healthy diets, nutritional requirements, and weight management.

Better Dietary Practices: Education on nutrition leads to improved dietary habits, such as increased consumption of fruits, vegetables, whole grains, and lean proteins.

Positive Pregnancy Outcomes: Nutritional education has been linked to reduced risk of anemia, preterm delivery and low-birth weight ¹².

Effective Strategies for Nutritional Education:

Personalized Counseling: Tailoring nutrition education to individual needs and cultural backgrounds can enhance its effectiveness.

Regular Sessions: Providing ongoing education and support throughout pregnancy can lead to better outcomes.

Healthcare Provider Involvement: Midwives and other healthcare professionals play a crucial role in delivering nutrition education and promoting healthy habits.

Challenges and Opportunities:

Limited Awareness: Many pregnant women lack adequate knowledge about nutrition and healthy eating habits.

Socioeconomic Factors: Economic constraints and cultural beliefs can influence food choices and dietary practices.

Opportunities for Improvement: Incorporating social media and mobile health applications can help reach more pregnant women and provide ongoing support².

By prioritizing nutritional education, healthcare providers can empower pregnant women to make informed choices about their diet and lifestyle, ultimately improving maternal and fetal health outcomes. Knowledge of pregnant women pre and post intervention: Average knowledge scores at three time periods (pre-intervention, immediate after intervention, and 6 weeks) were significantly increased in the majority of the studies.

Nutritional Education

A program or intervention designed to educate pregnant women about healthy nutrition and dietary practices. To improve knowledge, attitude, and food choices among pregnant women.

2.1.2 Knowledge

The understanding and awareness of pregnant women about healthy nutrition and dietary practices.

Measurement: Can be assessed through questionnaires, surveys, or interviews.

2.1.3 Attitude

The feelings, beliefs, and values of pregnant women towards healthy nutrition and dietary practices.

Measurement: Can be assessed through surveys, interviews, or attitude scales.

Food Choices

The selection of foods and dietary practices by pregnant women.

Measurement: Can be assessed through food frequency questionnaires, dietary recalls, or observational studies.

2.1.4 Educational Level

Definition: The level of formal education completed by the pregnant woman.

Potential impact: May influence the effectiveness of nutritional education, with higher education levels potentially leading to better knowledge retention and application.

2.1.5 Income Status

The economic status of the pregnant woman, including her ability to afford healthy food options.

Potential impact: May influence food choices, with higher income levels potentially leading to healthier food options and greater ability to apply nutritional knowledge.

These can interact with each other in complex ways. For example, nutritional education may be more effective for women with higher educational levels, while income status may influence the ability to apply knowledge and make healthy food choices.

2.1.6 Nutritional Needs during Pregnancy

Pregnancy brings physiological changes that increase energy and nutrient demands. These requirements vary based on factors like the mother's pre-pregnancy body mass index (BMI) and the stage of pregnancy. The Institute of Medicine (IOM) and the 2020-2025 Dietary Guidelines for Americans emphasize the importance of diverse dietary patterns, including whole grains, lean proteins, fruits, vegetables, and dairy products, to meet these demands⁴. Micronutrients such as folic acid, iron, and omega-3 fatty acids are particularly critical for fetal development and maternal health⁵. Nutrition during pregnancy is critical for the health of both the mother and the developing fetus. Adequate dietary intake provides the energy and nutrients required to support fetal growth, maternal physiological changes, and successful outcomes during childbirth.

Increased Energy and Macronutrient Needs

Pregnancy leads to an increase in caloric requirements to accommodate fetal growth, placental development, and maternal energy demands. Energy needs rise progressively through the trimesters:

First Trimester: Caloric intake remains close to pre-pregnancy levels.

Second Trimester: An additional 340 kilocalories per day is recommended.

Third Trimester: An extra 452 kilocalories per day is suggested to support rapid fetal growth and maternal tissue expansion⁶.

Macronutrients: which include carbohydrates, proteins, and fats, play critical roles in fetal development: Carbohydrates are the primary energy source, with complex carbohydrates preferred for their nutrient density⁷. Proteins are vital for fetal and placental tissue development. The recommended dietary allowance (RDA) increases to 1.1 grams per kilogram of body weight daily, equating to approximately 71 grams for an average pregnant woman⁸. Fats are essential for fetal brain and retinal development, with a particular emphasis on omega-3 fatty acids such as docosahexaenoic acid (DHA). Sources include fatty fish, flaxseeds, and walnuts⁹. **Micronutrient Needs:** are equally important during pregnancy, contributing to cellular development, immune function, and prevention of congenital abnormalities: **Folic Acid:** Adequate intake of folic acid (600 micrograms daily) prevents neural tube defects. Sources include leafy greens, fortified cereals, and citrus fruits¹⁰. **Iron:** Iron supports increased maternal blood volume and prevents anemia. A daily intake of 27 milligrams is recommended, with heme sources like meat and non-heme sources such as spinach and legumes¹¹. **Calcium:** Required for fetal skeletal development, the RDA is 1,000 milligrams daily. Key sources include dairy products and fortified plant-based milks. **Vitamin D:** Essential for calcium absorption and immune health, the recommendation is 600 IU daily. Sunlight exposure and fortified foods are primary sources¹². **Omega-3 Fatty Acids:** These support brain development, with a daily intake of 200–300 milligrams of DHA recommended. Fatty fish like salmon are an excellent source¹³.

2.1.7 Physiological Changes and their Impact

During pregnancy, physiological changes such as increased blood volume, hormonal shifts, and weight gain necessitate adjustments in dietary intake:

Increased Blood Volume: Drives higher demands for iron and water.

Weight Gain: Healthy weight gain varies by pre-pregnancy BMI. For women with a normal BMI, a gain of 11–16 kilograms are ideal¹⁴.

Recommendations for a Balanced Diet

To meet nutritional needs, pregnant women should adopt a diet that includes:

Diverse Food Groups: Whole grains, lean proteins, healthy fats, and colorful fruits and vegetables.

Frequent, Smaller Meals: To manage nausea and maintain steady energy levels.

Food Safety Practices: Avoiding high-mercury fish, raw or undercooked foods, and unpasteurized dairy to prevent foodborne illnesses¹⁵.

Role of Prenatal Supplements

Despite a balanced diet, prenatal supplements are often recommended to fill nutritional gaps, especially for folic acid, iron, and DHA. These are particularly critical for women with dietary restrictions or limited access to nutrient-dense foods¹⁶. Meeting the nutritional needs of pregnant women is vital to ensuring healthy pregnancies and optimal fetal development. Combining a balanced diet, prenatal supplementation, and culturally sensitive educational interventions offers a comprehensive approach to improving maternal and neonatal health outcomes.

2.1.8 Educational Level on Knowledge, Attitude, and Food Choices

Educational level is a critical determinant of health literacy, influencing individuals' ability to access, understand, and apply health-related information. Among pregnant women, education plays a pivotal role in shaping knowledge, attitudes, and behaviors regarding nutrition and dietary patterns. This section explores the relationship between educational attainment and these variables, with a focus on evidence from global, regional, and local perspectives¹⁷.

Education and Nutritional Knowledge

Higher levels of education have consistently been associated with increased knowledge about nutrition and health. Educated individuals are more likely to understand the significance of balanced diets, essential nutrients, and food safety practices. Education enhances a woman's ability to interpret dietary guidelines and incorporate them into daily practices, thereby improving nutritional outcomes for both mother and child.

In developing countries, where educational disparities are pronounced, the impact of limited education on nutritional knowledge is stark. A study conducted in southwestern Nigeria revealed that women with secondary or higher education demonstrated significantly better understanding of the importance of micronutrients, such as folic acid and iron, compared to those with no formal education⁵⁸. This highlights the role of education in bridging knowledge gaps that may affect maternal and child health outcomes.

Education and Attitudes toward Nutrition

Education not only imparts knowledge but also influences attitudes toward dietary habits. Educated women are more likely to appreciate the benefits of healthy eating and demonstrate a positive disposition toward adopting recommended dietary practices. For instance, a cross-sectional study in rural India found that pregnant women with higher educational levels exhibited more favorable attitudes toward consuming diverse diets and avoiding harmful substances like caffeine and alcohol⁸¹. Conversely, limited education may perpetuate misconceptions and cultural biases regarding food consumption during pregnancy. Studies in sub-Saharan Africa have documented that less-educated women often adhere to restrictive dietary taboos, which can compromise nutritional intake. These findings underscore the need for targeted educational interventions to address attitudinal barriers rooted in insufficient formal education⁸².

Education and Food Choices

Food choices during pregnancy are influenced by a complex interplay of knowledge, attitudes, and socioeconomic factors, with education serving as a key determinant. Educated women are more likely to make informed decisions about their diets, prioritizing nutrient-rich foods over calorie-dense, nutrient-poor alternatives⁸³. In low-income settings, however, the relationship between education and food choices can be moderated by economic constraints⁸⁴. For example, a study found that even among educated pregnant women in rural Nigeria, limited income often restricted access to diverse and nutritious foods. This underscores the need for complementary interventions, such as subsidies or food assistance programs, to ensure that educational gains translate into improved dietary behaviors⁸⁵.

The relationship between education and dietary patterns highlights the importance of tailoring community health nurse-led interventions to the educational backgrounds of pregnant women. Nurses play a vital role in delivering culturally sensitive and accessible nutritional education that addresses the specific needs of low-literacy populations⁸⁶. For example, visual aids and practical demonstrations can be employed to overcome barriers to understanding among less-educated women⁸⁷.

Furthermore, integrating education-focused strategies into antenatal care can amplify the impact of these interventions. A research demonstrated that combining nutrition education with skills-building workshops improved dietary adherence among pregnant women across diverse educational levels. These findings support the need for holistic approaches that address both knowledge deficits and structural challenges affecting food choices⁸⁸.

Educational level significantly influences knowledge, attitudes, and food choices among pregnant women. Higher education enhances nutritional literacy and fosters positive

attitudes and informed dietary behaviors⁸⁹. However, structural barriers such as income inequality may limit the translation of knowledge into practice, particularly in low-resource settings. Community health nurse-led interventions must therefore be designed to address these disparities, ensuring that all pregnant women, regardless of educational background, can benefit from improved dietary patterns.

2.1.9. Income Level on Knowledge, Attitude, and Food Choices on Dietary Pattern

Income level is a significant determinant of dietary patterns, shaping access to nutritious foods, health-related knowledge, and overall attitudes toward nutrition. This section explores how income influences knowledge, attitudes, and food choices among pregnant women, with an emphasis on global, regional, and local perspectives⁹⁰.

Income and Nutritional Knowledge

Income impacts access to resources that enhance nutritional knowledge, such as educational materials, antenatal classes, and healthcare services. Higher-income households are more likely to afford quality education and healthcare, which often include nutrition counseling⁹¹. Women from higher-income groups demonstrated greater awareness of the importance of a balanced diet, essential vitamins, and prenatal supplements compared to their lower-income counterparts⁹².

However, income disparities often exacerbate knowledge gaps in low-resource settings. In rural Nigeria, it was found that women from low-income households had limited exposure to nutrition education, relying instead on traditional knowledge that may not align with modern dietary recommendations⁹³. This underscores the need for targeted interventions to bridge knowledge gaps among economically disadvantaged populations.

Income and Attitudes toward Nutrition

Income level shapes attitudes toward nutrition by influencing perceptions of affordability and accessibility. Pregnant women from higher-income households are more likely to view nutritious foods as attainable and worthwhile investments in maternal and child health. In contrast, those from lower-income households may perceive healthy eating as a luxury, prioritizing cost over quality⁹⁴. Studies have shown that income-related stress can negatively impact attitudes toward nutrition. For example, a study by Zhang and Li in urban China revealed that financial constraints led to a preference for cheaper, calorie-dense foods among low-income pregnant women, despite their awareness of healthier options⁹⁵. These findings highlight the psychological and structural barriers that income inequality imposes on dietary choices.

Income and Food Choices

Income directly influences the affordability and availability of nutritious foods. Higher-income women are more likely to access a diverse range of fruits, vegetables, lean proteins, and whole grains, while those with limited income often rely on starchy staples and processed foods⁹⁶. A study found that low-income women prioritized quantity over quality, often consuming energy-dense but nutrient-poor diets. This pattern highlights the intersection of financial limitations and dietary behavior, emphasizing the need for community-based support systems to improve access to healthy foods⁹⁷.

2.1.10. Interaction Effects of Interventions, Education, and Income on Dietary Patterns

The interplay between community health nurse-led interventions, education, and income significantly influences dietary patterns among pregnant women. Understanding these interaction effects provides a holistic perspective on how social determinants and health interventions converge to shape knowledge, attitudes, and food choices.

Interactions between Nutritional Education Interventions and Education

Educational attainment can modulate the effectiveness of community health nurse-led interventions. Women with higher education levels are more likely to understand and implement nutritional advice, maximizing the benefits of such programs¹⁰⁰. For example, a study revealed that nutrition-focused interventions were twice as effective among women with secondary or higher education compared to those with primary education or less¹⁰¹.

Conversely, less-educated women may require tailored approaches, such as simplified educational materials and practical demonstrations, to fully benefit from interventions. Integrating adult literacy programs into antenatal care services can also enhance the impact of nurse-led initiatives by addressing underlying educational barriers¹⁰².

Interactions between Nutritional Education Interventions and Income

Income levels influence the accessibility and practicality of implementing dietary recommendations provided through community health nurse-led interventions. Higher-income women are better positioned to purchase diverse and nutritious foods, enabling them to adhere more closely to dietary guidelines. In contrast, low-income women may face financial constraints that limit their ability to act on nutritional advice.

Research highlighted the synergistic effect of combining financial assistance with nutritional education. The study found that providing food vouchers alongside nurse-led counseling significantly improved dietary diversity among low-income pregnant women in rural Nigeria. These findings underscore the importance of addressing economic barriers to maximize the effectiveness of interventions¹⁰³.

2.1.11. Combined Effects of Education and Income

Education and income jointly shape the outcomes of community health nurse-led interventions. Women with higher education and income levels are more likely to internalize and act on nutritional advice, resulting in better dietary patterns. In contrast, those with lower education and income may experience compounded challenges, such as limited understanding of dietary guidelines and restricted access to nutritious foods¹⁰⁴.

A study demonstrated that the combined effects of low education and income significantly reduced the efficacy of nutrition interventions. The researchers advocated for multifaceted approaches that address both educational and economic disparities, such as incorporating microfinance schemes and culturally adapted health education into maternal care programs¹⁰⁵.

2.1.12 Maternal Nutrition and Pregnancy Outcomes

Maternal nutrition is a cornerstone of healthy pregnancies and optimal birth outcomes. It influences fetal development, reduces the risk of maternal and neonatal complications, and sets the foundation for lifelong health for both mother and child. The relationship between maternal nutrition and pregnancy outcomes is complex, encompassing macronutrient and micronutrient intake, maternal weight status, and socio-environmental factors. Inadequate maternal nutrition has transgenerational effects, impacting the developmental trajectory of the fetus and increasing risks for metabolic and reproductive aging in subsequent generations¹⁷. In Nigeria, studies highlight similar challenges. Recent studies not only highlighted the link between carbohydrate intake during pregnancy, maternal health, and offspring well-being, but also suggested that the quality of carbohydrate foods consumed is more critical¹⁸. This dietary imbalance contributes to maternal malnutrition and adverse pregnancy outcomes.

Role of Maternal Nutrition in Fetal Growth and Development

Fetal development is directly tied to the nutritional status of the mother. Proper nutrition ensures adequate energy and nutrient supply for the formation of fetal tissues and organs. A balanced diet provides the macronutrients necessary for energy and growth and micronutrients essential for cellular function, immunity, and development.

Protein: Adequate protein intake supports fetal growth, particularly during the second and third trimesters. Insufficient protein can lead to intrauterine growth restriction (IUGR), while excess intake may be associated with gestational complications such as hypertension¹⁹.

Folic Acid: Crucial for DNA synthesis, folic acid prevents neural tube defects (NTDs) like spina bifida and anencephaly. Studies show that women who consume at least 400–600 micrograms of folic acid daily before and during pregnancy significantly reduce the risk of NTDs²⁰.

Omega-3 Fatty Acids: These are vital for fetal brain and eye development. Insufficient intake may result in developmental delays and cognitive impairments²¹.

Impact of Maternal Malnutrition on Pregnancy Outcomes

Malnutrition during pregnancy—whether undernutrition or over nutrition—has significant repercussions on maternal and neonatal health.

Undernutrition: Inadequate caloric and nutrient intake increases the risk of low birth weight (LBW), preterm birth, and neonatal mortality. Chronic maternal malnutrition can lead to placental insufficiency, reducing oxygen and nutrient delivery to the fetus²².

Over nutrition: Excessive gestational weight gain (GWG) is associated with macrosomia, gestational diabetes mellitus (GDM), and preeclampsia. High maternal BMI can also predispose the child to obesity and metabolic disorders later in life²³.

Micronutrient Deficiencies and Pregnancy Outcomes

Micronutrient deficiencies are particularly detrimental to pregnancy outcomes:

Iron Deficiency: Iron-deficiency anemia increases the risk of preterm delivery and LBW and reduces maternal energy levels, complicating labor and delivery²⁴.

Calcium Deficiency: Low calcium intake is linked to pregnancy-induced hypertension and preeclampsia. It can also affect fetal bone mineralization, leading to stunted growth²⁵.

Iodine Deficiency: Severe iodine deficiency during pregnancy results in congenital hypothyroidism, developmental delays, and increased perinatal mortality²⁶.

Vitamin A Deficiency: Associated with night blindness in mothers and congenital malformations in infants²⁷.

Socioeconomic and Cultural Influences on Maternal Nutrition

Socioeconomic status (SES) plays a significant role in maternal nutrition. Women in low-income settings often face food insecurity, limiting their access to nutrient-dense foods. Cultural practices, including food taboos and dietary restrictions, can further exacerbate nutrient deficiencies²⁸. For instance, in some cultures, pregnant women avoid protein-rich foods due to misconceptions about their effects on fetal size, leading to inadequate protein intake. Additionally, high food prices may force women to rely on carbohydrate-rich but nutrient-poor diets, increasing the risk of malnutrition and its associated complications²⁹.

2.1.13. Interventions to Improve Maternal Nutrition and Pregnancy Outcomes

Improving maternal nutrition requires multifaceted interventions that address dietary intake, education, and accessibility. **Nutrition Education Programs:** Community health nurse-led programs educate women about the importance of balanced diets, food safety, and proper supplementation. These programs have been shown to improve dietary behaviors and pregnancy outcomes³⁰. **Prenatal Supplementation:** Micronutrient supplementation, such as folic acid, iron, and calcium tablets, is critical, especially in resource-limited settings. These supplements bridge dietary gaps and reduce the risk of

nutrient deficiencies. Food Fortification: Fortifying staple foods with essential vitamins and minerals has proven effective in reducing micronutrient deficiencies on a population level³¹. Culturally Sensitive Interventions: Tailoring nutrition interventions to align with cultural beliefs and practices ensures greater acceptance and adherence³².

Maternal nutrition is a determinant of pregnancy outcomes, influencing both maternal health and fetal development. Addressing nutritional imbalances through education, supplementation, and culturally sensitive interventions is crucial for reducing maternal and neonatal morbidity and mortality. Policymakers and healthcare providers must prioritize maternal nutrition to improve public health outcomes and break the intergenerational cycle of malnutrition.

2.1.14. Role of Community Health Nurse

Community Health Nurse-Led education is a participatory approach where knowledge sharing and learning are driven by the local community itself, utilizing their insights, resources, and leadership to address specific challenges³³. In the context of maternal health and nutrition, Community Health Nurse-Led education serves as a transformative strategy to improve dietary patterns, dispel myths, and create sustainable health outcomes among pregnant women. This approach emphasizes the power of collective knowledge and shared responsibility within communities to drive behavioral change. Globally, Community Health Nurses are instrumental in maternal health programs, focusing on providing holistic care through education, counseling, and advocacy³⁴. They work within the community to identify and address barriers to optimal health behaviors. Their educational interventions are tailored to meet the unique needs of their communities, ensuring cultural and contextual relevance.

Community Health Nurses globally are engaged in programs that educate pregnant women on the importance of balanced diets and micronutrient supplementation. For

instance, in the United States, community health programs led by nurses include tailored nutritional counseling based on the U.S. Dietary Guidelines for Americans. These programs emphasize the importance of folic acid, iron, and calcium intake and the avoidance of harmful substances like alcohol and tobacco during pregnancy³⁵. Similarly, in India, Community Health Nurses deliver nutrition education through community workshops, helping pregnant women understand the importance of micronutrients like iodine and zinc, especially in rural areas where traditional diets may lack diversity³⁶. In multicultural settings, Community Health Nurses employ culturally sensitive strategies to address food taboos and misconceptions. For instance, in Ethiopia, Community Health Nurses conducted community-based education programs to challenge food taboos during pregnancy, such as the belief that eating eggs would result in a large baby, complicating delivery³⁷.

These interventions resulted in increased consumption of protein-rich foods among pregnant women. In low-income settings, Community Health Nurses address barriers such as food insecurity by connecting families to food assistance programs and teaching cost-effective ways to prepare balanced meals. In Bangladesh, Community Health Nurses working with local organizations implemented group education sessions focusing on affordable, nutrient-rich meal planning, leading to measurable improvements in maternal nutrition and birth outcomes³⁸. In Africa, where maternal malnutrition and adverse pregnancy outcomes are prevalent, Community Health Nurses play a critical role in bridging the gap between healthcare services and underserved populations. They focus on education and advocacy to improve dietary behaviors among pregnant women, often addressing socio-cultural and economic barriers unique to the region. In Kenya, Community Health Nurses implemented community-led nutrition groups, focusing on improving maternal and child health. Pregnant women were educated on the importance

of balanced diets, food safety, and supplementation through peer support and counseling sessions³⁹. These programs not only improved knowledge but also fostered community support for healthier dietary practices.

In South Africa, Community Health Nurses integrated dietary education into routine antenatal visits. Pregnant women received individualized counseling on nutrient-rich diets and the importance of maintaining a healthy weight during pregnancy, which reduced the prevalence of low birth weight and anemia⁴⁰. In rural Nigeria, Community Health Nurses have addressed traditional food taboos through education and dialogue. Programs that focused on demystifying harmful cultural beliefs, such as the avoidance of fish or dairy products during pregnancy, showed significant improvements in dietary diversity and maternal health outcomes⁴¹.

In Oyo State, community health nurses play a vital role in maternal and child health programs, particularly in addressing dietary patterns among pregnant women. The region faces unique challenges, including widespread poverty, food insecurity, and deeply rooted cultural practices that influence dietary behaviors. Community Health Nurses in Oyo State integrate dietary education into antenatal care services. Pregnant women attending clinics are counseled on the importance of micronutrients like folic acid and iron, as well as the benefits of consuming protein-rich foods such as fish, beans, and eggs. A study conducted in Ona-Ara Local Government Area revealed that many pregnant women lacked knowledge about the nutritional value of their diets until they participated in Community Health Nurse-led educational programs⁴².

Through outreach programs in rural communities, Community Health Nurses address common misconceptions about pregnancy diets. For example, education sessions held in local markets and religious centers focus on debunking myths, such as the belief that

eating eggs leads to large babies and complicated deliveries. These interventions have increased the intake of eggs and dairy among pregnant women in rural areas of Oyo State⁴³.

2.1.15. Importance of Community Health Nurse

The World Health Organization (WHO) underscores the significance of community involvement in achieving health-related goals, particularly in rural or underserved areas where access to healthcare resources is limited⁴⁴. Community Health Nurse-Led education provides localized solutions tailored to the cultural, economic, and social contexts of specific communities.

Community Health Nurse-Led education, particularly by community health nurses (Community Health Nurses), has proven to be a cornerstone in improving health outcomes in underserved populations. Community Health Nurses act as bridges between healthcare systems and communities, offering tailored education that respects cultural norms while addressing specific health challenges. Community Health Nurse-Led initiatives empower pregnant women with knowledge, skills, and resources necessary for making informed dietary choices. For example, interactive workshops, home visits, and group sessions not only enhance understanding but also foster peer support and accountability. Community Health Nurse-led education creates an enabling environment for behavioral change, addressing misconceptions and encouraging sustainable dietary practices.

Community Health Nurse-Led education promotes:

Cultural Relevance: Programs are designed to align with local beliefs and values, increasing acceptance.

Empowerment: Women are empowered with the skills and knowledge to make informed decisions about their nutrition.

Collaboration: Engagement of family members, community leaders, and healthcare providers strengthens social support systems⁴⁵.

2.1.16. Strategies for Community Health Nurse-Led Education

Community Health Nurse-Led education employs several evidence-based strategies to improve dietary patterns among pregnant women. These strategies address cultural, socioeconomic, and knowledge-related barriers, ensuring sustainable improvements in maternal nutrition:

Peer Education Programs: Peer education leverages the influence of community members who have successfully adopted healthy nutrition practices to educate others. This approach fosters a relatable and supportive learning environment, making pregnant women more receptive to dietary guidance. Recent research highlights the success of peer education in rural settings. For example, a study in Kenya demonstrated that peer-led groups significantly improved dietary diversity and nutritional knowledge among pregnant women by promoting relatable and accessible guidance⁴⁶. Similarly, in Nigeria, peer educators empowered pregnant women to incorporate more protein-rich foods into their diets, combating long-standing food taboos⁴².

Community Workshops and Nutrition Counseling: Community workshops offer a platform for practical and interactive learning. These workshops often include live demonstrations on preparing affordable, nutrient-rich meals using locally available foods, reducing misconceptions and improving dietary habits. In Oyo State, workshops conducted by community health nurses led to increased consumption of nutrient-dense foods like beans and eggs, which were previously avoided due to cultural beliefs⁴⁷.

Nutrition counseling further enhances these workshops by tailoring advice to individual needs, addressing specific dietary deficiencies, and encouraging adherence to health recommendations⁴⁸.

2.1.17. Involvement of Community Leaders and Influencers: Traditional and religious leaders hold significant sway in shaping community norms and values. Involving these leaders in educational initiatives enhances the cultural relevance and acceptance of health messages. For example, in South Africa, collaboration with community leaders helped increase the acceptance of fortified foods among pregnant women, leading to improved maternal and fetal health outcomes⁴⁹. In Nigeria, involving local influencers in dietary education programs enabled widespread dissemination of nutritional advice, with community leaders acting as role models and advocates for maternal nutrition²².

In Nigeria, involving local influencers in dietary education programs enabled widespread dissemination of nutritional advice, with community leaders acting as role models and advocates for maternal nutrition²².

Practical Food Demonstrations: Practical cooking demonstrations address barriers such as food insecurity and economic constraints. By teaching women how to prepare balanced meals with inexpensive, locally sourced ingredients, these programs empower pregnant women to make healthier dietary choices. For instance, in Ethiopia, food demonstrations incorporating low-cost protein sources like lentils and fortified flour resulted in improved dietary practices and reduced rates of anemia among pregnant women⁵⁰.

Benefits of Nutritional Education in Maternal Nutrition

Community Health Nurse-Led education has proven benefits in improving maternal dietary practices:

Increased Knowledge and Awareness: Women gain knowledge about the nutritional requirements during pregnancy, including the importance of consuming foods rich in protein, vitamins, and minerals. Studies showed that pregnant women exposed to community education increased their intake of vegetables, fruits, and legumes by 30%⁵¹.

Behavioural Change and Improved Practices: Behavioral change occurs when pregnant women receive education that addresses their cultural misconceptions and personal barriers. For example, Community Health Nurse-Led education dispels myths that certain foods harm the fetus or cause pregnancy complications.

Enhanced Social Support: Community Health Nurse-Led programs encourage family members to participate, fostering an environment where pregnant women receive support in adopting healthy dietary patterns. Involving husbands and mothers-in-law, who often influence household food choices, ensures long-term behavioral change⁵².

Reduction of Maternal Malnutrition and Health Risks: Improved dietary practices lead to better maternal and fetal health outcomes. Women who participated in nutrition education programs reported fewer cases of anemia, fatigue, and low birth weight⁵³.

Impact on Behavioral Change: Educational initiatives led by the community are more likely to result in meaningful behavioral changes. When education is contextually relevant and culturally sensitive, it increases acceptance and participation, leading to the adoption of healthier dietary practices⁵⁶. Research indicates that community-driven interventions effectively bridge gaps caused by limited access to formal education, promoting sustained nutritional improvements⁵⁷.

2.1.18 Dietary Patterns

Dietary patterns encompass the types and frequencies of foods consumed by individuals or groups over time. For pregnant women, these patterns are critical as they directly

influence maternal health and fetal development⁴⁴. Dietary patterns refer to the overall combination of foods and beverages consumed regularly and their nutritional and health implications. Unlike focusing on individual nutrients, dietary patterns examine the broader context of diet, considering how combinations of foods and nutrients collectively influence health outcomes. For pregnant women, dietary patterns are critical as they directly affect maternal health, fetal development, and pregnancy outcomes.

Importance of Dietary Patterns in Pregnancy

A well-balanced dietary pattern ensures that pregnant women meet their increased energy and nutrient demands. Pregnancy is associated with physiological changes, including an increased metabolic rate and higher requirements for macronutrients (carbohydrates, proteins, and fats) and micronutrients (vitamins and minerals). These demands emphasize the need for an adequate and diverse diet to support maternal and fetal health⁴⁸. Dietary patterns during pregnancy play a critical role in maternal and fetal health, influencing pregnancy outcomes, fetal development, and the long-term health of the child. Unlike focusing on individual nutrients, dietary patterns examine the overall composition and combination of foods consumed, providing a holistic view of nutritional intake. This approach recognizes the synergistic effects of food components and their collective impact on health.

Supporting Fetal Growth and Development: The development of the fetus is highly dependent on the mother's nutritional status and dietary habits. A balanced dietary pattern ensures the adequate intake of essential nutrients required for:

Cellular: Proteins and vitamins such as folic acid and vitamin A support rapid Growth cellular multiplication and differentiation. Brain Development: Omega-3 fatty acids,

especially DHA (docosahexaenoic acid), are crucial for the development of the fetal brain and retina. Pregnant women with diets rich in fatty fish, walnuts, and flaxseeds have been shown to have babies with improved cognitive outcomes⁵⁸. Bone Development: Calcium, vitamin D, and phosphorus are critical for fetal skeletal growth. Poor maternal intake of these nutrients may lead to inadequate fetal bone mineralization and stunted growth⁵⁹.

Preventing Maternal Complications: Maternal nutrition affects the mother's health during and after pregnancy. A healthy dietary pattern helps: Manage Gestational Weight Gain (GWG): Excessive GWG, common with diets high in refined sugars and saturated fats, increases the risk of complications like gestational diabetes and preeclampsia⁶⁰. Conversely, inadequate weight gain due to poor dietary diversity can lead to malnutrition and anemia. Reduce the Risk of Anemia: Iron-rich diets, combined with vitamin C for enhanced absorption, help prevent iron-deficiency anemia, which is associated with fatigue, poor birth outcomes, and complications during delivery⁶¹. Prevent Preeclampsia: Adequate calcium intake, achieved through dairy products, leafy greens, and fortified alternatives, reduces the risk of hypertensive disorders in pregnancy⁶².

Enhancing Pregnancy Outcomes: Healthy dietary patterns are strongly associated with favorable pregnancy outcomes, including: Normal Birth Weight (NBW): Proper maternal nutrition supports appropriate fetal growth, reducing the risk of low birth weight (LBW) and macrosomia⁶³. Lower Risk of Preterm Birth: Diets rich in fruits, vegetables, and whole grains have been linked to reduced rates of preterm delivery due to their anti-inflammatory and antioxidative properties⁶⁴. Optimal Postpartum Recovery: A nutritious diet aids in tissue repair, energy restoration, and successful breastfeeding after childbirth⁶⁵. Long-Term Health Implications for the Child: Maternal dietary patterns influence the long-term health of the child through a concept known as fetal programming. Poor maternal nutrition can predispose the child to chronic conditions such as obesity, diabetes,

and cardiovascular diseases later in life⁶⁶. Conversely, a nutrient-rich maternal diet reduces these risks and promotes healthy growth and development.

Addressing Socio-economic and Cultural Factors on Dietary Patterns: In many settings, dietary patterns are shaped by socioeconomic and cultural factors. For example: Economic Barriers: Women in low-income settings often rely on calorie-dense but nutrient-poor diets due to food insecurity. A balanced dietary pattern prioritizes cost-effective and locally available nutrient-rich options¹⁸. Cultural Beliefs and Taboos: Cultural practices may restrict the consumption of certain nutritious foods. For instance, in some communities, protein-rich foods like eggs are avoided during pregnancy due to myths about fetal size or delivery complications¹⁹. Addressing these barriers through culturally sensitive education can improve dietary practices.

Encouraging Sustainable Health Practices: Focusing on dietary patterns rather than individual nutrients fosters sustainable health practices. Pregnant women learn to prioritize balanced meals and diverse food choices, habits they can maintain beyond pregnancy to benefit their overall health and their family's nutrition²⁰.

Integration with Public Health Interventions: Dietary patterns provide a foundation for public health interventions, such as: Community-Based Programs: Educational workshops on preparing affordable, nutrient-dense meals improve dietary patterns and maternal health outcomes. Food Fortification Initiatives: Enriching staple foods with iron, iodine, and folic acid supports healthier dietary patterns on a population level²¹.

2.1.19 Types of Dietary Patterns

Dietary patterns can be categorized based on food choices, cultural influences, and the nutritional composition of the diet. These patterns reflect the overall eating behaviors of a population or individual and provide insights into how dietary habits influence health²². In the context of pregnancy, understanding different dietary patterns is crucial for promoting

maternal and fetal well-being. Below are various dietary patterns, their characteristics, and their implications during pregnancy.

1. Healthy Dietary Pattern

A healthy dietary pattern is characterized by a high intake of nutrient-dense foods, such as fruits, vegetables, whole grains, lean proteins, and healthy fats, while minimizing the consumption of processed and sugar-laden foods.

Key Components:

High consumption of fiber-rich foods, including whole grains, fruits, and vegetables.

Moderate intake of lean proteins such as fish, poultry, legumes, and nuts.

Use of unsaturated fats, such as olive oil and avocado.

Low consumption of added sugars, refined carbohydrates, and trans fats.

Impact on Pregnancy:

Positive Birth Outcomes: A healthy dietary pattern has been associated with reduced risks of gestational diabetes, preeclampsia, and preterm birth.

Enhanced Nutritional Status: Adequate intake of essential nutrients, including folate, iron, and calcium, supports fetal development and maternal health.

Example: The Mediterranean diet, rich in fruits, vegetables, olive oil, and fish, is considered a model of a healthy dietary pattern²³.

2. Western Dietary Pattern

The Western dietary pattern is characterized by high consumption of processed foods, red and processed meats, refined grains, sugary beverages, and saturated fats, with minimal intake of fruits, vegetables, and whole grains.

Key Components: High consumption of fast food, fried items, and convenience meals.

Low intake of fresh produce and whole foods.

High levels of added sugars and unhealthy fats.

Impact on Pregnancy: Increased Risks: Women adhering to a Western dietary pattern are at higher risk of excessive gestational weight gain, gestational diabetes, and hypertensive disorders of pregnancy.

Poor Nutritional Profile: Insufficient intake of critical nutrients, such as folate and calcium, can lead to adverse fetal outcomes, including low birth weight and neural tube defects.

Long-Term Effects: Exposure to a Western dietary pattern in utero has been linked to an increased risk of childhood obesity and metabolic disorders²⁴.

3. Traditional Dietary Pattern

Traditional dietary patterns are rooted in cultural and regional practices and are often based on locally available foods. While these diets may vary widely, they tend to emphasize minimally processed, plant-based foods and staples like grains and legumes.

Dominance of staple foods, such as rice, yams, or maize.

Limited variety of fruits, vegetables, and animal proteins in low-resource settings.

Heavy reliance on traditional cooking methods and cultural preferences.

Impact on Pregnancy:

Nutritional Gaps: While traditional diets can be rich in certain nutrients, they may lack diversity and critical micronutrients like iron, calcium, and vitamin A.

Cultural Influence: Food taboos and misconceptions may restrict the consumption of beneficial foods during pregnancy, such as eggs or milk, due to beliefs about their effects on fetal development⁴³.

Example: In many African countries, traditional diets heavily rely on starchy staples with limited animal protein, increasing risks of anemia and poor birth outcomes²⁵.

4. Plant-Based Dietary Pattern

A plant-based dietary pattern focuses primarily on foods derived from plants, including fruits, vegetables, nuts, seeds, legumes, and whole grains, with limited or no consumption of animal products.

Key Components:

High intake of fiber, antioxidants, and phytonutrients.

Low or no consumption of animal proteins.

Impact on Pregnancy:

Benefits: Plant-based diets can provide adequate nutrition during pregnancy if well-planned, offering high levels of fiber and essential vitamins like folate.

Challenges: Poorly planned plant-based diets may lack critical nutrients such as vitamin B12, iron, zinc, and omega-3 fatty acids, which are vital for fetal development.

Example: A vegetarian or vegan diet with fortified foods and supplements can meet nutritional needs during pregnancy²⁶.

5. Low-Carbohydrate Dietary Pattern

Low-carbohydrate diets emphasize reduced carbohydrate intake, often replaced with higher levels of fats and proteins.

Key Components:

Restricted intake of bread, pasta, rice, and sugary foods.

Increased consumption of proteins and fats, including meat, fish, eggs, and dairy.

Impact on Pregnancy:

Potential Risks: Low carbohydrate intake during pregnancy may restrict energy availability and result in ketosis, which can negatively impact fetal development.

Insufficient Evidence: While low-carbohydrate diets are popular for weight management, their safety and efficacy during pregnancy remain controversial²⁷.

6. High-Protein Dietary Pattern

High-protein diets focus on increased protein intake, often through meat, eggs, and dairy products.

Key Components:

Prioritization of animal-based proteins, with minimal carbohydrates and fats.

Impact on Pregnancy:

Mixed Outcomes: While protein is essential for fetal growth, excessive protein intake may strain maternal kidneys and increase risks of complications like preeclampsia.

Balance Required: A moderate protein intake within a balanced diet is recommended²⁸.

2.1.20. Factors Influencing Dietary Patterns

Several factors influence the dietary patterns of pregnant women, including:

Cultural Beliefs and Food Taboos: Cultural norms and beliefs can dictate food choices during pregnancy. For instance, in some African communities, foods like eggs and fish are avoided due to myths about their effects on fetal size or delivery complications⁵⁰.

Socioeconomic Status (SES): Women from low SES backgrounds often have limited access to nutrient-dense foods, leading to reliance on calorie-dense but nutrient-poor diets.

Food insecurity and financial constraints further exacerbate the problem⁴⁸.

Education and Awareness: Maternal education significantly influences dietary choices. Women with higher levels of education are more likely to adopt healthy dietary patterns and understand the importance of nutrition during pregnancy⁴².

Health Beliefs and Knowledge: Knowledge about nutrition and its role in pregnancy outcomes determines dietary patterns. Lack of awareness often leads to poor dietary diversity and nutritional deficiencies.

2.1.21. Recommendations for Optimal Dietary Patterns

Optimal dietary patterns for pregnant women emphasize variety, balance, and nutrient density. Recommendations include:

Energy Needs: Adjust caloric intake according to trimester, with additional 340–450 kcal/day during the second and third trimesters.

Macronutrients: Focus on whole grains, lean proteins, and healthy fats.

Micronutrients: Ensure adequate intake of folic acid, iron, calcium, iodine, and omega-3 fatty acids.

Dietary Diversity: Include a variety of fruits, vegetables, and protein sources to ensure all nutrient requirements are met.

Food Safety: Avoid high-mercury fish, unpasteurized dairy, and raw or undercooked foods to prevent foodborne illnesses²⁹.

Dietary patterns are critical determinants of maternal and fetal health during pregnancy. Adopting healthy dietary practices can improve pregnancy outcomes, reduce complications, and ensure optimal fetal development. Tailored nutritional interventions, education, and addressing socioeconomic and cultural barriers are necessary to promote optimal dietary patterns, particularly in resource-limited settings³⁰.

2.1.22 Implications for Nutritional Education Interventions

Nutritional Education interventions must account for income disparities to effectively promote healthy dietary patterns among pregnant women. Strategies such as providing free or subsidized nutritional counseling, distributing food supplements, and establishing community food programs can mitigate the effects of income inequality.

Additionally, advocacy for policy changes, such as food subsidies and maternal health support programs, can address systemic barriers. A research demonstrated that integrating financial support with nutritional education significantly improved dietary behaviors among low-income pregnant women in Nigeria¹⁰⁶.

Income level plays a critical role in shaping knowledge, attitudes, and food choices related to dietary patterns during pregnancy. While higher-income women benefit from better access to resources and diverse food options, low-income women face significant barriers that compromise maternal and child health. Community health nurse-led interventions must adopt inclusive strategies to address these disparities, ensuring equitable access to nutrition education and resources for all pregnant women¹⁰⁷.

2.1.23. Implications for Policy and Practice

Addressing the interaction effects of interventions, education, and income requires a comprehensive strategy that integrates health, education, and economic policies. Policymakers should prioritize investments in maternal education and social support programs to create an enabling environment for effective health interventions.

Community health nurses can play a pivotal role in coordinating these efforts by identifying at-risk populations and tailoring interventions to their unique needs. For instance, collaboration with local governments and non-governmental organizations can facilitate the provision of subsidized food supplies and literacy programs, enhancing the overall impact of nurse-led initiatives.

The interaction effects of interventions, education, and income on dietary patterns highlight the need for integrated and context-sensitive approaches to maternal nutrition. By addressing educational and economic disparities, community health nurse-led interventions can achieve greater equity and effectiveness, ultimately improving maternal and child health outcomes.

2.1.24 Effect of nutritional education intervention on knowledge, attitude and choice of food on Dietary Pattern among Pregnant Women

Educational interventions have proven effective in addressing health challenges, particularly in improving the knowledge, attitude, and behavior of individuals. Among

pregnant women, nutritional education is critical, as it directly influences maternal and fetal health outcomes. Educational interventions led by community health nurses are structured to enhance maternal knowledge of nutrition, emphasizing dietary requirements during pregnancy. A study in a rural setting demonstrated that nurse-led nutrition education significantly increased participants' understanding of macronutrient and micronutrient needs, such as protein, iron, folic acid, and calcium. The pre-intervention and post-intervention knowledge scores revealed a statistically significant improvement ($p < 0.001$)¹⁰⁸. Similarly, a randomized control trial involving 150 pregnant women in urban and peri-urban areas highlighted that Community Health Nurse-led sessions delivered bi-weekly improved knowledge retention compared to standard antenatal counseling. Participants reported better comprehension of food groups and dietary diversity¹⁰⁹.

Attitudinal changes towards nutrition during pregnancy have also been linked to targeted educational programs. For instance, it was reported that a six-week nurse-led nutritional counseling program positively shifted participants' attitudes toward the consumption of fruits and vegetables. Participants who previously exhibited apathy towards balanced diets showed increased enthusiasm and willingness to incorporate diverse food options into their meals¹¹⁰. It was investigated that the influence of community health nurses in rural Nigeria and found that culturally sensitive approaches in nutritional education positively shaped pregnant women's attitudes toward consuming locally available but nutrient-rich foods¹¹¹. The intervention included food demonstrations and group discussions, which reinforced the benefits of proper nutrition during pregnancy. Educational interventions have also impacted the actual food choices and dietary patterns of pregnant women. A study revealed that women who participated in a structured educational program led by Community Health Nurses showed significant improvements

in dietary diversity scores. They increased their consumption of whole grains, lean proteins, and dairy products while reducing intake of sugary and processed foods¹¹².

2.1.25 Educational level on knowledge, attitude and choice of food on Dietary Pattern among Pregnant Women

The educational level of pregnant women plays a critical role in shaping their knowledge, attitudes, and food choices, which in turn influence their dietary patterns. Higher education levels have often been associated with better health literacy and decision-making regarding nutrition. Several studies have demonstrated that educational level significantly impacts the knowledge of nutrition and dietary requirements among pregnant women. For instance, a cross-sectional study among 300 pregnant women in Nigeria and found that women with higher education (tertiary level) scored significantly better in nutritional knowledge tests than those with lower educational attainment (primary or secondary level)¹¹³. The knowledge gap was especially evident in areas such as micronutrient requirements, meal portioning, and understanding food labels. Similarly, a study in South Korea assessed the relationship between maternal education and understanding of prenatal dietary needs. The findings revealed that women with higher educational levels were more likely to know the importance of folic acid supplementation and iron-rich foods during pregnancy¹¹⁴. This group also exhibited a greater ability to identify balanced meal plans.

Educational attainment has also been linked to differences in attitudes toward nutrition and healthy eating during pregnancy; a study in Spain highlighted that women with tertiary education exhibited more positive attitudes toward consuming a diverse diet and avoiding unhealthy foods¹¹⁵. These women were more likely to perceive the long-term benefits of proper nutrition for maternal and fetal health.

Conversely, women with lower educational levels in the study showed greater reliance on traditional beliefs about pregnancy diets, often leading to suboptimal food choices. The researchers emphasized the need for tailored interventions to address cultural and educational disparities.

The effect of education on dietary choices is well-documented, a longitudinal study among 200 pregnant women in Ibadan, Nigeria, and found that women with higher educational levels were more likely to adopt healthy dietary patterns. This group reported increased consumption of fruits, vegetables, and protein-rich foods and a lower intake of processed and sugary foods. In contrast, women with lower education levels tended to adhere to less diverse diets, often limited to starchy staples. The researchers noted that financial constraints compounded by limited nutritional knowledge contributed to this disparity¹¹⁶. Additionally, a study in the United States found that education level influenced how pregnant women accessed and utilized information about nutrition. Women with higher education levels were more likely to seek evidence-based information from healthcare providers and reputable online sources, while those with lower education levels often relied on advice from family members or community elders, which was not always accurate. While education plays a significant role, studies have also highlighted mediating factors such as income, access to healthcare, and cultural practices¹¹⁷.

2.1.26 Effects of income on knowledge, attitude and choice of food on Dietary Pattern

Income is a critical socioeconomic factor influencing health behaviors, including nutrition. Among pregnant women, income level significantly affects knowledge, attitudes, and food choices, ultimately shaping dietary patterns. Income level plays a significant role in

determining access to nutritional education and resources. For instance, a cross-sectional study in Lagos, Nigeria, which revealed that women from higher-income households demonstrated greater knowledge of prenatal dietary requirements than those from lower-income households. High-income earners were more likely to attend private prenatal classes or seek personalized nutritional advice, which provided them with comprehensive knowledge of the importance of balanced diets and nutrient-rich foods¹¹⁸.

Conversely, low-income pregnant women in rural communities often relied on traditional beliefs and advice from family members rather than evidence-based information. Limited access to health services and educational materials due to financial constraints contributed to the observed knowledge gap¹¹⁹.

Income has also been shown to influence attitudes toward dietary practices during pregnancy. A study in urban China reported that women with higher incomes displayed more positive attitudes toward healthy eating, viewing nutritious diets as an essential investment in their baby's health¹²⁰. This group exhibited a willingness to prioritize the purchase of fresh and organic foods over cheaper, processed alternatives.

On the other hand, pregnant women in low-income households often experience dietary limitations due to financial constraints. A study in sub-Saharan Africa reported that low-income women frequently consumed monotonous diets dominated by starchy staples, with minimal intake of protein or micronutrient-rich foods. The researchers emphasized that food insecurity and poverty exacerbated these patterns, increasing the risk of malnutrition among pregnant women¹²¹. Despite the challenges posed by low income, some studies have highlighted the mitigating role of social support and government programs. A study examined the impact of a government-sponsored food subsidy program on the dietary patterns of pregnant women in India. The findings indicated that women from low-income households who benefited from food vouchers exhibited

significantly improved dietary diversity compared to those who did not participate in the program¹²².

Similarly, it was found that community health initiatives, such as food banks and subsidized nutrition counseling, helped low-income pregnant women make better food choices despite financial constraints. These interventions emphasized culturally appropriate and affordable dietary options, thereby improving both attitudes and dietary patterns¹²³.

2.1.27. Two-way interaction effect of Nurse-led nutritional education intervention and educational level on knowledge, attitude and choice of food on Dietary Pattern among Pregnant Women

The interaction between community health nurse-led educational interventions and educational level has garnered significant attention as a potential strategy to improve the knowledge, attitudes, and dietary choices of pregnant women. While nurse-led programs are designed to address gaps in maternal nutrition, the educational level of participants often moderates the effectiveness of these interventions. Community health nurse (Community Health Nurse)-led educational interventions are designed to improve maternal nutrition knowledge across diverse populations. However, the effectiveness of these programs often depends on the baseline educational level of participants.

A study in urban China assessed the knowledge outcomes of a Community Health Nurse-led intervention involving 200 pregnant women with varying educational levels. The study found that women with tertiary education demonstrated a greater increase in knowledge about prenatal nutrition than those with primary or secondary education. The researchers suggested that highly educated participants were better able to comprehend complex nutritional concepts and apply them in their dietary practices¹²⁴.

Educational level also interacts with Community Health Nurse-led interventions in shaping attitudes toward nutrition during pregnancy. A study in Brazil explored how educational workshops led by community health nurses affected attitudes toward dietary diversity. Women with higher education levels were more likely to embrace positive attitudes and adopt recommended practices following the intervention¹²⁵. This group exhibited a deeper understanding of the long-term benefits of proper nutrition for maternal and fetal health.

Conversely, women with lower education levels demonstrated slower attitudinal shifts, requiring more intensive follow-up and culturally tailored messaging. While nurse-led interventions improved attitudes among low-education participants, these women were more influenced by traditional beliefs and practices, necessitating additional strategies to address these barriers¹²⁶.

The two-way interaction effect of Community Health Nurse-led interventions and educational level is particularly evident in dietary behavior. Nigeria examined dietary changes among 300 pregnant women exposed to a six-month Community Health Nurse-led nutrition program. The study found that participants with higher education levels were more likely to adopt diverse and nutrient-rich diets post-intervention compared to those with lower education levels¹²⁷.

However, the study also revealed that nurse-led interventions were instrumental in narrowing the dietary disparity between high- and low-education groups. Women with lower education levels who received intensive support, such as food demonstrations and personalized counseling, showed significant improvements in dietary diversity. This finding underscores the importance of tailoring interventions to address the unique challenges faced by less-educated populations¹²⁸.

Socioeconomic factors often mediate the interaction between Community Health Nurse-led interventions and educational levels. For instance, there was reported that the effectiveness of a nurse-led nutrition program in India was moderated by income level. High-income women with higher education exhibited the greatest improvement in dietary patterns, while low-income, less-educated women benefited from additional support mechanisms, such as food subsidies and home visits¹²⁹.

2.1.28 Two-way interaction effect of community health Nurse-led educational intervention and income on knowledge, attitude and choice of food on Dietary Pattern among Pregnant Women

Maternal nutrition plays a crucial role in ensuring the health and well-being of both mother and child during pregnancy. Proper dietary knowledge, coupled with a positive attitude toward nutrition, often influences food choices, which are key to achieving favorable pregnancy outcomes. In recent years, community health nurse-led educational interventions have gained attention for their potential to improve pregnant women's nutritional knowledge and promote healthier eating habits. However, socioeconomic factors, particularly income, often determine the effectiveness of these interventions. Community health nurse-led educational interventions have consistently proven to be an effective strategy for enhancing maternal nutrition. For instance, a study conducted in Kiambu County, Kenya, highlighted how the use of community health volunteers to deliver nutritional education significantly improved pregnant women's knowledge and attitudes toward iron and folic acid supplementation¹³⁰. Similarly, a quasi-experimental study in southwestern Ethiopia evaluated the impact of community-based nutritional education on pregnant women's knowledge, attitudes, and compliance with supplementation. The study found that these interventions significantly enhanced

participants' understanding of nutrition and their attitudes toward dietary compliance, reinforcing the importance of community-driven approaches¹³¹.

Despite the success of educational programs, income remains a significant determinant of dietary choices among pregnant women. For example, a study in Australia found that food insecurity—often caused by financial limitations—affected nearly half of the surveyed pregnant women, leading to poor nutrition and increased stress. Similarly, research conducted in southwestern Nigeria revealed that factors such as education level, occupation, and household income strongly influenced nutrition knowledge¹³². These findings emphasize the financial barriers many pregnant women face in adopting healthier dietary practices, even when they have the necessary knowledge and understanding.

The interaction between nurse-led educational interventions and income highlights an important dynamic. While educational programs improve knowledge and attitudes, financial constraints often limit their practical application. For instance, women in lower-income households may be unable to afford nutrient-rich foods, despite understanding their importance. This underscores the need for integrated approaches that combine education with strategies to improve financial stability, such as income-generating activities or social welfare programs. Such combined efforts could have a synergistic effect, enabling pregnant women to make informed dietary choices while overcoming economic barriers.

2.2. Theoretical Framework

The theoretical model adopted for this study is the **Theory of Planned Behaviour (TPB)**. Developed by Icek Ajzen in 1991, adapted by Yeoman I. S 2024, the theory of planned behavior explains individual behavior as resulting from intentions, which in turn are influenced by attitudes, subjective norms, and perceived behavioral control¹³⁶.

Particularly in predicting health-related behaviors such as dietary choices¹⁰⁶. This theory is relevant to understanding how Community Health Nurse-Led education influences dietary patterns and identifies barriers that prevent optimal nutrition among pregnant women.

2.2.1 Overview of the Theory of Planned Behavior

The Theory of Planned Behavior posits that behaviour is guided by three key determinants: **attitude toward the behavior**, **subjective norms**, and **perceived behavioral control**¹⁰⁷. These components interact to shape an individual's behavioral intentions, which, in turn, determine actual behavior.

1. **Attitude toward the behaviour:** This refers to the individual's positive or negative evaluation of performing a behavior. If a person believes that engaging in a particular action will lead to favorable outcomes, they are more likely to engage in that behavior.
2. **Subjective norm:** This involves the perceived social pressure to perform or not perform a behavior. It is influenced by the attitudes of significant others (e.g., family, friends, or peers) and societal expectations. If a person perceives that people they care about expect them to perform a behaviour, they are more likely to do so.
3. **Perceived behavioural control:** This factor refers to an individuals' belief in their ability to perform the behavior, considering external constraints or barriers. It is similar to self-efficacy and reflects the extent to which a person feels they can execute the behavior despite challenges. High perceived control increases the likelihood of engaging in the behavior.

According to the theory of planned behaviour, behaviors are influenced by intentions, which are determined by three factors: attitudes, subjective norms, and perceived behavioral control¹⁰⁶.

It is also possible for external factors to directly force or prevent behaviors, regardless of the intention, depending on the degree to which a behavior is actually controlled by the individual, and the degree to which perceived behavioral control is an accurate measure of actual behavioral control. This relationship is shown with a dashed line in Figure 2.1.

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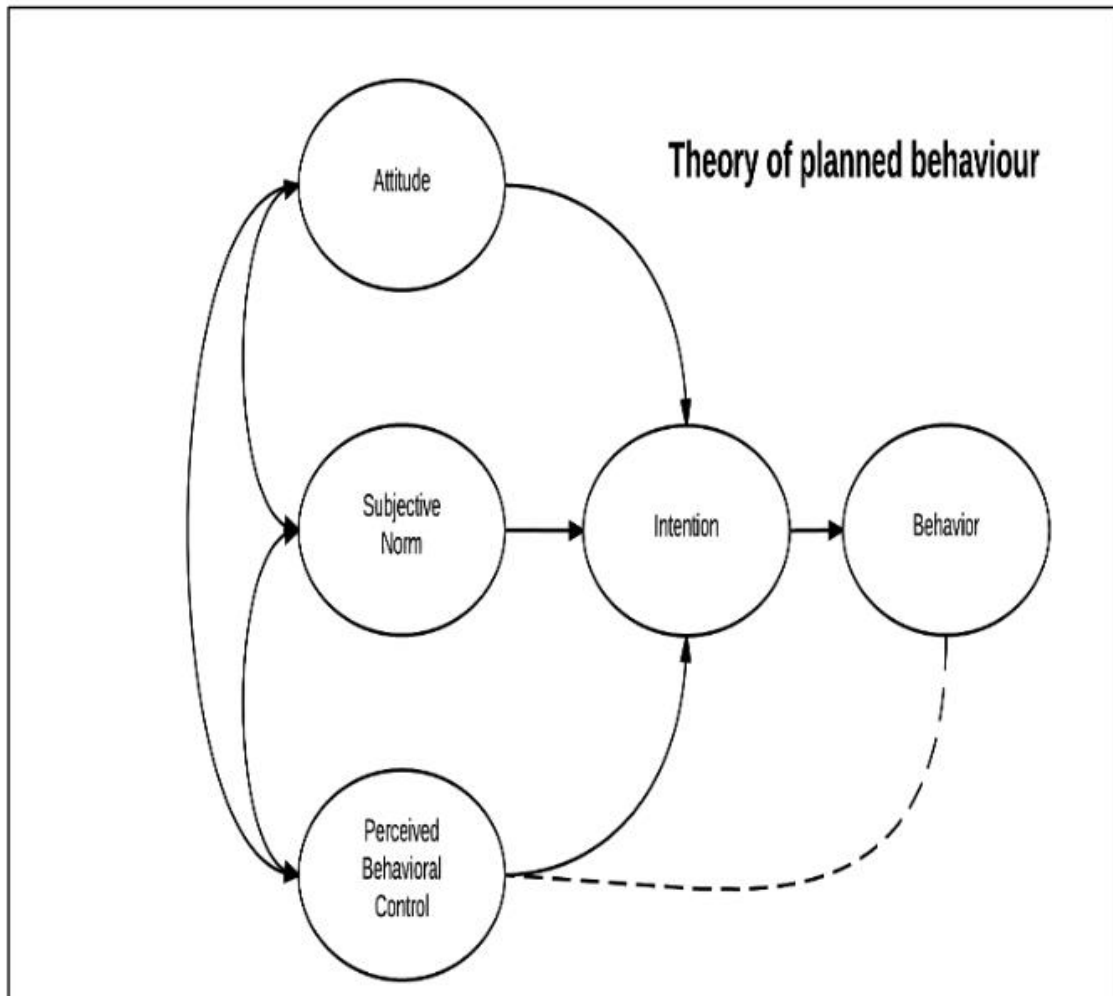


Figure 2.1: Theory of Planned Behavior Model.
Source¹³⁸.

2.2.2 Relevance of the Theory to the Study

The TPB, therefore, provides a comprehensive framework for understanding the dynamics of Community Health Nurse-Led education and its impact on improving dietary patterns among pregnant women. The TPB posits that behavior is primarily determined by an individual intention, which is in turn influenced by their attitude towards the behavior.

Subjective norms (perceived social pressure) and perceived behavioral control (belief in their ability to perform the behavior).

2.2.3. Theory of Planned Behavior (TPB)

Knowledge: pregnant women's knowledge about healthy eating during pregnancy (e.g., essential nutrients, food groups) can influence their attitudes and intentions towards specific foods.

Attitude: a positive attitude towards healthy foods and a negative attitude towards unhealthy foods can lead to intentions to consume more of the former and less later.

Subjective norms: if a pregnant woman perceives that her family friends, or health care providers encourage healthy eating, she is more likely to adopt those behaviors.

Perceived behavioral control: if a pregnant woman believes she can overcome barriers to healthy eating (time constraints, cost, craving), she is more likely to act on her intentions.

Behaviour: a pregnant woman who understands the importance of folic acid (knowledge) and has a positive attitude towards consuming fortified foods (attitude) might be more likely to consume those foods (behavior).

The TPB is a widely used model in behavioral science for understanding and predicting human in various contexts. It has been successfully applied to areas such as health behaviors (e.g., food waste reduction), and educational practices. The theory can be used

to design interventions aimed at changing behaviors by targeting the underlying beliefs, attitudes, norms, and perceptions of control¹³⁶.

2.3. Review of Empirical Studies

According to the nutrition and health knowledge and attitude of pregnant women in the study area where 70% (430) were suboptimal. Improving knowledge and attitude during the first trimester of pregnancy is essential for suggestion nutrition and health related behaviour in the succeeding periods of pregnancy, which predominantly determine the pregnancy's outcomes¹³³. Considering that most of our pregnant women believes that the knowledge they had will be sufficient for them throughout the period of pregnancy not knowing that they needed more knowledge about their dietary patterns during the pregnancy to prevent congenital abnormalities ¹³³.

Suggested in their study that lack of intake of some food nutrients that contained Vit A during pregnancy can affect most of the organs systems of the fetus ¹³⁴. Therefore, the pregnant women should be counseled on their choice of foods by taking cereals, meat, milk and milk products, vegetables, fish, carrots, fat & oil to prevent Vit A deficiency in the new born babies¹³⁴.

In accordance with the study carried out by showed that the majority (86%) of pregnant women were unaware of their nutritional needs during pregnancy. The foods and nutrition knowledge, attitude and practices of pregnant women, followed at the Mentioned Zone Hospital were insufficient and could affect the health of the pregnant and their fetus. It would be worthwhile subjecting pregnant women to nutritional education sessions to improve their level of knowledge and food and nutrition, which would enable them to make appropriate food choice for their health and that of their future babies ¹³⁵.

Pregnant women with higher education level tends to have better dietary practices and less likely to experience anaemia.

It is suggested that correlation of education may empower women to make informed dietary choices by improving their nutritional status during pregnancy¹³⁷.

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2.4 Conceptual Framework

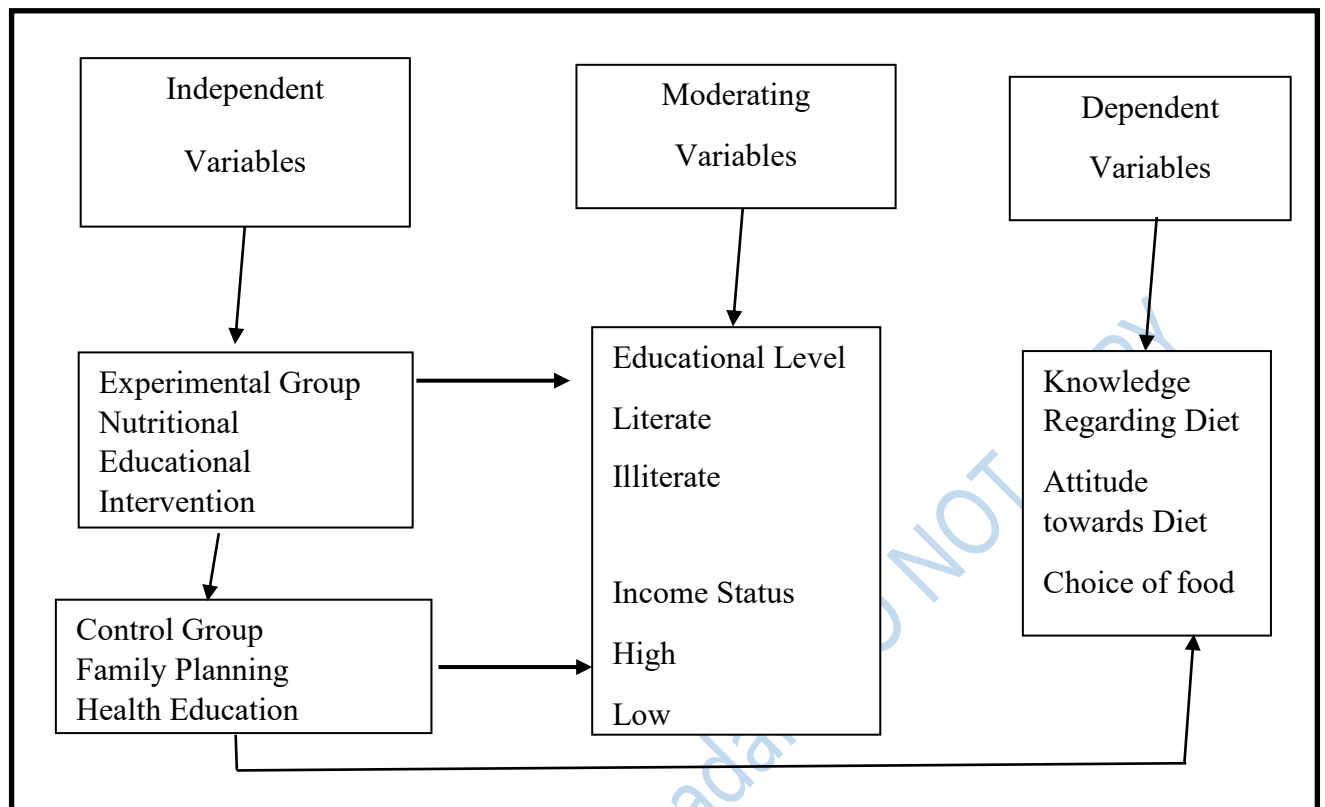


Fig 2.2: Conceptual Framework on Nutritional Education Intervention on Knowledge, Attitude and Choice of food.

Source: Researcher's Fieldwork, 2025.

2.4. Conceptual Framework

The conceptual framework is self-developed by the researcher and it was structure in a way that nutritional education interventions improved knowledge on dietary patterns, change attitudes towards dietary patterns and choice of food of pregnant women. Fig. 2.1, above the conceptual framework on which the study is based and the process by which the research is done it is conceptualized. It is conceptualized in the study that nutritional education intervention would bring about improved knowledge on dietary patterns, change attitudes towards dietary patterns and choice of food on dietary patterns among pregnant women in Ibadan Semi-Urban area.

The independent variables that are manipulated in the study are expressed at two (2) levels. Nutritional education intervention on dietary patterns among pregnant women (experimental) and family planning health education (control). In the framework developed by researcher NEI stands as stimulus, in independent variables to be manipulated to examine its effect on the dependent variables of knowledge on dietary patterns, attitudes and choice of food in this study is referred to as response. While the two (2) intervening moderating variables are referred to as the organisms, these are educational level and income status.

They may affect the outcome of the NEI and are significant enough to be observed and measured.

The NEI concept of proper care of pregnant women in terms of coming for ante-natal care thereby having the opportunity of being educated on all what to do to remain healthy in pregnancy, labour and to have safe delivery to be sure of not having malformed baby. These important messages to the pregnant women are; personal hygiene and environmental sanitation to prevent filthy and unhealthy environment that can cause flies infestations, adequate and normal diet/nutrition which should be rich in vitamins

especially iron and folic acid that can prevent neural tube defect, to discourage pregnant women from taking alcohol and sugary drinks/beverages caution in the use of unprescribed medicine, moderacy in economic deals, involvement in mild exercises, sleep and rest, taking fruits and vegetables and plenty of water to drink, to attend ANC regularly, taking immunization accordingly (Tetanus Toxoid) and follow the appointment dates. In any normal situation where a pregnant woman is exposed to this education listed above, gained knowledge on dietary patterns, attitude and choice of food will change positively towards unhealthy dietary patterns.

2.5 Summary of the Literature Reviewed

This chapter reviewed relevant literature related to the study's objectives, including Nutritional education on dietary patterns among pregnant women, barriers to optimal nutrition, and evidence-based interventions. The review was organized under conceptual studies, conceptual framework, empirical studies and theoretical framework. The conceptual studies provided insights into the variables of interest, specifically Nutritional education and dietary patterns. Studies revealed that Nutritional education enhances knowledge and practices of pregnant women regarding nutrition. For instance, a study demonstrated that community-based programs increase dietary diversity by dispelling myths and promoting affordable, nutrient-rich foods⁶⁰.

The review of empirical studies highlighted the impact of nutrition education programs on maternal health outcomes. It was found that interventions tailored to local cultural and economic contexts significantly improved dietary patterns⁶². Common barriers identified include poverty, cultural beliefs, food insecurity, and lack of access to education⁵³. These barriers limit pregnant women's ability to adopt optimal nutrition, emphasizing the need for targeted programs.

The theoretical framework utilized the Theory of Planned Behavior (TPB), which explains dietary behaviors through three constructs: attitude toward behavior, subjective norms, and perceived behavioral control¹⁰⁶.

Pregnant women's eating behaviors are influenced by personal attitudes, social norms, and perceived barriers. Community Health Nurse-Led interventions address these constructs by fostering positive attitudes, involving influential community members, and reducing barriers such as food insecurity.

The conceptual framework for the study illustrates how Community Health Nurse-Led education influences dietary patterns through the constructs of the TPB. Community education programs provide knowledge, address misconceptions, and promote practical solutions, ultimately enabling pregnant women to make healthier food choices⁵¹.

The reviewed literature underscores the importance of Nutritional education intervention in improving dietary patterns among pregnant women. By addressing barriers and leveraging social support, such programs positively influence knowledge, attitudes, and behaviors related to maternal nutrition. However, gaps remain regarding localized interventions tailored to specific communities, such as Ona-Ara, Egbeda and Oluyole Local Government Areas in Oyo State. This study seeks to bridge these gaps by proposing evidence-based educational programs to enhance dietary outcomes for pregnant women in the selected health facilities.

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Chapter Three

Methodology

This chapter discusses the research methodology adopted in the study. It outlines the research design, population of the study, sampling size and sampling techniques, description of research instruments, validity, reliability, data collection, and analysis methods and ethical consideration.

3.1 Research Design

The research adopted a pretest–posttest quasi-experimental research design using 2x2x2 factorial matrix. The design involves one(1) experimental group and a control group. This design is appropriate for examining the effectiveness of nutritional education on knowledge, attitude, and food choices on dietary patterns among pregnant women in Ibadan Semi-Urban LGAs, Oyo State. The pretest–posttest quasi-experimental approach allows for evaluating changes in outcomes attributable to the intervention by comparing the experimental groups, that received the Nutritional education intervention with the control group, that did not receive any intervention. Pretest measurements were taken for the groups to assess baseline levels of dietary knowledge, attitude, and food choices before the intervention. Afterwards, participants in the experimental group undergone structured, Nutritional education intervention sessions designed to enhance their knowledge of dietary practices, while the control group continued their usual routine without exposure to any intervention.

Following the intervention, a posttest was conducted for two (2) groups to measure the same variables and identify changes. By comparing the pretest and posttest outcomes within and between the two groups, this design enable the researcher to determine the effectiveness of the nutritional education intervention. This quasi-experimental design is particularly suitable because it allows for the examination of causal relationships in real-

world settings, even without randomization, making it practical and feasible for research in community health contexts. The results from this design provided valuable insights into how nutritional education interventions can influence pregnant women's dietary patterns and related outcomes.

The choice of the factorial matrix used was independent variables at two levels; the treatment group and the control. Modifying variables of educational level has two levels (Literate and illiterate) while that of income status has two levels also (High and Low).

Schematic formulation of research design;

The scheme of the experiment used for this study is as presented below:

$Y_1 X_1 X_3$ -----Experimental

$Y_2 X Y_4$ -----control

$Y_1 Y_2$ -----represent pretest for the experimental and the control groups respectively

$Y_3 Y_4$ -----represent posttest for the experimental and the control group respectively

X_1 -----represent Nutritional intervention

X ----- this represents family planning health education.

Table 3.1: 2x2x2 Factorial Matrix

Group	Education Level	Income Status
Experimental		
Nutritional Education	Literate	High
	Illiterate	Low
Control		
Family Planning	Literate	High
Education	Illiterate	Low

Source: Researcher's Fieldwork, 2025

Table 3.2 Representation of Research Design

Pretest	NEI	Control	Post test
	√	√	√
		√	√

Source: Researcher's Fieldwork, 2025

The participants were assigned into 2 groups the experimental and the control groups.

The experimental group exposed to nutritional education intervention training while the control group exposed to family planning health education.

Variables that used in this study were:

- a) Independent variables
- b) Modifying variables
- c) Dependent variables

a) Independent variables: these variables were manipulated at three (2) levels

Treatment (Nutritional Education Intervention)

Control (Family Planning Health Education)

b) Modifying variables: in this study two (2) modifying variables would be used.

Educational Level at two (2) levels – Literate and illiterate

Income at two level – High and Low

c) Dependent variables: knowledge, Attitude and food choices

Research Settings

This study was conducted in three LGAs,(Ona-Ara, Oluyole and Egbeda).

Ona – Ara local government area is domiciled in Oyo State, South – West, Nigeria and has its headquarters in the town of Akanran. Ona-Ara LGA Shares boundaries with Egbeda, Oluyole, Ibadan South – East LGAs and with part of Ogun and Osun State Towns and Villages that made up of Ona – Ara LGA includes Gbedun, Olunloyo, Araromi, Amuloko, Akanran, Olorunsogo, Foworogun, Olosunde and Gbada Efon. Inhabitants with the vast majority of the area dwellers being members of the Yoruba ethnics group. Local government chairman and the head of the local government council, Mr. Temitope Kolapo (Glorious). It has an area of 290km and a population of 265, 059 at the 2006 census². The Postal code of the area is 200¹. Ona – Ara LGA was created in 1989 from Oluyole LGA². The main source of income for the residents of Ona – Ara LGA is Agriculture, with a range of fruits and nuts, including Cocoa, Kolanut, and cashew, cultivated nearby. The residents of Ona – Ara LGA also engage in significant economics activities such as wood carving, hunting, weaving and dying textiles². Wards and communication under Ona – Ara LGA are; Akanran, Araromi, Aperin, Agugu, Badeku, Gbada Efon, Gbedun, Odi – Odeyale, Ogbere, Ogberetioya, Aba – Emu, Olode, Ojebode, Olorunsogo, Oremeji and Olorunda.

Egbeda Local Government Area (LGA) in Oyo State, Nigeria, was created in 1989 when it was carved out of Lagelu LGA. It's situated in the Oyo Central Senatorial District of Ibadan, with its headquarters in the town of Egbeda. The LGA shares borders with Osun State to the east, Lagelu LGA to the north, Ibadan North East LGA to the west, and Ona Ara LGA to the south. Egbeda LGA was established in 1989, marking a significant administrative division from the older Lagelu LGA. The Chairman of Egbeda LGA is Hon. Sikiru Ayodele Sanda. Location and Boundaries: It's located in the heart of Oyo State, with specific boundaries that define its area. Dominant Ethnic Group: The Yoruba people are the majority ethnic group in Egbeda LGA. Economic Activities: The area is known for agricultural production, particularly livestock and arable crops. It also has various industries, including block making, sawmills, and metal and steel works. Wards: Egbeda LGA is subdivided into 11 wards: Erunmu, Ayede/Alugbo/Koloko, OwoBaale/Kasumu, Olodan/Ajiwogbo, Olodo/Kumapayi I, Olodo II, Olodo III, Osegere/Awaye, Egbeda, Olode/Alakia, and Olubadan Estate.

Oluyole Local Government Area (LGA) in Oyo State was established in 1976. It's one of the oldest LGAs in the state, with its headquarters in Idi-Ayunre. Oluyole LGA is known for its agricultural activities, trading, local food processing, and transportation businesses, as well as its industrial sector. Early History: The area now known as Oluyole LGA was originally part of the larger Ibadan region. Oluyole LGA was created in 1976 as part of a broader restructuring of local government in Nigeria. The Chairman of Oluyole LGA is Hon. Laide Popoola.

Location: It's situated within the Ibadan metropolitan area and shares boundaries with other LGAs like Ibadan South-West, Ibadan South-East, Ona-Ara, and Ido, as well as Egbeda-Obafemi, Odeda, and Ijebu-North in Ogun State. Administrative Structure: The LGA is divided into 10 wards, further grouped into the Idi-Ayunre and Olode sectors.

Economic Activities: Oluyole LGA is known for its agricultural production, trading, local food processing, and transportation businesses. Industrialization: The area has seen some industrial development, including quarries and other manufacturing facilities. Notable Features: The Odo Ona River is a significant geographical feature, with several settlements named after it (e.g., Odo Ona Nla, Odo Ona Kekere). Current Status: Oluyole LGA continues to be a significant part of Oyo State, playing a role in both its agricultural and industrial sectors.

3.2 Population of the Study

The population for this study was made up of all pregnant women in selected LGAs Ibadan Semi-Urban.

Target Population of the Study

The target population for this study consists of all the pregnant women who registered and attending the selected health facilities in Ibadan Semi-Urban LGAs.

3.3. Sampling and Sampling Technique

Multistage Sampling Procedure

Stage 1: Simple Random Sampling Technique by balloting, wrapping the names of the LGAs in a paper and picked: The researcher adopted Simple Random Sampling Technique to select three (3) LGAs in Ibadan Semi-Urban LGAs, out of six (6) Local Government Areas (LGAs). Ona-Ara, Egbeda, Akinyele, Lagelu, Oluyole and Ido LGAs. The selected LGAs are: Ona-Ara, Egbeda and Oluyole.

Stage 2: Purposive Sampling Technique was used to select ten (10) PHCs in each of the selected LGAs:

Stage 3: Purposive Sampling Technique was used to select five (5) pregnant women in each of the selected PHCs.

Ona-Ara - 10 PHCs, Egbeda -10 PHCs, Oluyole - 10 PHCs.

Stage 4: Purposive Sampling Technique was also used through balloting to select 150 pregnant women in all the selected PHCs.

Stage 5: The participants were selected by Balloting and assigned to experimental and control groups, using non-based on their distance to the study setting.

Experimental group - 1 (Ona-Ara and Egbeda LGAs).

Control group - 1 (Oluyole LGA).

3.3.1 Inclusion Criteria

1. Pregnant women who registered and attending antenatal care (ANC) in the three selected Local Government areas PHCs during the period of study
2. Pregnant women who are residents at adjoining communities served by the Primary healthcare centres.
3. Pregnant women and women seeking family planning services within the reproductive age ranging from 18 to 45.
4. Pregnant women who are willing to consent to participate in the study.

3.3.2 Exclusion Criteria

1. Health Care providers
2. Women with severe medical or psychological conditions that may impair their ability to provide consent or participate in the study
3. Women unwilling to comply with the study protocol or complete the required procedures.

These criteria ensure the study includes participants directly relevant to the research objectives while excluding individuals who may introduce confounding factors or data inconsistency.

Sampling Size

Taro Yamane's formula used to determine the sample size of respondents from healthcare center.

$$n = \frac{N}{1 + N(e^2)}$$

Where n = sample size

N = population under study

e = margin error

N = 150

e = 0.05

1 = constant

$$n = \frac{150}{1 + 150(0.05^2)}$$

$$n = \frac{150}{1 + 152(0.0025)}$$

$$n = \frac{150}{1 + 0.38}$$

$$n = \frac{150}{1 + 0.4}$$

$$n = \frac{150}{1.4}$$

$$= 107.142$$

$$n = 107 \text{ participants}$$

10% attrition rate will be 10.7

$$\begin{array}{r} 107 \\ + 10.7 \\ \hline 117.7 \end{array} = 118$$

$$n = 118 \text{ participants}$$

3.4 Description of the Research Instrument

The primary instrument for data collection was a validated structured questionnaire. The questionnaire consists of four sections:

- **Section A:** Demographic information of the respondents is 10 items. (e.g., age, years of experience, and qualifications). (ten) question items
- **Section B:** Knowledge on dietary patterns among pregnant women. Twenty (20 question items)
- **Section C:** Attitude towards dietary patterns among pregnant women. Fifteen (15 question items)
- **Section D:** Choice of food on dietary patterns among pregnant women. Fifteen 15 question items).

The research instruments that was used for this study are two (2):

1. Self-developed training manual
2. Self-developed questionnaire (Adapted).

Training Manual

(Nutritional Education Intervention Package)

The manual is used as a training guide for the experimental group, outlining step by step procedures. The manual guide is validated by my promoter in line with the variables under study. The training manual which provided outlines and instructions for six weeks for the pregnant women, this includes a training schedule and instructions for different exercises. It provides such information as objectives of the program, daily programme outline including durations and hour per week, topic content(s), audience, teaching methods, instructional materials and evaluation.

Outlines of the Training

Experimental group:

1. Pretest
2. Concept of dietary patterns definition of diet/ food types, classes of food, examples of classes of food and functions.
3. Attitude towards dietary patterns
4. Choice of food on dietary patterns
5. Post treatment evaluation of dietary patterns

Control Group

1. Concept of family planning – definition, types, mode of action and rate of effectiveness.
2. Types of Family planning
3. Different types of methods
4. Mode of action
5. Reasons for family planning
6. Benefits of family planning.

Self-Developed Questionnaire

To examine the effects of nutritional education intervention on knowledge, attitude and choice of food on dietary pattern among pregnant women in Ibadan Semi-Urban LGAs a self – developed questionnaire is designed to test hypothesis for this study. The questionnaires which is self – developed was validated by the researchers' promoter. Nutritional educational intervention (NEI) on knowledge, attitude and choice of food on dietary pattern has three 3 major scales which are knowledge on dietary pattern scale, Attitude towards dietary patterns scales and choice of food on dietary scale.

3.5 Validity of the Instrument

Validity refers to the extent to which an instrument accurately measures what it tends to measure, ensuring that findings are accurate and meaningful. Accuracy is important whether you are using measurement tools or tools for gathering information like questionnaires⁸.

It was thoroughly scrutinized to ensure its appropriateness in terms of clarity, adequacy of content and ability to elicit accurate information for the study. It was therefore presented to the research Promoter for clarification, correction and approval before it was administered for the purpose of the study.

3.6 Reliability of the Instrument

Reliability refers to the consistency and stability of an instrument, it is an indication of the degree to which it gives the same answer overtime across similar groups and irrespective of who administers it. In order to ensure the reliability, pilot study was carried out using test retested method among 12 pregnant women (10% of the calculated sample size) in Primary health centres, Moniya, Akinyele Local Government Area. Representative population, similar characteristics with the study population. Test – retest method will be used to test reliability co-efficient 0.7 Also Cronbach's alpha to ensure internal consistency⁷.

3.7 Method of Data Collection

A letter of permission was obtained from the Head of the Department of Nursing at Lead City University to conduct the study. This letter was presented to the Medical Officer in the selected facility in order to facilitate the process of data collection and to meet the designated protocol. The researcher introduced herself and the purpose of research to the respondents so as to gain their cooperation. Informed consent was obtained with assurance of confidentiality and anonymity. The data collection process involved distributing the validated questionnaires to the respondents in the selected health facilities.

The researchers and trained assistants ensured proper explanation of the study's objectives and provides guidance to respondents as needed.

3.8 Method of Data Analysis

Data were collected, clean and coded in IBM Statistical Package for the social Sciences (SPSS) version 25.0 software. Research Questions were analyzed using descriptive statistics of frequency counts and percentage, mean and Standard Deviation (S.D) inferential statistics of Analysis of Covariance (ANCOVA) was used to test hypotheses⁶.

3.9 Ethical Approval

The ethical approval for this study was obtained from the Institutional Review Board (Ethical Committee) of the Oyo State Ministry of Health after a copy of the proposal has been presented. The approval letter from the Institutional Review Board of the Oyo State and Application letter was presented to the medical officer of selected health facility to be used for the study. Aim and Objectives of the study were explained to the participants. Then their consent to participate only be sought and their right to participate or not was respected.

Participants were told that they can withdraw from the study at any stage of the study, if they wish and that such withdrawal was not causing any problem. Confidentiality was maintained by not including the names and addresses of the respondents.

Confidentiality of data collected: Data collected, entered, and saved on a password protected computer and a data back up to an external hard drive, only authorized individuals were allowed to handle participants' information. Names of the participants were used and questionnaires were identified by codes.

Beneficence to Participants: this research was very crucial and significant. The outcome will target the provision of evidence – based data for policy makers towards dietary patterns for pregnant women.

Non – maleficence to Participants: the research work was non – invasive

Autonomy: the researcher respected the right of the participant and informed consent was gained and no coarseness on the part of the participants into the study.

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Endnotes

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Chapter Four

Results and Discussion of Findings

In this chapter data collected from 118 pregnant women which 59 in each group. [experiment and control).

The majority of participants were between 20–29 years (46, 78.0% in experimental; 44, 74.6% in control), with a mean age of about 26–27 years. Most were married (47, 79.7% vs. 51, 86.4%) and predominantly Yoruba (57, 96.6% in both groups). Nearly half had only primary education (28, 47.5% versus. 30, 50.8%), while others had secondary or tertiary education. Employment was mainly self-employment (47, 79.7% versus. 41, 69.5%), and household income was generally below ₦50,000 per month. Most participants were in monogamous marriages (40, 67.8% versus. 42, 71.2%). A substantial proportion had no children (26, 44.1% in both groups), while about one-third had one child. Regarding pregnancy stage, most were in the third trimester (36, 61.0% versus. 32, 54.2%). None of the socio-demographic variables showed significant differences between groups ($p>0.05$), indicating comparability, (table 4.1 and 4.2).

Table 4.1: Baseline Characteristics of the Study Participants

Characteristic	Experiment n (%)	Controls, n (%)	χ^2 /t-test	P- value
Age group (years)				
<20	1(1.7)	2(3.4)		
20-29	46(78.0)	44(74.6)	3.518	.318
30-39	11(18.6)	8(13.6)		
40-49	1(1.7)	5(8.5)		
Mean Age [range](years)	26.2±5.0 [17-42]	27.2±5.6 [18-40]	0.952	.343
Marital Status				
Single	12(20.3)	8(13.6)	.963	.326
Married	47(79.7)	51(86.4)		
Ethnicity				
Yoruba	57(96.6)	57(96.6)	1.333 ^a	.513
Igbo	1(1.7)	2(3.4)		
Others	1(1.7)	0		
Religion				
Christianity	16(27.1)	17(28.8)	1.030	.597
Islam	42(71.2)	42(71.2)		
Others	1(1.7)	0		
Level of Education			5.950	.429
Primary	28(47.5)	30(50.8)		
Secondary	7(11.9)	10(16.9)		
Tertiary	24(40.7)	19(32.3)		
Employment status				
public service	7(11.9)	15(25.4)	3.818 ^a	.148
Self employed	47(79.7)	41(69.5)		
Artisan/Apprentice	5(8.5)	3(5.1)		
Monthly Household income in Naira				
Below 20000	26(44.1)	27(45.8)		
20000-50000	22(37.3)	23(39.0)	.243	.970
51000-100000	5(8.5)	4(6.8)		
Above 100000	6(10.2)	5(8.5)		

Source: Fieldwork, 2025.

Table 4.2: Family Characteristics of the Study Participants

Characteristic	Experiment n (%)	Controls, n (%)	χ^2	<i>P</i> -value
Type of Marriage				
Monogamy	40(67.8)	42(71.2)	1.430	.567
Polygamy	19(32.2)	17(28.8)		
Number of Children				
None	26(44.1)	26(44.1)	.388	.943
One	20(33.9)	19(32.2)		
Two	7(11.9)	6(10.2)		
More than two	6(10.2)	8(13.6)		
Pregnancy Stage				
First trimester	10(16.9)	11(18.6)	.593	.743
second trimester	13(22.0)	16(27.1)		
third trimester	36(61.0)	32(54.2)		

Source: Fieldwork, 2025.

Table 4. 3: Baseline Mean Score of Knowledge Based Diet, Attitude Based on Dietary Patterns and Food Choices Regarding Dietary Pattern between Experimental and Control

Variables	Statistics /items	Experimental	Controls	t-test	p-value
Knowledge based diet	Mean $\pm$ SD	16.4 $\pm$ 2.3	16.2 $\pm$ 2.3	.429	.668
	Range	10.0-19	11.0-19.0		
Attitude based on dietary patterns	Mean $\pm$ SD	39.7 $\pm$ 7.8	39.4 $\pm$ 6.8	.250	.803
	Range	21.0-56.0	26.0-49.0		
Food choices regarding dietary pattern	Mean $\pm$ SD	41.1 $\pm$ 7.5	40.9 $\pm$ 8.3	.093	.926
	Range	15.0-57.0	21.0-50.0		

Source: Field work, 2025.

Table 4. 3: Baseline Mean Score of Knowledge Based Diet, Attitude Based on Dietary Patterns and Food Choices Regarding Dietary Pattern between Experiment and Control

Before intervention, both groups had similar mean scores for knowledge (16.4 versus. 16.2), attitude (39.7 versus. 39.4), and food choices (41.1 versus. 40.9), with no significant differences ($p>0.05$). This shows that both groups started at the same level.

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Table 4.4: Post intervention Mean Score of Knowledge Based Diet, Attitude Based on Dietary Patterns and Food Choices Regarding Dietary Pattern between Experiment and Control

Variables	Statistics /items	Post Experiment	Post Controls	t-test	p-value
Knowledge based diet	Mean $\pm$ SD	18.8 $\pm$ 1.8	16.2 $\pm$ 2.3	6.172	.0001
	Range	13.0-20.0	11.0-19.0		
Attitude based on dietary patterns	Mean $\pm$ SD	44.7 $\pm$ 6.1	39.4 $\pm$ 6.8	3.833	.0001
	Range	27.0-60.0	26.0-49.0		
Food choices regarding dietary pattern	Mean $\pm$ SD	48.4 $\pm$ 5.1	41.1 $\pm$ 8.3	6.263	.0001
	Range	39.0-60.0	21.0-50.0		

Source: Field work, 2025.

Table 4.4: Post intervention Mean Score of Knowledge Based Diet, Attitude Based on Dietary Patterns and Food Choices Regarding Dietary Pattern between Experiment and Control

After intervention, the experimental group showed higher scores in knowledge (18.8 versus. 16.2), attitude (44.7 versus. 39.4), and food choices (48.4 versus. 41.1). These differences were highly significant ($p < 0.001$), showing a positive effect of nutritional education.

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Table 4.5: Comparison of Pre and Post Mean of Knowledge Based Diet, Attitude Based on Dietary Patterns and Food Choices Regarding Dietary Pattern within The Experimental Group

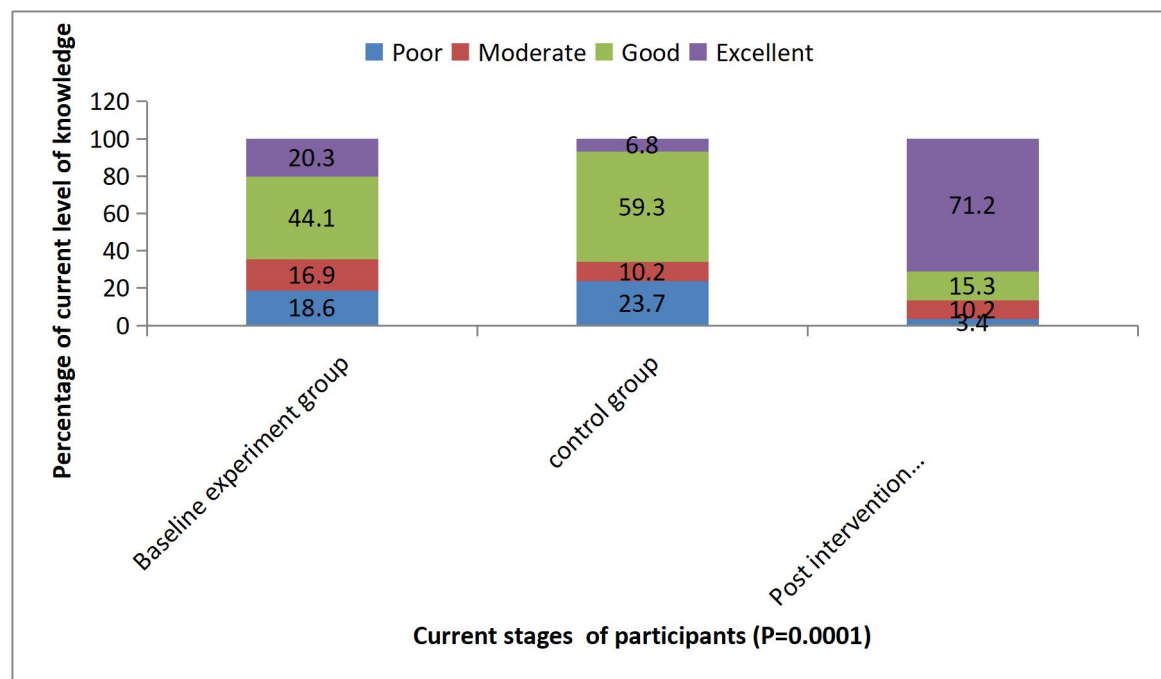
Group	Variables	Stage	Mean $\pm$ SD	Pair difference		Pair t-test	p-value
				Mean	SD		
Experiment	Knowledge based diet	Pre	16.4 $\pm$ 2.3	2.4	2.9	6.333	.0001
		Post	18.8 $\pm$ 1.8				
	Attitude based on dietary patterns	Pre	39.7 $\pm$ 7.9	5.0	9.9	3.851	.0001
		Post	44.7 $\pm$ 6.1				
	Food choices regarding dietary pattern	Pre	41.1 $\pm$ 7.5	7.4	9.7	5.864	.0001
		Post	48.4 $\pm$ 5.1				

Source: Field work 2025.

Table 4.5: Comparison of Pre and Post Mean of Knowledge Based Diet, Attitude Based on Dietary Patterns and Food Choices Regarding Dietary Pattern within The Experimental Group

The experimental group recorded significant improvements between pre- and post-test: Knowledge increased by +2.4 points ($p < 0.001$). Attitude increased by +5.0 points ($p < 0.001$). Food choices improved by 7.4 points ($p < 0.001$). This demonstrates the effectiveness of the intervention within the same group.

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Effect of Nutritional Education on Knowledge Regarding Diet among Pregnant Women

Source: Field work, 2025

Figure 4.1: Main Effect of Nutritional Education on Knowledge Regarding Diet

The figure illustrates that the experimental group had a marked improvement in knowledge scores after nutritional education compared to the control group, confirming the intervention's impact which had 71.2% excellent knowledge at post intervention, 20.3% at baseline and 6.8% excellent of the control group.

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Table 4. 6a: Knowledge Regarding Diet among Pregnant Women. [Pre Intervention Stage]

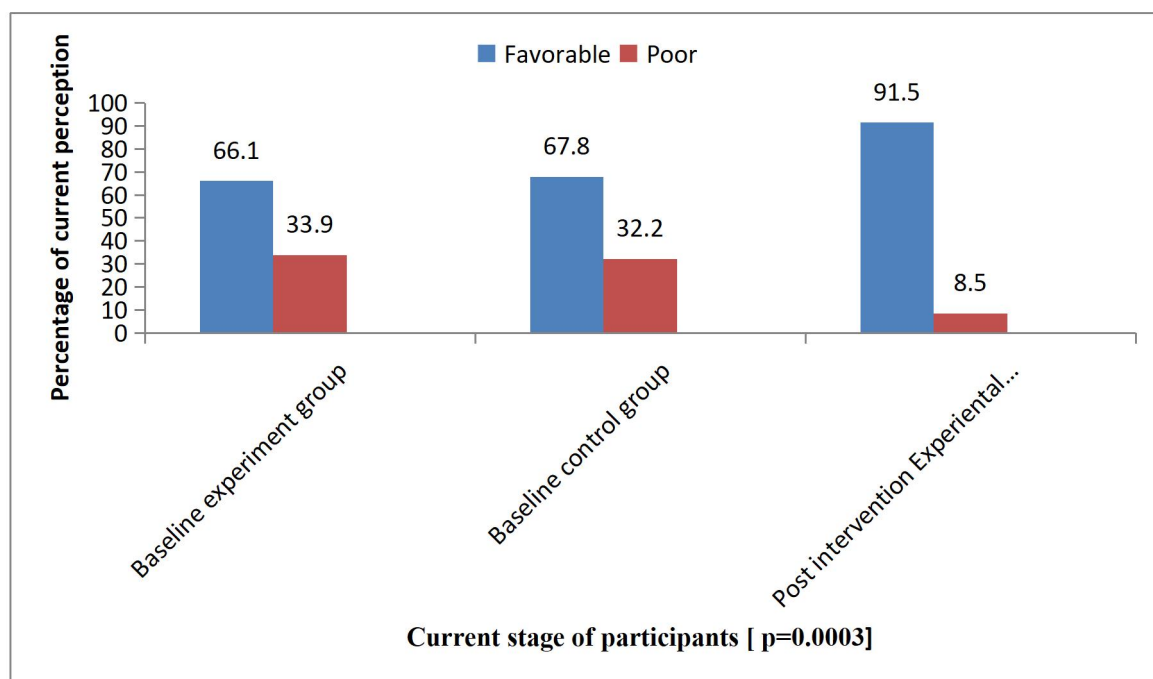
Items	Pre intervention stage			
	Experimental group		Control group	
	Yes	No	Yes	No
Do you know that pregnant women require increased nutrients compared to non-pregnant women?	50(84.7)	9(15.9)	56(94.9)	3(5.1)
Are you aware that eating fruits and vegetables daily is important during pregnancy?	40(67.8)	19(32.2)	50(84.7)	9(15.3)
Do you know that iron-rich foods help prevent anemia in pregnancy?	42(71.2)	17(28.8)	44(74.6)	15(25.4)
Can you identify protein-rich foods such as beans, eggs, meat, or fish?	52(88.1)	7(11.9)	50(84.7)	9(15.3)
Do you know that skipping meals during pregnancy can affect your baby's growth?	46(78.0)	13(22.0)	45(76.3)	14(23.7)
Are you aware that excessive intake of sugary foods can lead to gestational diabetes?	43(72.9)	16(27.1)	43(72.9)	16(27.1)
Do you know the importance of folic acid in preventing birth defects?	49(83.1)	10(16.9)	49(83.1)	10(16.9)
Can you list at least three food items that are rich in calcium?	50(84.7)	9(15.3)	50(84.7)	9(15.3)
Are you aware that drinking enough clean water helps in maintaining a healthy pregnancy?	57(96.6)	2(3.4)	57(96.6)	2(3.4)
Do you know that excessive consumption of junk food can lead to poor birth outcomes?	46(78.0)	13(22.0)	46(78.0)	13(22.0)
Can you identify foods that are high in fiber and helpful in preventing constipation?	41(69.5)	18(30.5)	43(72.9)	16(27.1)
Do you know the recommended number of meals/snacks a pregnant woman should have daily?	43(72.9)	16(27.1)	43(72.9)	16(27.1)

Items	Pre intervention stage			
	Experimental group		Control group	
	Yes	No	Yes	No
Are you aware of the risks associated with consuming unpasteurized milk or undercooked meat during pregnancy?	43(72.9)	16(27.1)	41(69.5)	18(30.5)
Do you know that balanced nutrition can improve pregnancy outcomes and reduce maternal mortality?	50(84.7)	9(15.3)	50(84.7)	9(15.3)
Are you aware that certain traditional herbs or concoctions may be harmful during pregnancy?	57(96.6)	2(3.4)	57(96.6)	2(3.4)
Do you know that daily intake of prenatal vitamins is recommended for pregnant women?	51(86.4)	8(13.6)	51(86.4)	8(13.6)
Can you identify local foods that are rich in essential nutrients for pregnancy?	57(96.6)	2(3.4)	57(96.6)	2(3.4)
Are you aware that alcohol consumption during pregnancy can harm the baby's development?	57(96.6)	2(3.4)	54(91.5)	5(8.5)

Source: Fieldwork, 2025.

Table 4.7: Knowledge Regarding Diet among Pregnant Women. [Post Intervention Stage]

Items	Post intervention stage			
	Experimental group Yes	Experimental group No	Control group Yes	Control group No
Do you know that pregnant women require increased nutrients compared to non-pregnant women?	58(98.3)	1(1.7)	56(94.9)	3(5.1)
Are you aware that eating fruits and vegetables daily is important during pregnancy?	59(100.0)	0	50(84.7)	9(15.3)
Do you know that iron-rich foods help prevent anemia in pregnancy?	56(94.9)	3(5.1)	44(74.6)	15(25.4)
Can you identify protein-rich foods such as beans, eggs, meat, or fish?	58(98.3)	1(1.7)	50(84.7)	9(15.3)
Do you know that skipping meals during pregnancy can affect your baby's growth?	56(94.9)	3(5.1)	45(76.3)	14(23.7)
Are you aware that excessive intake of sugary foods can lead to gestational diabetes?	57(96.6)	2(3.4)	43(72.9)	16(27.1)
Do you know the importance of folic acid in preventing birth defects?	51(86.4)	8(13.6)	49(83.1)	10(16.9)
Can you list at least three food items that are rich in calcium?	51(86.4)	8(13.6)	50(84.7)	9(15.3)
Are you aware that drinking enough clean water helps in maintaining a healthy pregnancy?	59(100.0)	0	57(96.6)	2(3.4)
Do you know that excessive consumption of junk food can lead to poor birth outcomes?	54(91.5)	5(8.5)	46(78.0)	13(22.0)
Can you identify foods that are high in fiber and helpful in preventing constipation?	56(94.9)	3(5.1)	43(72.9)	16(27.1)
Do you know the recommended number of meals/snacks a pregnant woman should have daily?	54(91.5)	5(8.5)	43(72.9)	16(27.1)
Are you aware that vitamin A-rich foods like carrots and pumpkins are important during pregnancy?	52(88.1)	7(11.9)	52(88.1)	7(11.9)
Do you know that consuming too much salt can increase the risk of high blood pressure in pregnancy?	54(91.5)	5(8.5)	43(72.9)	16(27.1)
Are you aware of the risks associated with consuming unpasteurized milk or undercooked meat during pregnancy?	52(88.1)	7(11.9)	41(69.5)	18(30.5)
Do you know that balanced nutrition can improve pregnancy outcomes and reduce maternal mortality?	52(88.1)	7(11.9)	50(84.7)	9(15.3)
Are you aware that certain traditional herbs or concoctions may be harmful during pregnancy?	57(96.6)	2(3.4)	57(96.6)	2(3.4)
Do you know that daily intake of prenatal vitamins is recommended for pregnant women?	57(96.6)	2(3.4)	51(86.4)	8(13.6)
Can you identify local foods that are rich in essential nutrients for pregnancy?	57(96.6)	2(3.4)	57(96.6)	2(3.4)
Are you aware that alcohol consumption during pregnancy can harm the baby's development?	59(100.0)	0	54(91.5)	5(8.5)



Effect of Nutritional Education on Attitude towards Diet among Pregnant Women .

Source: Field work, 2025

Figure 4. 2: Main Effect of Nutritional Education on Attitude towards Diet Pattern

The chart shows that nutritional education significantly improved attitudes toward dietary practices in the experimental group with 91.5% favorable attitude, while the control group showed little change with 67.8% favourable attitude.

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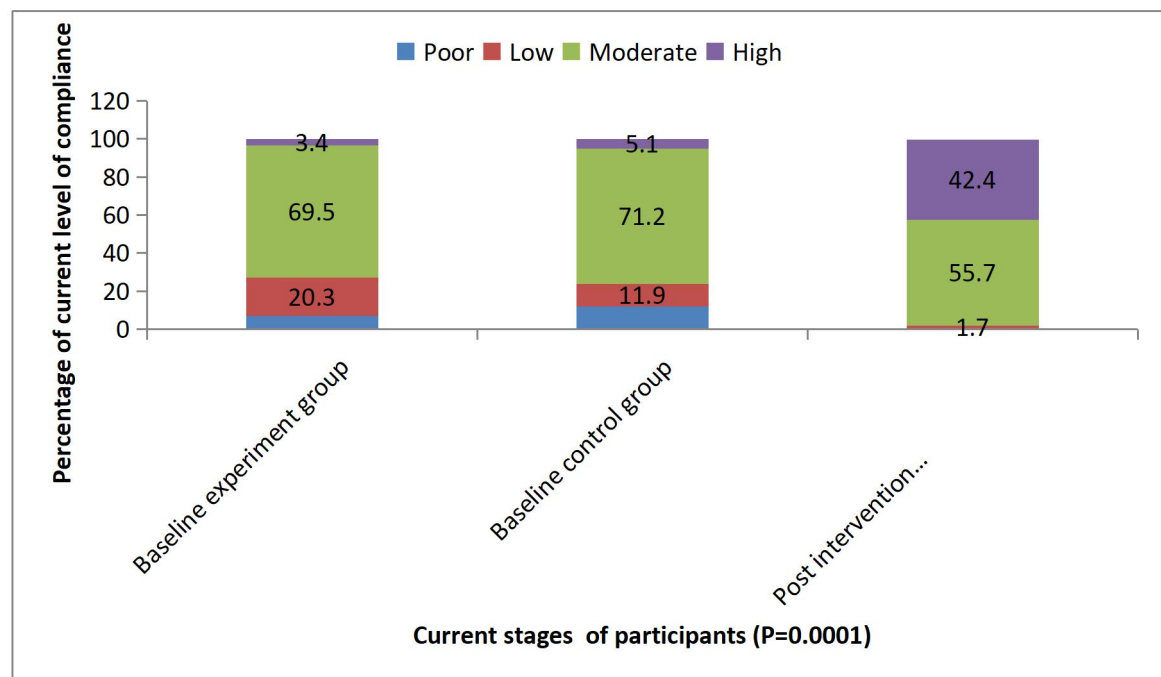
Table 4. 8a: Effect of Nutritional Education on Attitude towards Diet

Items	Post intervention stage							
	Experimental group				Control group			
	SD Strongly Disagree	D Disagree	A Agree	SA Strongly Agree	SD Strongly Disagree	D Disagree	A Agree	SA Strongly Agree
Eating a balanced diet is important for my baby's health.	2(3.3)	1(1.6)	1(1.6)	57(93.4)	3(4.9)	0	5(8.2)	53(86.9)
I eat more fruits and vegetables during pregnancy.	2(3.3)	1(1.6)	1(1.6)	57(93.4)	3(4.9)	0	5(8.2)	53(86.9)
Eating traditional or local food is healthier than processed food during pregnancy.	1(1.6)	0	2(3.3)	58(95.1)	3(4.9)	0	3(4.9)	55(90.2)
I am concerned about the nutritional value of what I eat during pregnancy.	2(3.3)	15(24.6)	4(6.6)	40(65.6)	8(13.1)	8(13.1)	12(19.7)	33(54.10)
I take prenatal vitamins is necessary even if I eat well.	1(1.6)	9(14.8)	1(1.6)	50(82.0)	4(6.6)	9(14.8)	10(16.4)	38(62.3)
skipping meals occasionally does not affect my pregnancy.	1(1.6)	9(14.8)	2(3.3)	49(80.3)	9(14.8)	13(21.3)	9(14.8)	37(60.7)
sugary snacks and drinks should be avoided during pregnancy.	2(3.3)	9(14.8)	4(6.6)	46(75.4)	4(6.6)	13(21.3)	9(14.8)	35(57.4)
It is difficult to follow dietary advice from health workers due to financial reasons.	1(1.6)	7(11.5)	2(3.3)	51(83.6)	4(6.6)	10(16.4)	9(14.8)	38(62.3)

Table 4.8b Effect of nutritional education on attitude towards diet

Items	Post intervention stage							
	Experimental group				Control group			
	SD Strongly Disagree	D Disagree	A Agree	SA Strongly Agree	SD Strongly Disagree	D Disagree	A Agree	SA Strongly Agree
I eat plenty of protein (e.g., beans, eggs, fish) to supports my baby's growth.	2(3.3)	5(8.2)	4(6.6)	50(82.0)	4(6.6)	8(13.1)	9(14.8)	40(65.6)
I valued the dietary advice from community health nurses which is helpful and trustworthy.	3(4.9)	4(6.6)	3(4.6)	54(88.5)	3(4.9)	15(24.6)	13(21.3)	30(49.2)
It is unnecessary to change my eating habits during pregnancy.	1(1.6)	1(1.6)	1(1.6)	58(95.1)	3(4.9)	4(6.6)	13(21.3)	41(67.2)
I give room to receive proper guidance which give me confident in making healthy food choices.	2(3.3)	3(4.9)	2(3.3)	51(83.6)	6(9.8)	7(11.5)	5(8.2)	45(75.4)
I drink enough water which is as important as eating nutritious food.	1(1.6)	3(4.9)	2(3.3)	55(90.2)	4(6.6)	2(3.3)	9(14.8)	46(75.4)
My cultural beliefs and practices influence the food I eat during pregnancy.	1(1.6)	2(3.3)	1(1.6)	57(93.4)	2(3.3)	6(9.8)	7(11.5)	46(75.4)
I give more attention to education on dietary practices during pregnancy during the antenatal clinics	3(4.9)	4(6.6)	0	54(88.5)	3(4.9)	15(24.6)	13(21.3)	30(49.2)

Source: Field work, 2025.



Effect of Nutritional Education on Food Choices Regarding Diet Pattern among Pregnant Women.

Source: Fieldwork, 2025

Figure 4.3. Main Effect of Nutritional Education on Food Choices Regarding Diet Pattern

The figure highlights a significant improvement in food choice practices (such as regular fruit intake, protein inclusion, and water consumption) in the experimental group had 42.4% high compared to the control group with 5.1 % high.

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Table 4.9: Main Effect of Nutritional Education on Food Choices Regarding Diet

Items	Post intervention stage							
	Experimental group				Control group			
	SD Strongly Disagree	D Disagree	A Agree	SA Strongly Agree	SD Strongly Disagree	D Disagree	A Agree	SA Strongly Agree
I eat breakfast that includes foods like bread, pap, or yam every morning.	2(3.3)	1(1.6)	1(1.6)	54(93.4)	1(1.6)	0	5(8.2)	53(86.9)
I eat fruits such as banana, orange, or watermelon every day.	1(1.6)	0	2(3.3)	58(95.1)	3(4.9)	0	5(8.2)	53(86.9)
I choose protein-rich foods like beans, eggs, fish, or meat in my meals.	1(1.6)	0	2(3.3)	58(95.1)	3(4.9)	0	3(4.9)	55(90.2)
I drink at least 8 cups of clean water daily.	0	0	1(3.3)	58(95.1)	8(13.1)	8(13.1)	12(19.7)	33(54.10)
I take prenatal supplements such as folic acid or iron tablets regularly.	0	0	2(3.3)	58(95.1)	4(6.6)	9(14.8)	10(16.4)	38(62.3)
I include green leafy vegetables such as spinach (ugu), okra, or bitter leaf in my meals.	1(1.6)	9(14.8)	2(3.3)	49(80.3)	9(14.8)	13(21.3)	9(14.8)	37(60.7)
I avoid eating raw or undercooked foods like suya, half-cooked eggs, or unwashed fruits.	2(3.3)	9(14.8)	4(6.6)	46(75.4)	4(6.6)	13(21.3)	9(14.8)	35(57.4)
I reduce eating sugary snacks like biscuits, cake, soft drinks, and sweets.	1(1.6)	7(11.5)	2(3.3)	51(83.6)	4(6.6)	10(16.4)	9(14.8)	38(62.3)

Table 4.9b Main effect of nutritional education on food choices regarding diet

Items	Post intervention stage							
	Experimental group				Control group			
	SD Strongly Disagree	D Disagree	A Agree	SA Strongly Agree	SD Strongly Disagree	D Disagree	A Agree	SA Strongly Agree
I eat iron-rich foods like liver, beans, or pumpkin leaves (ugu).	2(3.3)	5(8.2)	4(6.6)	50(82.0)	4(6.6)	8(13.1)	9(14.8)	40(65.6)
I drink milk or eat foods rich in calcium such as cheese, sardines, or okra.	3(4.9)	4(6.6)	3(4.6)	54(88.5)	3(4.9)	15(24.6)	13(21.3)	30(49.2)
I ask or read about the nutritional value of the foods I buy or eat for choice food	1(1.6)	1(1.6)	1(1.6)	58(95.1)	3(4.9)	4(6.6)	13(21.3)	41(67.2)
I eat more natural and local foods like yam, rice, maize, and plantain instead of fast food.	2(3.3)	3(4.9)	2(3.3)	51(83.6)	6(9.8)	7(11.5)	5(8.2)	45(75.4)
I have changed my food choices after receiving advice from the nurse or antenatal classes.	1(1.6)	3(4.9)	2(3.3)	55(90.2)	4(6.6)	2(3.3)	9(14.8)	46(75.4)
I wash fruits like apple, cucumber, or pawpaw thoroughly before making a choice to eat.	1(1.6)	2(3.3)	1(1.6)	57(93.4)	2(3.3)	6(9.8)	7(11.5)	46(75.4)
I ensure my meals contain a mix of foods like rice, beans, vegetables, and fruit.	1(1.6)	0	1(1.6)	57(93.4)	3(4.9)	15(24.6)	7(11.5)	46(75.4)

Source: Fieldwork, 2025

There is no significant main effect of nutritional education on knowledge regarding diet among pregnant women

Table 4.10: Tests of Between-Subjects Effects

Group	N	Pre-test Mean $\pm$ SD	Post-test Mean $\pm$ SD	Adjusted post test mean (ANCOVA)	F(df=1,117)	p-value
Intervention	59	16.4 $\pm$ 2.3	18.8 $\pm$ 1.8	18.7	55.436	0.0001
Control	59	16.2 $\pm$ 2.3	16.3 $\pm$ 2.2	16.5		

Source: Fieldwork, 2025.

H01. There is no significant main effect of nutritional education on knowledge regarding diet among pregnant women.

ANCOVA test of hypotheses (Knowledge)The ANCOVA results showed significant main effects of nutritional education on knowledge with adjusted post test mean intervention 18.7 versus control 16.5, $F=55.436$, $p<0.001$. This confirms that nutritional education had a statistically significant positive effect on all three outcomes. The null hypotheses (H_{01}) was rejected.

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H₀₂. There is no significant main effect of nutritional education on attitude towards diet pattern among pregnant women .

Table 4.11: Tests of Between-Subjects Effects

Group	N	Pre-test Mean ±SD	Post-test Mean ±SD	Adjusted post test mean (ANCOVA)	F(df=1,117)	p-value
Intervention	59	39.7±7.8	44.7±6.1	43.6	34.2	0.0001
Control	59	39.4±6.8	39.7±5.9	39.8		

Source: Fieldwork, 2025.

H02. There is no significant main effect of nutritional education on attitude towards diet pattern among pregnant women .

ANCOVA test of hypotheses (attitude) The ANCOVA results showed significant main effects of nutritional education on attitude with adjusted post test mean intervention 43.6 versus control 39.8; $F=34.2$, $p<0.001$. This confirms that nutritional education had a statistically significant positive effect on outcome. The null hypotheses (H_{02}) was rejected.

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H₀₃. There is no significant main effect of nutritional education on food choices regarding diet among pregnant women

Table 4.12: Tests of Between-Subjects Effects

Group	N	Pre-test Mean ±SD	Post-test Mean ±SD	Adjusted post test mean (ANCOVA)	F(df=1,117)	p-value
Intervention	59	41.1±7.5	48.4±5.1	48.6	40.872	0.0001
Control	59	40.9±8.3	41.0±7.1	41.4		

Source: Fieldwork, 2025.

H03. There is no significant main effect of nutritional education on food choices regarding diet among pregnant women

ANCOVA test of hypotheses (Food choices) The ANCOVA results showed significant main effects of nutritional education on attitude with adjusted post test mean intervention 48.6 versus control 41.4,; $F=40.872$, $p<0.001$. This confirms that nutritional education had a statistically significant positive effect on outcomes. The null hypotheses (H_{03}) was rejected.

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4.2 Discussion of Finding

As presented, the experimental and control groups were comparable at baseline across all socio-demographic and family characteristics. The results on respondents' age, marital status, education, occupation, and religion. The majority were aged 25–34 years, married, and had at least secondary education. This suggests a population in active reproductive years with potential receptiveness to nutrition education. Studies confirm maternal education strongly predicts improved dietary diversity and health outcomes⁶. There were no statistically significant differences ($p>0.05$) in age, marital status, ethnicity, education, income, type of marriage, number of children, or pregnancy stage. This initial equivalence is crucial as it ensures that any subsequent differences observed between the groups can be more confidently attributed to the intervention rather than pre-existing demographic disparities¹. Findings confirms that the mean scores for knowledge, attitude, and food choices were not significantly different between the groups at the pre-test stage ($p>0.05$), establishing a equivalent starting point for the outcome variables.

The results demonstrated a significant main effect of the nutritional education intervention on knowledge. The result shows a marked increase in the mean knowledge score for the experimental group (from 16.4 to 18.8) compared to the negligible change in the control group (16.2 to 16.3). This difference was highly significant, $p<0.001$). Most respondents had moderate baseline knowledge of diet, while a smaller proportion demonstrated high knowledge. This aligns with earlier findings that pregnant women often have gaps in nutrition knowledge, affecting dietary practices⁷. Nutrition education has been shown to significantly improve this knowledge⁸. The finding revealed significant improvement in dietary knowledge after nutritional education compared to pre-test scores. This supports the effectiveness of targeted interventions during

pregnancy⁹ This confirms that improvements in the intervention group were attributable to the educational program, not external factors¹⁰.

Attitude plays a central role in translating knowledge into practice, as shown in studies of planned behavior and on maternal nutrition beliefs¹². After intervention, respondents' attitudes improved significantly, indicating that nutrition education positively shaped perceptions toward healthy diets. This echoes findings that educational interventions can shift maternal attitudes toward better dietary compliance¹³. No significant change was observed in the control group, reinforcing that attitude shifts in the intervention group resulted from the program. Literature confirms that attitudes rarely change without structured interventions⁵. Pre-test dietary choices were less optimal, but post-test results revealed healthier food selections, particularly in protein and fruit/vegetable intake. This supports earlier evidence that nutritional education promotes better dietary practices among pregnant women¹⁵.

Control participants maintained largely the same food choices before and after, confirming that without education, dietary patterns remain unchanged. Similar findings were reported in trials in Sub-Saharan Africa. The bar chart shows a clear upward shift in the intervention group compared to stagnant control group scores. This visually reinforces the intervention's positive effect. Such trends are consistent with randomized nutrition education studies⁶. The chart illustrates that positive attitudes increased post-intervention, while negative/mixed attitudes decreased. This matches findings that health education can reshape health-related attitudes¹⁰. The chart shows a transition from less healthy to healthier food choices among the intervention group. This aligns with studies showing that increased nutrition knowledge is strongly associated with improved dietary behavior⁹.

This study examined the effectiveness of nutritional education on knowledge, attitude, and food choices regarding diet among pregnant women in semi-urban Ibadan, Oyo State.

The findings revealed that most respondents were in their reproductive years, married, and had attained at least secondary education, indicating that they were at a stage where nutritional education could be impactful. Pre-test results demonstrated moderate knowledge levels and mixed attitudes toward diet, with food choices reflecting cultural and socio-economic influences. Following the nutritional education intervention, there was a statistically significant improvement in knowledge, positive attitudes toward dietary practices, and healthier food choices. Conversely, the control group showed little to no change in outcomes, suggesting that improvements observed in the intervention group were directly attributable to the education program.

Charts which illustrates that 71.2% of the intervention group achieved "excellent" knowledge post-intervention, a substantial increase from 20.3% at baseline, compared to only 6.8% in the control group. This finding aligns with existing literature. The study by Sossa et al. found that pregnant women often had insufficient nutritional knowledge, which was significantly improved through targeted educational sessions². The post-intervention data in, where nearly all participants in the experimental group (98-100%) correctly answered questions about the importance of fruits, vegetables, iron, and protein, underscores the intervention's success in conveying critical information. This supports the assertion that nutritional education is a vital tool for bridging knowledge gaps among pregnant women in semi-urban settings³.

The intervention also had a profound positive impact on participants' attitudes towards dietary practices. Finding indicated a significant improvement in the mean attitude score for the experimental group (from 39.7 to 44.7) compared to the stable scores of the control group (39.4 to 39.7), a difference that was statistically significant ($t\text{-test}=3.833$, $p<0.001$). Figure 4.2 shows that 91.5% of the intervention group held a favourable

attitude post-intervention, compared to 67.8% in the control group. Granular detail, showing that after the NEI, a vast majority of the experimental group strongly agreed with positive statements. For instance, 93.4% strongly agreed on the importance of a balanced diet for the baby's health, and 95.1% strongly disagreed that it was unnecessary to change eating habits during pregnancy.

This shift indicates that the intervention successfully addressed and reshaped deep-seated beliefs and perceptions, moving beyond mere knowledge acquisition to fostering a genuine appreciation for healthy dietary practices. This finding corroborates the work of Taiwo and Egbetokun, who emphasized that culturally sensitive nutritional education is key to reframing negative attitudes and misconceptions surrounding food during pregnancy⁴. The most critical outcome—actual food choices—also showed significant improvement due to the intervention. Finding reveals a large increase in the mean score for food choices in the experimental group (from 41.1 to 48.4) versus no change in the control group (40.9 to 41.0), with a highly significant t-test value of 6.263 ($p < 0.001$).

Chart highlights that 42.4% of the intervention group were classified as having "high" positive food choice practices post-intervention, a stark contrast to only 5.1% in the control group. The behavioural data confirms this transformation. Post-intervention, over 95% of the experimental group reported daily consumption of fruits and protein-rich foods, drinking at least 8 cups of water, and avoiding raw or undercooked foods. This demonstrates a translation of knowledge and positive attitude into concrete, healthier daily practices. This is consistent with the study by Adeoye et al. in Ibadan, which found that educational interventions could significantly improve dietary diversity and intake of essential nutrients among pregnant women, thereby directly contributing to better maternal and fetal health outcomes⁵.

Endnotes

1. I. A. Adeoye, & A.P. Okekunle, *Dietary Patterns and Associated Factors among Pregnant Women in Ibadan, Nigeria: Evidence from Ibadan Pregnancy Cohort Study*. **PLoS ONE** 117(9), 2022, e0273796.
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Chapter Five

Conclusion

5.1 Summary of Finding

This study assessed the impact of a nutritional education intervention on pregnant women in Ibadan's semi-urban areas. A quasi-experimental design was used with an experimental group that received the intervention and a control group that did not. The groups were demographically similar at the start of the study. The intervention significantly improved participants' knowledge about essential prenatal nutrition. It also positively changed their attitudes towards healthy dietary practices. Most importantly, the education led to better daily food choices, such as increased fruit and protein intake. Statistical analysis confirmed these improvements were highly significant. The finding concludes that nutritional education is highly effective. It empowers pregnant women with the knowledge to make informed decisions. Therefore, such interventions are crucial for improving maternal and fetal health outcomes.

5.2 Conclusion

The study concludes that nutritional education significantly enhances maternal nutrition-related knowledge, fosters positive attitudes, and promotes healthier dietary practices among pregnant women. By equipping women with correct information and dispelling myths surrounding pregnancy diets, education interventions help bridge gaps caused by cultural beliefs and limited awareness. These findings align with Ajzen' Theory of Planned Behavior, which emphasizes that knowledge and attitudes directly influence behavioral intentions and practices. They also reinforce evidence from global studies that nutrition education delivered during antenatal care reduces risks of anemia, low birth weight, and adverse maternal outcomes⁷. Therefore, integrating structured nutrition education into antenatal services is a cost-effective and sustainable strategy for improving maternal and fetal health in Nigeria.

It also provides compelling evidence that a community health nurse-led nutritional education intervention is a powerful tool for improving dietary practices among pregnant women in semi-urban Nigeria. It successfully enhanced their knowledge, transformed their attitudes, and positively changed their food choices. The findings underscore the critical role of education in bridging the gap between knowledge and practice in maternal nutrition. Therefore, the integration of such targeted interventions into standard antenatal care is not just beneficial but essential. Ultimately, this approach promises to contribute significantly to reducing maternal and infant morbidity and mortality.

5.3 Recommendations

1. The Chairman should integrate structured, standardized nutritional education modules into routine antenatal care services at all primary healthcare centers.
2. The Government should train and empower community health nurses to be the primary facilitators of these nutritional counseling sessions.
3. Authority should develop culturally sensitive and locally relevant educational materials in local languages, featuring affordable, available food options.
4. Community Health Nurses(CHN) should implement group education sessions during antenatal clinics to foster peer support and shared learning among pregnant women.
5. Community Health Nurses (CHN) should involve family members, particularly husbands and mothers-in-law, in educational programs to build a supportive home environment.
6. Community Health Nurses (CHN) should advocate for policy changes that support subsidizing nutrient-rich foods for low-income pregnant women to overcome financial barriers.
7. CHN should establish a system for regular reinforcement of nutritional messages through follow-up sessions or mobile health (mHealth) reminders.

8. CHN should address and deliberately debunk common local food taboos and misconceptions during counseling sessions for the pregnant women.
9. CHN should incorporate practical demonstrations, like cooking shows, to teach how to prepare balanced meals with local ingredients.
10. CHN should monitor and evaluate the long-term impact of these educational programs on birth outcomes like birth weight and maternal anemia rates.

5.4 Contribution to Knowledge

1. It validates the expanded role of the community health nurse as an educator and primary agent of behavioral change in public health.
2. The study provides a evidence-based framework for developing and implementing effective nutritional education programs in nursing practice.
3. It highlights the necessity for nurses to possess not only clinical knowledge but also skills in cultural competency and health communication.
4. The findings emphasize the importance of nursing research in addressing tangible public health problems and informing policy.
5. It serves as a model for how nursing interventions can be systematically designed, executed, and evaluated to measure their real-world impact.

5.5 Suggested Area of Further Research

A longitudinal study should be conducted to investigate the sustained impact of nutritional education on the women's dietary practices and its correlation with actual birth outcomes like birth weight, prevalence of anemia, and preterm birth rates. Further research is needed to explore the specific barriers (economic, cultural, logistical) that

prevent pregnant women from applying nutritional knowledge, even after education, to design more holistic interventions.

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Appendix I
Lead City University, Ibadan
Department of Nursing Science

**Questionnaire on Effectiveness of Nutritional Education on Knowledge, Attitude
and Food Choices on Dietary Patterns Among Pregnant Women in Ibadan Semi-
urban Areas, Oyo state**

Dear Respondent,

Thank you for taking the time to participate in this study. This research aims to examine the effectiveness of Nutritional Education on knowledge, attitude, and food choices regarding diet among pregnant women in Ibadan Semi-urban Area. Your cooperation will be highly needed in the area of filling the questionnaire. Please note that your responses will be treated with strict confidentiality and used solely for research purposes. There are no right or wrong answers; we are only interested in your honest opinions. Completing the questionnaire should take approximately 10–15 minutes.

Thank you.

Yours Sincerely,

Adekanmbi Iyabode O.

08023080670

Participant's Signature

Section A: Demographic Data

Instruction: Please tick (✓) the appropriate option

1. Age as at last birthday: -----
2. Marital status (a) single () (b) Married () (c) Divorced ()
3. Ethnicity: (a) Yoruba () (b) Igbo () (c) Hausa () (d) Others (specify) ()
4. Religion: (a) Christianity () (b) Islam () (c) Others (specify) ()

5. Educational Qualification: (a) PhD () (b) M.Sc. () (c) BSc () (d) HND () (e) ND () (f) SSCE () (g) Primary School Certificate ()
6. Family Type: (a) Monogamy () (b) Polygamy ()
7. Number of children: (a) None () (b) 1 () (c) 2 () (d) more than 2 ()
8. Pregnancy stage: (a) 1st trimester () (b) 2nd trimester () (c) 3rd trimester ()
9. Employment Status (a) Public service () (b) self-employed () (c) Artisan /Apprentice ()
10. Monthly Household Income (in Naira): (a) Below ₦20,000 (b) ₦20,000–~~₦50,000~~ (c) ~~₦51,000–₦100,000~~ (d) Above ₦100,000

Section B: These questions ask typically to rate your Knowledge-Based on Diet.

Instruction: Please tick (✓) the appropriate option

S/N	Item	Yes	No
1.	Do you know that pregnant women require increased nutrients compared to non-pregnant women?		
2.	Are you aware that eating fruits and vegetables daily is important during pregnancy?		
3.	Do you know that iron-rich foods help prevent anemia in pregnancy?		

4.	Can you identify protein-rich foods such as beans, eggs, meat, or fish?		
5.	Do you know that skipping meals during pregnancy can affect your baby's growth?		
6.	Are you aware that excessive intake of sugary foods can lead to gestational diabetes?		
7.	Do you know the importance of folic acid in preventing birth defects?		
8.	Can you list at least three food items that are rich in calcium?		
9.	Are you aware that drinking enough clean water helps in maintaining a healthy pregnancy?		
10.	Do you know that excessive consumption of junk food can lead to poor birth outcomes?		
11.	Can you identify foods that are high in fiber and helpful in preventing constipation?		
12.	Do you know the recommended number of meals/snacks a pregnant woman should have daily?		
13.	Are you aware that vitamin A-rich foods like carrots and pumpkins are important during pregnancy?		
14.	Do you know that consuming too much salt can increase the risk of high blood pressure in pregnancy?		
15.	Are you aware of the risks associated with consuming unpasteurized milk or undercooked meat during pregnancy?		
16.	Do you know that balanced nutrition can improve pregnancy outcomes and reduce maternal mortality?		
17.	Are you aware that certain traditional herbs or concoctions may be harmful during pregnancy?		
18.	Do you know that daily intake of prenatal vitamins is recommended for pregnant women?		
19.	Can you identify local foods that are rich in essential nutrients for pregnancy?		
20.	Are you aware that alcohol consumption during pregnancy can harm the baby's development?		

Section C: These questions ask typically to rate your Attitude-Based on Dietary Patterns. Provide your response by ticking the appropriate column for each item using: Strongly Disagree (**SD**), Disagree (**D**), Agree (**A**) or Strongly Agree (**SA**).

SD - 1, D - 2, A - 3, SA - 4.

S/N	Item	SD	D	A	SA
1.	Eating a balanced diet is important for my baby's health.				

2.	I eat more fruits and vegetables during pregnancy.				
3.	Eating traditional or local food is healthier than processed food during pregnancy.				
4.	I am concerned about the nutritional value of what I eat during pregnancy.				
5.	Is taking prenatal vitamins necessary even if I eat well.				
6.	Skipping meals occasionally does not affect my pregnancy.				
7.	Sugary snacks and drinks should be avoided during pregnancy.				
8.	Is it difficult to follow dietary advice from health workers due to financial reasons.				
9.	I eat plenty of protein (e.g., beans, eggs, fish) to supports my baby's growth.				
10.	I valued the dietary advice from community health nurses which is helpful and trustworthy.				
11.	Is it necessary to change my eating habits during pregnancy.				
12.	I give room to receive proper guidance which give me confident in making healthy food choices.				
13.	I drink enough water which is as important as eating nutritious food.				
14.	Is my cultural beliefs and practices influence the food I eat during pregnancy.				
15.	I give more attention to education on dietary practices during pregnancy during the antenatal clinics				

Section D: These questions ask typically to Food Choices Regarding Dietary Patterns. Provide your response by ticking the appropriate column for each item using: Strongly Agree (SA) Agree (A) Disagree (D) Strongly Disagree (SD)

SA - 4, A - 3, D - 2, SD - 1.

S/N	Item	SA	A	D	SD
1.	I eat breakfast that includes foods like bread, pap, yam every				

	morning.				
2.	I eat fruits such as banana, orange, watermelon every day.				
3.	I choose protein-rich foods like beans, eggs, fish, meat in my meals at times.				
4.	I drink at least eight (8) cups of clean water daily.				
5.	I take prenatal supplements such as folic acid and iron tablets regularly.				
6.	I include green leafy vegetables such as spinach (ugu), okra, water leaf in my meals.				
7.	I avoid eating raw or undercooked foods like suya, half-cooked eggs, or unwashed fruits.				
8	I reduce eating sugary snacks like biscuits, cake, soft drinks, and sweets.				
9	Do cost reduce the flair you have for your food choices				
10	Does taste influence your food choices during pregnancy				
11	I ask or read about the nutritional value of the foods I buy or eat for choice food				
12	I eat more natural and local foods like yam, rice, maize, and plantain instead of fast food.				
13	I have changed my food choices after receiving advice from the nurse or antenatal classes.				
14	I wash fruits like apple, cucumber, or pawpaw thoroughly before making a choice to eat.				
15	I ensure my meals contain a mix of foods like rice, beans, vegetables, and fruit.				

A	B	C	D	E	F	G
Week/Ti me	Training Objectives	Topics/	Audience	Method Of Teaching	Instructional Material	Evaluation

		Content				
Week 1 1hr	The researcher and the participants will be able to; Familiarize with each other Do orientation together and introduction of the topic is done. Create avenue for questions from each other.	General orientation/ introduction Familiarization with the participants. Introduce the pre-test and post-test to them.	Pregnant women	Group discussion Direct teaching. One on one teaching based on the questions.	Paper biro	What is balanced diet?

Appendix II

Training Guide and Time Table for the Experimental Group

A	B	C	D	E	F	G
Week/ Time	Training Objectives	Topics/ Content	Audience	Method	Instructional Materials	Evaluation

Week 2 1hr	At the end of this session, participant will be able to; Know the meaning of balanced diet, the classes of food	Administrati on of pretest classes of food e.g. carbohydrat e protein, fat & oil, mineral fibers water & roughages Food items that fall under each class of food	Pregnant women	Group discussion Direct teaching Lecturing	Posters, pictures, paper, biro & questionnaires	How many lasses of food do you know? What are the type of food that fall under each classes?
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A Week/Ti me	B Training Objectives	C Topics/ Content	D Audience	E Method	F Instructional Material	G Evaluation
Week 3 1hr	Participant should be able to show the knowledge on dietary patterns mentioning functions of each class of food.	Knowledge and dietary patterns by mentioning functions of classes of food	Pregnant women	Group discussion Direct teaching Lecturing	Charts and posters	Show knowledge about the classes of the food and state the functions of classes of food e.g. carbohydrates protein, fat & oil vitamin etc.

A Week/ Time	B Training Objectives	C Topics/ Content	D Audience	E Method	F Instructional Material	G Evaluation
Week 4 1hr	At the end of this sessions, participants should be able to; State the good attitudes towards the dietary patterns	Attitudes towards the dietary patterns.	Pregnant women	Group discussion Lecturing	Posters	Mention good attitudes towards the dietary pattern?

A Week/ Time	B Training Objectives	C Topics/ Content	D Audience	E Method Of Teaching	F Instructional Material	G Evaluation
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Week 5 1hr	At the end of this session participants should be able to; State different choices of food on dietary patterns	Different choices of food on dietary patterns.	Pregnant women	Group discussion Lecturing	Posters	State different choices of food on dietary patterns?
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A Week/ Time	B Training Objectives	C Topics/ Content	D Audience	E Method Of Teaching	F Instructional Material	G Evaluation
Week 6 1hr	At the end of this session both participant and researcher will know the outcome of the Programme. Summary of the whole training will be made by the researcher. Classification will be made on areas that participants did not understand. Post-test will be distributed and collected.	Appraisal of the training summary. Questions on the subject matter.	Participants and the researcher.	Discussion	Interaction	Questions and feedback between the participant and the researcher. Administration on post-test instrument.

A Week/ Time	B Training Objectives	C Topics/ Content	D Audience	E Method Of Teaching	F Instructional Material	G Evaluation
Week 1 1hr	Participant and the researchers will be able to; Familiarize with each other. Do orientation together and introduction the topic to them. Create avenue for questions from each other.	Introduction Familiarization with the participants. Introduce the pre-test and post-test to them.	Women of reproductive age	Group discussion Direct teaching Lecturing	Paper and biro	What is family planning

A Week/ Time	B Training Objectives	C Topics/ Content	D Audience	E Method Of Teaching	F Instructional Material	G Evaluation
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Week 2 1hr	Participants will be able to; Know the types of family planning methods. Fill the questionnaires	Administrati on of pre- test. Types of family planning.	Women of reproductive age	Discussion brain storming. Lecturing	Posters Pictures	How many types of family planning methods do we have?
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Training Guide And Time Table For The Control Group

A Week/T ime	B Training Objectives	C Topics/ Content	D Audience	E Method Of Teaching	F Instructional Material	G Evaluation
Week 3 1hr	Participant should be able to; State the family planning commodities under each method.	State the family planning commodities under each methods.	Women of reproductive age.	Group discussion Health talk Lecturing	Posters	State each family planning commodities on each method. ((examples of each commodities)

A WEEK /TIME	B TRAINING OBJECTIVES	C TOPICS/ CONTENT	D AUDIENCE	E METHOD OF TEACHING	F INSTRUCTIO NAL MATERIAL	G EVALUATION
Week 4 1hr	At the end of this session, participant should be able	The use and administrati on of each family	Women of reproductive age	Group discussion	Posters	How can you administer each family planning commodity?

	to; Know when to administer the commodities and the interval between each use for the commodities.	planning commodities.		Direct teaching Lecturing		
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A Week/ Time	B Training Objectives	C Topics/ Content	D Audience	E Method Of Teaching	F Instructional Material	G Evaluation
Week 5 1hr	At the end of this session, participant should be able to; Know the benefits and effects of the family planning globally.	Benefits and effect of each family planning method to the couples including the failure rates.	Women of reproductive age.	Discussion (Group) Lecturing	Posters	What are the benefits and effects of family planning methods?

A Week/Ti	B Training	C	D	E Method Of	F Instructional	G
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me	Objectives	Topics/ Content	Audience	Teaching	Material	Evaluation
Week 6 1hr	At the end of this session, The participants, research assistants and researcher should be able to; Know the outcome of the Programme. Summarize the whole training. Clarify are as that participants did not understand. Administer post-test instrument and collection.	Appraisal of the training. Summary Questions on the subject matter.	Participants and research assistants.	Discussion Interactive session.	Posters.	Questions and feedback between the participants and researcher. Administration and collection of post-test instrument.

Appendix III

TELEGRAMS.....

TELEPHONE.....



MINISTRY OF HEALTH

DEPARTMENT OF PLANNING, RESEARCH & STATISTICS DIVISION

PRIVATE MAIL BAG NO. 5027, OYO STATE OF NIGERIA

Your Ref. No.

All communications should be addressed to

the Honourable Commissioner quoting

Our Ref. No: AD 13/479/174^f

Date 08 May, 2025

NAME OF PRINCIPAL INVESTIGATOR: ADEKANMBI IYABODE

TITLE OF STUDY: EFFECTIVENESS OF NUTRITIONAL EDUCATION ON KNOWLEDGE, ATTITUDE AND FOOD CHOICES REGARDING DIET AMONG PREGNANT WOMEN IN IBADAN SEMI-URBAN AREAS, OYO STATE.

RESEARCH INSTITUTION: LEAD CITY UNIVERSITY, IBADAN.

NREC ASSIGNED NUMBER: NHREC/OYOSHREC/10/11/22

DATE OF RECEIPT OF VALID APPLICATION: 06/05/2025

NOTIFICATION OF EXECUTIVE APPROVAL OF PROTOCOL

This is to notify you that the Oyo State Ministry of Health Research Ethics Committee (HREC) has concluded to give executive approval to your research proposal after necessary reviews and corrections under the regulations guiding experiment in human subjects.

2. This approval is for a period of (1) one year from 08th May, 2025 to 07th April, 2026. If there is hindrance in starting this research, please inform the Oyo State HREC so that dates of approval can be adjusted accordingly. Note that no activity related to this research may be conducted outside these dates. No changes are permitted in the research without prior approval by Oyo State HREC.

3. All forms and questionnaires used in this study must carry the HREC assigned number and the duration of HREC approval. You are to note further that the National Code of Health Research Ethics requires you to comply with all Institutional guidelines, rules and regulation of the codes. Please ensure that any adverse effect from your study is quickly reported to the HREC Oyo State Ministry of Health, Ibadan.

4. You are expected to submit a report to this committee every three (3) months from the date of this approval. The Oyo State HREC reserves the right to conduct compliance visit on your research sites without previous notification.

5. I thank you.


Adekunle Aremu
Director, Planning, Research & Statistics
Secretary, Oyo State Research Ethics Review Committee

Informed Consent Form for the Participants

Confidentiality

Information obtained will be treated with outmost confidentiality.

Voluntariness

The study allows participants with kin and genuine interest to participate

Management and Care

In any case of injury or assault to the participants in the course of this study, it will be taken care of by the researcher.

Statement of person obtaining Informed Consent

I have fully explained this research to _____
with _____ sufficient and accurate
information including risks and benefits to make an informed decision.

Name _____

Signature _____

Date _____

Statement of person giving consent

I have read the description of the study and that my participation is voluntary. The purpose, risks and benefits of the research have been explained to me. I understand that I can withdraw my participation from the study at any time. I have received a copy of this consent form for my personal keep.

Name _____

Bio-data

A. Personal Data

1. Full Name: Iyabode Olufunmike ADEKANMBI

(Address, E-mail address & phone no) Plot 2, Phase 1, Abraham Ohonyon Close,
Behinde BOVAS Filling Station, Kukumada Adegbayi New Ife road Ibadan, Oyo State

Email Address: funkyadek1@gmail.com

Phone Number: 08023080670 / 08165917458

2. Date and Place of Birth: 24th January, 1965

Place of Birth: Ibadan

3. Nationality: Nigerian

4. Marital Status: Married

5. No. of Children & their ages: Three (3)

6. Name and Address of Spouse:

(Including E-mail address & Phone no)

7. Name and Address of Next of Kin: Mrs Adadamola Akinbode

Address: General Post Office Dugbe, Ibadan

Email: adedamolaadekanmbi@yahoo.com

Phone Number: 08038607784

B. Educational Background

Higher Educational Institutions Attended with Dates & Qualification:

Master of Science in Community / Public Health Nursing in View

Master in Environmental Management 2005

Bachelor of Nursing Science 2019

Bachelor of Education (Health Education) 2006

Higher National Diploma in Public Health Nursing 2013

Diploma in Public Health Nursing Education 2010

Diploma in Community Health Officers Course 1994

Registered Nurse 1988

Registered Midwife	1985
General Certificate of Education (WAEC)	2006
Primary School Leaving Certificate	1976

1. Educational Institutions Attended with Dates and Qualification:

- i. Primary Education: Ibadan City Council, Agugu, Ibadan - 1976
- ii Secondary Education: Awe High School, Awe, Oyo - 1981
- iii Higher Educational Institutions Attended with date and Qualification:
 - Lead City University, Ibadan
 - University of Ado-Ekiti, Ekiti State 2005
 - University of Ibadan, Oyo State 2006
 - Ladoke Akintola University of Technology, Ogbomoso 2019
 - College of Health Technology, Eleyele, Ibadan 2013

C. Awards and Fellowships:

D. 1. Work Experience: With Dates (including courses taught where relevant)

11. University College Hospital (UCH) 2009 – 2020

Medical Unit

Care of In-patients with medical conditions

Care of unconscious patients

Administrations of medications, injections, intravenous fluid etc

Surgical Unit

Care of postoperative patients

Preparation of pre-operative patients

Bed making, bed bathing, oral toileting

Wound dressing, observation of vital signs

Responsibilities

Supervision of Nursing of Nursing activities on the ward

Co-ordination of subordinates

Plotting of duty roasters

Other responsibilities assigned by the senior colleagues

d) School of Hygiene Clinic Eleyele Ibadan

1996-2009

Responsibilities

Thesis submitted to the department of Geography and Physical Planning in partial fulfillment of the requirement for the award of Masters Degree in Environmental Management. University of Ado-Ekiti, now Ekiti State University Ado- Ekiti, Ekiti.

Publications in Journals:

Care givers perception and Socio-economic challenges of Nocturnal Enuresis on Child and family in Ibadan, Nigeria. International Journal of Innovative Science and Research Technology Vol. 9, ISSN No. 2456 – 2165, December, 2024 [https// doi.org/10.528//zendo 14637059](https://doi.org/10.528//zendo.14637059)

Awareness and Determinant of Prenatal Diagnosis utilization among pregnant women in Ibadan South West Local Government Area of Oyo State: Journal of Human Kinetics and Sport Science Vol.06 No 01 April 2022. Department of Human Kinetics and Sports Science, UNIBEN, Benin City Nigeria

2. Books/Monographs: Nil

(a) Authored Books: Nil

(b) Edited Books: Nil

(c) Contribution to Books: Nil

3. Published Refereed Conference Proceedings

Assessment of Work related stress and coping mechanism among Nurses working in University College Hospital Ibadan Oyo State. For sustainable development, Lead City University Conference centre 6th – 8th June, 2022.

4. Papers Accepted for Publication: Effectiveness of Nutritional Education on knowledge, attitude and food choices regarding diet among pregnant women in Ibadan Semi-urban Areas Oyo state.

5. Book Reviews and Commentaries in Scholarly Journals: Nil

6. Technical Reports: NIL

7. Other Publications: Nil

8. Creative Work: Nil

G. Notable Scholarly or Professional Accomplishments: Nil

H. Major Conferences/Workshops Attended

1. Workshop on Building your Academic Career 26th – 27th March, 2021 Liprорich
2. Pragmatic Human Capital for Sustainable Development 6th -8th June, 2022. Organised by Faculty of Arts and Education, Lead City University, Ibadan.
3. Mandatory Continuing Professional Development Programme (MCPDP) 22nd – 26th October 2021 Organised by Nursing and Midwifery Council of Nigeria.
4. Nursing Research Workshop: Strategies for Effective Dissemination of Research Finding 12-15th Dec. 2022.
5. A 5-day Workshop; Examiners workshop 2023 organized biennially by Nursing and Midwifery Council of Nigeria 24th – 28th July, 2023
- 6 Workshop on Basic life Support course on 24 -25th July, 2024
7. Research Training for all postgraduate students: Theme: AI Research and Grant Writing Training Nov. 2024.
8. A5-day Workshop; Examiners workshop 2025 organized biennially by Nursing and Midwifery Council of Nigeria 21st - 25th July, 2025.

I. Services in Lead City University:

J. Extra Curricular Activities: Nursing, Reading, Traveling

K. Others

L. Names and Addresses of Referees:

- i. Dr Oyeronke O. Bello
Clinical Nursing Department
University College Hospital
Ibadan.

08033978208

ii Dr Grace Iyabode Ogundele
Public Health nursing Department
University College Hospital
Ibadan.
08034971377

iii Rev. Kunle Oloyede
Foursquare Gospel Church
Alaro Sango
Ibadan
08033038986.

M.

Signature

Date

The University Compliance Certification

This is to certify that Iyabode Olufunmike ADEKANMBI with matriculation number LCU/PG/003284 in the Department of Nursing Science, Faculty of Basic Medical and

Health Sciences, Lead City University, Ibadan, Oyo State is in full compliance with the approved University format and style.

Signature

Date

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