

**Nutritional Status and Associated Factors of Pregnant Women Utilizing Traditional
Birth Attendants (TBAs) in Ogun State, Nigeria**

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Certification

This is to certify that Ogunsanya Halimat, Abosede with matriculation number LCU/PG/002407 carried out this research titled ‘Assessment of Nutritional Status of Pregnant Women Patronizing TBAs in Some Selected LGAs in Ogun State, Nigeria’ in the Department of Public Health, Faculty of Basic Medical and Health Sciences, Lead City University, Ibadan for the award of Master’s Degree in Public Health (MPH) and this has not been previously submitted.

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Dedication

This work is dedicated to the Lord God Almighty who was and He is and He is to come, the Alpha and Omega

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Though the above-mentioned institution and persons have assisted in the process of this research work, I alone stand responsible for the errors, if any found in the work.

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Abstract

In Ogun State, Nigeria, a significant number of pregnant women utilize the services of Traditional Birth Attendants (TBAs) for their prenatal care and delivery. The nutritional status of pregnant women is a critical determinant of both maternal and fetal health outcomes. The study investigates the socio-demographic characteristics and nutritional knowledge of pregnant women utilizing Traditional Birth Attendants (TBAs) in Ogun State. This study employed a cross-sectional approach. A total of 425 pregnant women were interviewed for this study. Findings shows that majority of pregnant women utilizing TBAs in Ogun State do not meet the recommended dietary intake for several essential nutrients, including energy, iron, Vitamin B12, and zinc. Only 14.8% of pregnant women have good nutritional status. Findings reveals that BMI was significantly associated with nutritional status, with obese (12 1.383,103.376 p value 0.024) and overweight (5.919(1.138,30.772 p value 0.035) women having higher odds of poor nutritional status. A large proportion of pregnant women who utilize TBAs in Ogun State have poor nutritional knowledge (76.7%). Factors significantly associated with good nutritional knowledge included secondary education level, being married, specific occupations, husbands having secondary or tertiary education, holding certain food taboos and cultural beliefs, consuming 3-4 meals daily, and not skipping meals. The findings highlight the critical need for targeted interventions to improve the nutritional status and knowledge of pregnant women who utilize TBAs in Ogun State.

Keynote: TBAs, Nutritional status, Dietary Intake, Knowledge, Pregnant women

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List of Acronyms

Abbreviation	Meaning
TBA	Traditional Birth Attendant
LMIC	Low Medium Income Countries
NDHIS	National Demographic and Health Survey
LGA	Local Government Area
BMI	Body Mass Index
RBP	Retinol Binding Protein
BCC	Behavioral Change Communication
WHO	World Health Organization
DNA	Deoxyribonucleic Acid
UNICEF	United Nations Children Fund
FAO	Food and Agricultural Organization
NNR	National Nutrient Rich
GABA-A	Gamma -Aminobutyric Acid – A
LBW	Low Birthweight
GCC	Gulf Cooperation Council
RDA	Recommended Daily Allowance
HBM	Health Belief Model
MUAC	Mid -Upper -Arm – Circumference
PLWHA	People Living with HIV/AIDS
HIV	Human Immunodeficiency Virus
AGHE	Australian Guide to Healthy Eating

DRI

Dietary Reference Intake

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Chapter One

Introduction

1.1 Background to the Study

Malnutrition contributes more than one-third to all maternal deaths worldwide. The mother's nutritional state has the biggest influence on the health of both the mother and the unborn child throughout pregnancy, which is a delicate and essential time¹. Compared to previous life phases, the need for nutrients, especially micronutrients, increases during pregnancy, leading to higher nutritional needs². Insufficient maternal nutrition during pregnancy is associated with negative immediate and long-term health effects for both mother and infant³. Literature acknowledges that dietary habits during pregnancy may contribute to the development of particular diseases in offspring, as well as the development of metabolic changes in pregnant women, especially in the early stages of pregnancy, which raises the risk of obesity in their children⁴.

Globally, there is a growing interest in evaluating the nutrition status of mothers, which is a significant issue⁵. This may be due to the known fact that pregnancy has been linked to an increase in the physiologic, metabolic, and nutritional demands imposed on a woman by her growing child⁶. About 13%, 54%, and 50% more energy, protein, vitamins, and minerals are required by the organism during pregnancy respectively⁷. Therefore, pregnancy is a crucial time for meeting these macro- and micronutrient requirements. The growing fetus needs a significant amount of nutrients from the mother in order to improve the child's future physical and mental development. As a result, a healthy dietary lifestyle is essential⁸. A healthy diet during pregnancy helps avoid problems related to pregnancy, assists recovery from childbirth, sustains breastfeeding effectively, and prevents the development of adult diseases¹³. However,

sufficient nutrition can only be sustained during pregnancy by maintaining pregnant women's nutritional status.¹⁴ It has been established that low birth weight is associated with mortality among babies, respiratory disorders, and developmental metabolic difficulties in the future¹⁵.

In Nigeria, where there is a dual risk of malnutrition, women's nutrition is also suboptimal. Of non-pregnant women of reproductive age, 11% are thin (body mass index [BMI] <18.5), and 28% are overweight or obese (BMI >25.0), though these rates vary by sociodemographic²².

Reproductive health care services are not fully and fairly accessible to Nigerian women¹¹.

Specifically, there are insufficiently qualified experts to treat every woman in the nation.

Traditional birth attendants (TBAs), who are primarily untrained community members who help women during pregnancy and childbirth, are the only option available to these women¹¹.

In Low Middle-Income Countries (LMIC), TBAs are crucial to maternal health care¹².

They are frequently seen in rural regions and are a part of the unofficial healthcare system. Political, economic, and cultural factors have influenced their role. While women who cannot afford professional healthcare access TBAs, from a cultural standpoint, the community views them as more trustworthy and accepted. Although many healthcare professionals do not consider the contributions of TBAs to be important, They are often consulted during pregnancy by moms in rural areas.

A number of studies utilizing dietary patterns and the nutrient analysis of groups have demonstrated the significance of a healthy diet in pregnancy-related outcomes. According to studies examining the relationship between dietary patterns during pregnancy and pregnancy outcomes, food categories that were high in energy, low in nutrient density, and high in saturated and trans fats were linked to lower birth weight.

Nutrient-dense foods, such as fruits, vegetables, and whole cereals, are associated with positive pregnancy outcomes is a significant outcome of maintaining a positive nutritional status throughout pregnancy ¹⁶. Nevertheless, although some researches have shown a correlation between pregnancy outcomes and sociodemographic characteristics, there are discrepancies in the relationships between pregnancy outcomes and nutritional status. In terms of prenatal growth, skeletal growth and development, and future childhood development, vitamin deficits have been associated with adverse pregnancy outcomes ¹⁸. There are a few studies that highlight the importance of B vitamins, aside from those that primarily look at how folic acid, iron supplementation, and vitamin D affect birth outcomes. According to a review, vitamin B12, thiamin, riboflavin, or folate deficiencies are linked to higher blood homocysteine levels, which have been linked to unfavorable pregnancy outcomes ¹⁹. The availability of the nutrients listed above during pregnancy will depend directly on the nutritional status of expectant women as determined by an assessment.

Traditional Birth Attendants (TBAs) play a critical role in providing prenatal care in the communities due to their accessibility, affordability, and cultural acceptance⁴. However, TBAs often lack formal training in nutrition, which can impact their ability to provide adequate dietary advice to pregnant women. Despite the reliance of many pregnant women in Ogun state on TBAs, there is limited research on the nutritional status of pregnant women under their care. Research focusing on the nutritional status of pregnant women attending TBAs is essential to identify nutritional deficiencies and inform targeted interventions for improving maternal health in this special population. This study, therefore assessed the nutritional status of pregnant women utilizing TBAs in selected Local Government Areas in Ogun State.

1.2 Statement of the Problem

Nigeria ranked high in malnutrition and other nutrition-related problems, particularly among pregnant women¹⁰. One of the main factors influencing a successful pregnancy and a healthy, well-fed child is malnutrition, which is also one of the main causes of maternal mortality⁹. Despite making only 2.4% of the world's population, Nigeria is currently responsible for 10% of all maternal fatalities worldwide. Nigeria has the fourth-highest maternal mortality rate in the world, with 576 deaths per 100,000 live births, according to recent data. About 262,000 kids are born in the nation each year, which is the second-highest number in the world¹⁰.

Numerous negative consequences, such as low birth weight, premature delivery, an elevated risk of maternal and neonatal morbidity and mortality, and long-term developmental problems in children, are linked to malnutrition during pregnancy. According to the 2018 Nigeria Demographic and Health Survey (NDHS), 62% of pregnant women in Nigeria are anemic, reflecting a significant public health challenge²⁵. In Ogun State, the prevalence of anemia and other nutritional deficiencies among pregnant women is similarly high, exacerbating the risk of poor pregnancy outcomes²⁶. Traditional Birth Attendants, while trusted and embedded within their communities, often lack formal training in modern medical practices and nutrition. This gap in knowledge can result in inadequate dietary advice and support for pregnant women, further contributing to poor nutritional status. Research has shown that TBAs' practices vary widely, and many do not have the necessary information to support optimal maternal nutrition effectively¹².

Preterm birth, low birth weight, and an increase in maternal morbidity and mortality are just a few of the negative effects of malnutrition during pregnancy. In many nations, including

Nigeria, women's diets are deficient in meat, fish, dairy, and vegetables. Poor diets deficient in essential minerals during pregnancy, such as calcium, zinc, iron, folate, and iodine, can result in anemia, pre-eclampsia, hemorrhage, and maternal mortality. Additionally, they may result in low birthweight, wasting, stillbirth, and developmental problems in children ^{10,17,18,19}.

TBAs, often lacking formal training in nutrition and health education, may not provide adequate dietary guidance to pregnant women. Consequently, this gap in knowledge and practice could exacerbate the nutritional challenges faced by pregnant women in these communities¹².

The nutritional status of pregnant women is a critical determinant of both maternal and fetal health outcomes. In Ogun State, Nigeria, a significant number of pregnant women utilize the services of Traditional Birth Attendants (TBAs) for their prenatal care and delivery²⁴. Despite the widespread use of TBAs, there is limited research on the nutritional status of these women and the impact of TBAs on their dietary practices and overall health.

In order to detect possible nutritional deficits and create focused interventions that can enhance the health of both the mother and the fetus, it is crucial to evaluate the nutritional status of expectant mothers using TBAs. This study evaluated the nutritional status of pregnant women in selected Local Government Areas (LGAs) in Ogun State who rely on TBAs for their maternity care. The findings provide valuable insights into the nutritional needs of this population and inform policies and programs to enhance the quality of maternal nutrition and care provided by TBAs.

1.3 Justification of Study

The nutritional status of pregnant women is a crucial determinant of maternal and fetal health outcomes, influencing pregnancy complications, birth outcomes, and long-term health. In Ogun State, Nigeria, a significant proportion of pregnant women rely on Traditional Birth Attendants (TBAs) for prenatal care and delivery services due to their accessibility, affordability, and cultural acceptance. Despite the widespread use of TBAs, there is limited research on the nutritional status of these women and the impact of TBAs on their dietary practices and overall health. Likewise, there is dearth of information about the ability of TBAs to provide adequate nutritional guidance^{9,10,12}.

In Ogun State, Nigeria, Traditional Birth Attendants (TBAs) provide prenatal care and delivery services to a considerable number of expectant mothers ²⁴. In order to detect possible nutritional deficits and create focused interventions that can enhance the health of both the mother and the fetus, it is crucial to evaluate the nutritional status of expectant mothers using TBAs.

Studies have found that the nutritional status of the pregnant woman is a significant predictor of the pregnancy outcome^{27,28}. It is necessary to conduct a study that assess the nutritional status of pregnant women utilizing in Ogun State to identify nutritional deficiencies and inform targeted interventions for improving maternal health. Also, the findings provides valuable insights into the nutritional needs of this population and inform policies and programs to enhance the quality of maternal nutrition and care provided by TBAs.

Addressing maternal malnutrition is critical to reducing maternal and neonatal morbidity and mortality rates in Ogun State. By understanding the nutritional status of pregnant women under

the care of TBAs, we can identify key areas for intervention. The findings of this study provide essential data that can inform policy decisions and strategies aimed at improving maternal nutrition and healthcare services. Effective policy interventions require a clear understanding of the current situation and the specific needs of the population. The study offers insights into the knowledge and practices of TBAs regarding maternal nutrition. This information is vital for designing and implementing training programs for TBAs, ensuring they are equipped to provide better nutritional guidance to pregnant women. Enhancing the nutritional status of pregnant women lead to healthier pregnancies and better birth outcomes, contributing to overall community health improvement. Healthy mothers are more likely to give birth to healthy babies, reducing the long-term healthcare burden. There is a significant gap in the literature regarding the nutritional status of pregnant women utilizing TBAs in Ogun State. This study fills this gap, providing a foundation for future research and interventions.

1.4 Aim and Objectives of the Study

The study assessed the nutritional status of pregnant women utilizing Traditional Birth Attendants (TBAs) in Ogun State, Nigeria.

The objectives of the Study are to;

1. Examine the level of nutritional knowledge of pregnant women who patronize TBAs in Ogun State.
2. Assess the dietary intake of pregnant women utilizing TBAs in Ogun State;
3. Examine the nutritional status of pregnant women utilizing TBAs in Ogun State;
4. Identify factors influencing the nutritional status of pregnant women who patronize TBAs in Ogun State.

1.5 Research Questions

1. What is the dietary intake of pregnant women utilizing TBAs in Ogun State?
2. What is the nutritional status of pregnant women utilizing TBAs in Ogun State?
3. What are the factors influencing the nutritional status of pregnant women who patronize TBAs in Ogun State?
4. What is the level of nutritional knowledge of pregnant women who patronize TBAs in Ogun State?

1.6 Scope of Study

This study focused on assessing the nutritional status of pregnant women who utilize Traditional Birth Attendants (TBAs) for prenatal care and delivery services in selected Local Government Areas (LGAs) within Ogun State, Nigeria. The scope includes evaluating dietary intake, anthropometric measurements, and biochemical indicators to understand nutritional deficiencies. Socio-economic and cultural factors influencing the nutritional status of pregnant women was explored to provide a comprehensive understanding of the context. The study was conducted using a cross-sectional research design, targeting pregnant women attending antenatal care with TBAs in the specified LGAs. Data collection methods includes the use of questionnaire and anthropometric measurements to quantitative information.

1.7 Operational Definition of Terms

Nutritional Status: Refers to the overall health and well-being of pregnant women as influenced by their dietary intake, anthropometric measurements (such as weight, height, BMI), and biochemical indicators (e.g., levels of essential nutrients like iron, folate).

Traditional Birth Attendants (TBAs): Refers to individuals who provide childbirth and maternal health services based on traditional practices, often without formal medical training. In this study, TBAs are specifically those operating within selected Local Government Areas (LGAs) of Ogun State.

Dietary Intake: Refers to the types and quantities of food consumed by pregnant women, including macronutrients (carbohydrates, proteins, fats) and micronutrients (vitamins, minerals) essential for maternal and fetal health.

Anthropometric Measurements: Refers to physical measurements of pregnant women, such as weight, height, and BMI, used to assess nutritional status and monitor changes over time.

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Chapter Two

Literature Review

This chapter of the study considered the review of literature of concepts important to this study which was done.

2.1 Conceptual Review

2.1.1 Concept of Pregnancy

Pregnancy is the most critical phase of dietary needs in a woman's life. Proper nutrient consumption during this era is essential for fetal growth and improved mother nutritional health. Inadequate intake of essential micro- and macronutrients during this period will lead to undernutrition and negative pregnancy outcomes. Undernutrition during pregnancy exerts both immediate and enduring impacts on an infant's health by influencing developmental programming, heightening the risk of noncommunicable diseases, and is closely linked to the survival of both mothers and their infants. Malnourished mothers exhibit increased susceptibility to illnesses, experience a higher incidence of miscarriages, and deliver underweight offspring whose survival is jeopardised¹. Pregnancy, or gestation, is the period during which one or more offspring develop within a mother. A woman is deemed pregnant upon fertilization, resulting in the formation of one or more embryos in the uterus. Human gestation is segmented into three trimesters, with parturition occurring approximately 40 weeks after the previous menstrual period².

Pregnancy signifies a phase of emotional, physical, identity, and relational transformations predominantly influenced by women's unique circumstances. For certain women, discovering a pregnancy is an exceedingly affirmative event. For some, it may elicit anxiety and distress, or sensations of shock, astonishment, or ambivalence. Pregnancy

acceptability refers to a woman's perceptions and emotions regarding a pregnancy upon discovering it. The notion of pregnancy acceptability seeks to encapsulate a woman's evaluation of the suitability and timing of the pregnancy post-conception. Prior frameworks have employed a pregnancy intendedness model, based on a planned versus unplanned dichotomy, to identify women susceptible to mental health issues and early bonding challenges. The intricate nature of pregnancy emotions and experiences suggests that a binary classification based on original reproductive intentions may be insufficient for comprehending and assisting pregnant people³.

The pregnancy intendedness model categorizes pregnancies as intended, mistimed, or unwanted, with the latter two classifications encompassing the broader category of 'unintended' pregnancy. Global studies indicate that around 50% of all pregnancies and 40% of pregnancies carried to term are unplanned. Unintended pregnancy correlates with postponed antenatal care and diminished health-related activities during gestation for women, including an elevated likelihood of requiring neonatal special care post-birth, breastfeeding challenges, and mental health and behavioral issues in offspring. Consequently, the intentional or unintentional aspects of women's pregnancies have been a focal point of research for the past two decades. Some research indicates that women with unwanted pregnancies experience greater difficulty in forming a link with their infant and sustaining optimal mental health during pregnancy; nevertheless, other studies have not yielded significant findings³.

Pregnancy acceptability is defined as the extent to which women regard their pregnancy as 'acceptable' post-conception. It considers a woman's evaluation of the desirability and timing of the pregnancy, the alignment of pregnancy objectives with fertility-related activities, and the spectrum of emotions encountered upon discovering the pregnancy. The pregnancy

acceptability framework recognizes that a woman's intents and emotions around her pregnancy might be multifaceted and inconsistent. This facet of the model is corroborated by empirical research indicating that 68% of women characterize their unintended pregnancies as “wanted,” and that women acknowledge beneficial aspects of unintended pregnancies, including enhancement of partner relationships, acknowledgement of resilience, and the avoidance of deferring to the “perfect time” to conceive². A recent study revealed that couples determined their pregnancy acceptability based on aspects including marital stability, preparedness and capability for parenting, and a flexible attitude to family planning. These studies underscore the importance of comprehending women's cognitive and emotional reactions to pregnancy. They propose that a woman's emotional response to discovering a pregnancy may influence her self-perception, her feelings towards her infant, and the emotional connection that forms between them⁴.

Pregnancy is a time of physical and emotional development, in which women adapt to their future maternal role¹. The gestational phase provides an opportunity to acclimatize to the pregnancy, develop an attachment to the foetus, and prepare for delivery. For numerous women, this period is replete with apprehensions and uncertainties. Occasionally, these worries are so intense that women are compelled to deny their pregnancy. This maladaptive defensive mechanism may be so potent that the woman remains genuinely oblivious to her predicament. She will not acknowledge the pregnancy and is incapable of advancing to the stages of foetal attachment and delivery preparation. She will therefore be ill-equipped for childbirth and parenting. This entails considerable hazards for both the mother and foetus, including mental distress, inadequate prenatal care, rapid delivery, and neonaticide. It is proposed that a continuum of pregnancy denial behaviours exists, extending from complete awareness of

pregnancy accompanied by concealment, to suspicion of pregnancy, and culminating in total denial³.

2.1.1.1 Type of Pregnancy

Pregnancy may seem like a simple term, yet there are different types. Most are as a result of physical differences between women, but some are related to multiple egg released, among other reasons. Different types of pregnancy include⁵;

i. Intrauterine Pregnancies: These refer to typical pregnancies in which the fetus or fetuses implant within the uterus. The placenta is affixed to the interior of the uterus and the uterine musculature.

ii. Ectopic Pregnancies

Ectopic pregnancies transpire when the fertilized ovum implants in a location other than the fallopian tube or uterus. It may be located in the cervical region or within the abdominal cavity. The pregnancy is nonviable, and the body will likely undergo spontaneous abortion of the fetus. Tubal pregnancies transpire when the fertilized ovum implants within the fallopian tube rather than the uterus. These pregnancies are nonviable and must be terminated if a miscarriage does not occur spontaneously.

Intra-Abdominal Pregnancies

The majority of intra-abdominal pregnancies arise following a prior Caesarean surgery. The caesarean section scar may deteriorate and rupture, permitting the fetus to enter the abdominal cavity. The viability of the pregnancy is contingent upon the gestational age of the fetus at the

time of the rupture. Instances of undiagnosed intra-abdominal pregnancies that reached term have occurred, necessitating a total hysterectomy post-delivery.

iv. Singular Pregnancies

Singlet pregnancies arise when a single ovum fertilizes with a single sperm, resulting in the development of one fetus.

v. Multiple Gestations

Multiple pregnancies can arise from the simultaneous fertilization of many eggs. This occurs when two sperm fertilize one egg or when one sperm fertilizes an egg that then divides into two zygotes. If many eggs are fertilized, the pregnancies will yield fraternal twins. If a single egg is fertilized by two sperm, fraternal twins will ensue. If a single egg divides into numerous zygotes, identical twins will result. Natural multiples, such as twins, triplets, and quadruplets, have been documented. Fertility treatment may increase the likelihood of multiple pregnancies, resulting in the fertilization and implantation of five or more embryos.

vi. Molar Pregnancies

Complete molar pregnancies occur when the placenta develops in the uterus without the presence of a fetus. Partial molar pregnancies arise when two sperm fertilize a single egg, although two fetuses fail to develop. The placenta is atypical, and the fetus possesses an excess of chromosomes. This invariably leads to a spontaneous abortion, as the fetus is unable to develop safely.

2.1.2 Meaning of Nutrition

This science elucidates the correlation between nutrients and other components in food and an organism's maintenance, growth, reproduction, health, and disease. It encompasses food intake, digestion, absorption, assimilation, biosynthesis, catabolism, and excretion. Four. Diet refers to the food ingested by an organism, mostly influenced by the accessibility and appeal of food. A nutritious diet for humans encompasses food preparation and storage techniques that safeguard nutrients against oxidation, heat, or leaking, while minimising the danger of foodborne illnesses.

An inadequate diet can result in deficiency-related diseases, including blindness, anaemia, scurvy, preterm birth, stillbirth, and cretinism in humans, alongside health-threatening conditions due to nutrient excess, such as obesity and metabolic syndrome, as well as prevalent chronic systemic diseases like cardiovascular disease, diabetes, and osteoporosis. Acute malnutrition may result in atrophy and marasmus, whereas chronic malnutrition can lead to stunting^{5,6}.

2.1.3 Malnutrition in Nigeria

Malnutrition during gestation is marked by arduous labour, preterm delivery, and the birth of infants with low birth weight. A child born to an undernourished mother is vulnerable to infections, stunted growth, and cognitive deficits. Pregnancy is a vital phase in a woman's life, necessitating high-quality nourishment to sustain the developing embryo. Almost all pregnant women inherently have heightened hunger. One must recognise the repercussions of nutrient shortage and the implications of malnutrition during pregnancy. It would adversely affect the well-being of both the mother and the kid ¹³.

2.1.4 Nutritional Deficiency and Pregnancy

Malnutrition is characterized by the lack of critical nutrients necessary for the body's proper functioning. It impacts the body's organs and induces mild to severe medical consequences over time. A notable fact regarding malnutrition is that a greater number of individuals suffering from hunger reside in developing nations. Consequently, Asia and Africa have a greater prevalence of malnutrition during gestation.

Medical evidence indicates that pregnant women, lactating mothers, and children under three years of age are more vulnerable to malnutrition than other demographics. Upon conception, a woman must assume responsibility for adhering to a nutritious diet in substantial amounts to facilitate the growth of a new life within her uterus. A pregnant lady must acknowledge that her daily nutrition is crucial not just for her personal health but also for the enduring wellbeing of her unborn child ¹³.

Consequently, malnutrition during this period is the principal cause of adverse pregnancy outcomes. It is plausible to conclude that a malnourished expecting lady is not providing adequate nutrition to the foetus. In other words, vital nutrients and trace minerals. Inadequate resources are available for the establishment of a comprehensive existence. Consequently, the infant will exhibit a diminished growth rate and be underweight. Malnutrition adversely affects the body by compromising the immune system, heightening vulnerability to sickness, reducing stamina, and resulting in diminished stature. Certain consequences of maternal malnutrition persist throughout the infant's lifespan. A malnourished infant is vulnerable to illnesses both in early development and later in life. Furthermore, it is claimed that cognitive impairment and

diminished IQ are directly associated with starvation, especially during gestation and early childhood.

Women who have had deprivation throughout pregnancy give birth to infants with low birth weight. These youngsters are prone to development retardation, impaired coordination, diminished vision, learning challenges, and various other ailments. Anaemia is a malnutrition-related disease that impacts many pregnant women worldwide¹⁴. It elevates the risk of maternal and neonatal mortality during parturition. Additional serious side effects encompass preterm delivery, labour complications, postpartum haemorrhage, and congenital anomalies. Malnutrition adversely affects infant development due to insufficient nutritional consumption during gestation and breastfeeding. A meticulously structured diet for pregnancy and breastfeeding is crucial for the infant's health during both phases. A person's health and well-being are fundamentally reliant on the nutrition received during gestation, nursing, and early childhood. To alleviate these negative effects, a woman seeking to conceive can cultivate nutritious eating habits and implement dietary modifications. Pre-pregnancy fitness is crucial as the developing embryo depends on the mother's stored nutrients for accelerated growth in the initial months.

2.1.5 Assessment of Nutritional Status of Pregnant Women

Assessment of nutritional status of pregnant women enables the identification of the nutrients whose supply is adequate or inadequate. There are various methods of assessing nutritional status of pregnant women which includes (i) clinical assessment, (ii) anthropometry, (iii) dietary survey and (iv) biochemical analysis. Clinical assessment entails the examination of individuals for physical indicators of malnutrition, which arises from the slow depletion of

nutritious tissue stores. Alterations in nutritional status frequently manifest as clinical indicators in bodily organs or tissues. Examples of these indicators encompass pallor and fatigue in iron deficiency; corneal ulcer, corneal scarring, and Bitot's spots in vitamin A deficiency; moon facies, fragile and discoloured hair in kwashiorkor; and spongy, hemorrhagic gums in vitamin C insufficiency, among others.

Clinical examination, however, cannot be considered a dependable indicator of nutritional status. This arises from erroneous interpretation or diagnosis, stemming from the non-specificity of clinical sign causation, as multiple nutrients and even non-nutritional disorders can elicit identical signals. Oedema in a pregnant woman may result from anaemia, pre-eclampsia, pathological problems, or may be physiological in nature.

- Anthropometric method: Anthropometry is the predominant technique employed to evaluate the nutritional status of individuals or population groups. Nutritional anthropometry involves measuring the changes in the body's physical dimensions. Anthropometric indices employed to evaluate the nutritional condition of pregnant women encompass weight growth, mid-upper arm circumference (MUAC), and height.

The benefit of nutritional anthropometry is in its precision and accuracy, contingent upon the application of standardised approaches. The employed processes are straightforward, secure, and non-invasive. The necessary equipment is affordable, portable, sturdy, and may be produced or acquired locally. Nutritional anthropometry can assess variations in nutritional status across time, seasons, and generations. The approach can be utilised for screening tests in contexts such as nutritional emergency to identify individuals at elevated risk. The limitations of anthropometry encompass its relative insensitivity to identify changes in nutritional status after brief periods of dietary deficiency. It is also limited by its inability to

identify the primary cause of undernutrition and to differentiate the impact of individual nutritional deficiencies on growth.

- **Dietary survey:** This entails the assessment of real food intake by a person within a household or community. The predominant method is the food intake study, which provides data on the various foods and beverages ingested by an individual, household, or nation during a specified timeframe. Other methods include dietary recall and food frequency questionnaires, among others. Dietary assessment can reveal people or communities with insufficient consumption of nutrient-dense foods. It serves as a regulatory entity for a certain population concerning nutritional education and other initiatives aimed at enhancing nutritional and health outcomes. Nevertheless, it has been noted that dietary assessment alone is insufficient to evaluate nutritional status with the precision necessary to effectively identify high-risk individuals.

- **Biochemical studies:** This includes the examination of bodily fluids and tissues to evaluate the mobile or stored forms of nutrients, metabolites, or waste products. Blood is the predominant body fluid utilised, as it transports the majority of nutrients, metabolites, and waste materials. Alterations in blood composition signify modifications in nutrition and metabolism. Nutrient blood levels are compared to standard norms based on age, sex, and physiological condition. The application of biochemical investigations is frequently constrained by the availability of laboratory facilities, staff, time, and cost, which are significant limits to their broader utilisation.

A multitude of laboratory investigations exists for evaluating iron status in pregnant women. The most effective diagnostic procedures entail quantifying the concentration of haemoglobin in circulating blood or the packed volume of erythrocytes (haematocrit). Additional measurements comprise serum iron, iron-binding capacity, serum ferritin, free erythrocyte protoporphyrin (FEP), mean corpuscular volume (MCV), and mean red cell diameter. The expense and intricacy of the majority of these procedures inhibit their extensive utilisation. Determinations of haemoglobin or haematocrit are frequently employed due to their cost-effectiveness and excellent dependability. Haemoglobin concentrations are ascertained using the cyanmethemoglobin technique. The haemoglobinometer is currently regarded as the most suitable instrument when advanced hospital-based devices, such as microhaematocrit centrifuge calorimeters or Coulter counters, are unavailable. The battery-operated solid-state hemoglobinometer has been suggested to be precise, economical, and durable.

The interpretation of iron deficiency test results is based on reference standards. Since anemia grades might differ, the WHO standards, which are based on hemoglobin levels, are typically applied. In pregnant women living at sea level, a hemoglobin content of less than 11 g/dl is symptomatic of anemia. Table 2.1 lists the degrees of anemia based on WHO standards.

Population	Non- anaemic (g/L)	Mild (g/L)	Moderate (g/L)	Severe (g/L)
6 – 59 months	≥110	100 – 109	70 – 99	<70
5 – 11 years	≥115	110 – 114	80 – 109	<80
12 – 14 years	≥120	110 – 119	80 – 109	<80
>15 (Non-pregnant)	≥120	110 – 119	80 – 109	<80
Pregnant women	≥110	100 – 109	70 – 99	<70
>15 (Men)	≥130	110 – 129	80 – 109	<80

Table 1. Classification of anemia. Adapted from Chaparro & Suchdev (2019)⁴.

The determination of serum retinol using high performance liquid chromatography (HPLC) is presently the recommended biochemical evaluation approach for vitamin A insufficiency (VAD). Other techniques include the measurement of dried blood spot retinol, which is employed when there is no power or cold chain apparatus. Using this technique, blood drawn from finger punctures is dropped into filter paper cards, kept at room temperature in an envelope, and then transported to a lab for examination. Compared to HPLC, this approach is less invasive because less blood is needed, and it allows for a more thorough assessment of remote field conditions. Other techniques, including the fluorometer and spectrophotometer, are not extremely precise or specific. The amount of serum retinol-binding protein (RBP) may be a. act as a stand-in for serum retinol. An immunological technique, which requires less serum and is easier and less expensive than HPLC, could be used to detect RBP. Furthermore, retinol is less stable than RBP. For RBP, no cut-off has been set as of yet, though. Each population surveyed must have its cut-off points established. Although more complex and costly equipment is needed for retinol assessment methods like HPLC, the benefit is that cut-off points are available. Vitamin A deficiency is indicated by serum retinol concentrations < 0.7 pmol/l and 20 pg/dl. Though it is influenced by infection, the liver's release of holo-RBP, protein status, and the sufficiency of other nutrients, serum retinol concentration indicates a person's vitamin A status. But these elements are more crucial at the individual level than at population level.

2.1.6 Nutrition Education

Diverse terminology characterises healthy diet promotion interventions across countries and institutions. The two most common terms are "nutrition education" and "BCC - Behaviour Change Communication," both of which are informed by nutrition education. Online research

of documents, mission statements, professional publications, and textbooks produced the following definitions: Nutrition education empowers individuals, families, and communities to make dietary and lifestyle choices that enhance their physiological health, economic prosperity, and social well-being. It encompasses a combination of educational techniques and environmental supports aimed at fostering the voluntary adoption of healthful dietary choices and related behaviours⁷. Multiple channels and activities at the individual, community, and policy levels are utilized to impart nutrition education.

Nutrition education is an aspect of Applied Nutrition that allocates resources towards the acquisition, adaptation, and acceptance of good dietary practices, aligned with personal food culture and scientific nutritional knowledge, ultimately aiming to enhance individual or community health⁸.

In health promotion and primary prevention, it is essential to foster the establishment of healthy eating habits across diverse environments. This approach is also an excellent tool for therapeutic nutritional prescriptions and secondary prevention. Nutrition education involves training individuals or groups on the principles of nutrition science. The role of health professionals in educating individuals varies in a clinic, community, or long-term care facility. In these contexts, the dietitian, nutritionist, or nurse facilitates individuals in integrating nutritional and behavioral modifications into their lifestyles.

This approach to nutrition prioritises the cultivation of enduring behavioural changes over the acquisition of knowledge and facts. Nutrition education involves deconstructing extensive knowledge into manageable components, which are conveyed to patients or clients at a pace and complexity suitable for their comprehension and application; thus, it is essential for

elucidating the concept of nutritional knowledge. Effective teaching renders nutritional information accessible and useful in daily living⁹.

2.1.6.1 Nutrition Education Methods leading to Nutrition Knowledge

The methodology of presentation refers to the approach employed in delivering nutrition education to individuals or groups, significantly influencing the outcomes. To effectively engage older adolescents and adults, it is essential to employ a learner-centred approach alongside the principles of adult learning. The concepts of adult learning, predicated on the notion that the learner brings a wealth of experience to the educational process, are often overlooked or superficially acknowledged. Numerous nutrition education programs encounter challenges and obstacles. The concepts of adult learning priorities discussion, leverage learners' life experiences, promote active learning through small group problem-solving, emphasize practical application, foster intellectual and emotional involvement, and provide affirmation. Additional methodological challenges that hinder the effectiveness of nutrition education for groups involve the assembly of overly large groups (exceeding 10 participants), which do not provide an environment conducive to individuals articulating their opinions or concerns, nor facilitate effective communication and visibility. In outdoor settings, visual aids are often inadequately sized or utilise colours that lack sufficient contrast. Individual counselling can be more precisely customised to the specific needs and circumstances of each learner; however, it is essential that the counsellor possesses strong interpersonal skills, communicates accurate information, engages in dialogue to identify issues or barriers, and aids in formulating effective solutions.

Acquiring proficient counselling abilities necessitates substantial practice accompanied by constructive comments for development. In-service training generally comprises singular sessions with limited subsequent engagement. The challenge of enhancing counselling proficiency among health and nutrition professionals substantially affects the execution of government programs. Mass media have evolved into increasingly sophisticated tools for nutrition education. The reach of mass media has broadened to encompass the Internet and other technologies, including mobile phones, in addition to broadcast and print media¹⁰. The limitation of the media lies in its inability to transcend mere information dissemination and motivational appeals to action, thereby hindering the development of good eating abilities in individuals. The propagation of purported nutritional information from untrustworthy sources constitutes a major challenge presented by the media. Advertisers and business entities also propagate misleading nutritional information.

2.1.7 Traditional Birth Attendants (TBAs)

Traditional Birth Attendants (TBAs) are characterised by the World Health Organisation as individuals who support mothers during childbirth, having initially developed their abilities via personal experience in delivering infants or through apprenticeship with other TBAs¹⁸. Traditional Birth Attendants (TBAs) have existed for centuries and belong to the category of informal healthcare practitioners operating in rural parts of low- and middle-income countries (LMIC). Women in rural regions typically utilise their services more frequently than formal healthcare practitioners²⁰. TBAs persist despite the formal healthcare system due to the inadequate infrastructure in rural areas, which includes impassable roads and under-resourced health facilities, among other factors.

TBAs are classified within the informal health system, characterised by four categories: training, payment, registration, and occupation²⁰. The authors characterised TBAs as lacking formal training, despite the possibility of having participated in some degree of formal education, including apprenticeships, seminars, and workshops sponsored by NGOs. It was asserted that TBAs earn remuneration directly from the clients they assist. The payments lack documentation and may be provided in forms other than currency, such as food items. TBAs lack registration with any organisation and possess no professional affiliation. Additionally, four categories of Traditional Birth Attendants (TBAs) were identified: urban TBAs, who engage in practice for income without formal training; rural TBAs, typically elderly relatives or neighbours who assist in childbirth without financial compensation; family TBAs, who exclusively care for close relatives; and trained TBAs, who have undergone some formal training yet lack comprehensive skills²¹.

The existence of TBAs in most LMIC is due to limited availability of professional health care providers in rural areas, leaving TBAs to fill the gap. There is a wide gap between formal and informal health care providers in LMIC due to literacy levels²¹. The TBAs are permanently attached. They are integrated into the community, socially and culturally accepted, and accessible when required²². This elucidates the significance of TBAs within their communities. The Traditional Birth Attendants (TBAs) hold significant prestige within the community, which presumably justifies the necessity for policymakers to engage with them to enhance maternal health in rural regions. This section examines the role of Traditional Birth Attendants (TBAs),

2.1.7.1 Role of TBAs

TBAs have been present from the inception of childbirth among women. Their work has been exceptional, and individuals in remote areas appreciate their services.

Initially, TBAs lacked formal training yet nonetheless executed midwifery responsibilities. Training commenced in the 1970s by the WHO and several financing organisations²².

A study claimed that Traditional Birth Attendants (TBAs) serve as a connection between rural populations in Africa and healthcare services. They additionally asserted that Traditional Birth Attendants had a distinctive aptitude, utilising ancestral knowledge of techniques and practices that have developed from the social, cultural, and spiritual heritage of the communities they assist. Although TBAs are associated with elevated maternal mortality, they may also significantly contribute to its reduction, as they are frequently the initial and often sole healthcare providers accessible in rural regions; thus, their involvement is essential²³.

A survey revealed that almost two-thirds of traditional birth attendants are elderly women who operate alone. Approximately fifty percent of the Traditional Birth Attendants in their study lacked designated delivery rooms. They did not regard any pregnant women as being at risk; hence, they deemed it unnecessary to refer them to the hospital for additional evaluation. The authors also noted that a limited number of TBAs conducted examinations on women during their pregnancies²⁴.

Notwithstanding this, mothers continued to utilise their services; of the 109 clients surveyed, fifty percent employed traditional birth attendants for all their births. TBAs engaged with an average of five clients monthly, illustrating their significance within the community. The 109 interviewed clients recognised the inadequacies of the TBAs, nevertheless they expressed

satisfaction with their services and endorsed them to other women²⁴. The authors highlighted the unique roles played by TBAs and how greatly their clients valued them.

Despite the WHO's recommendation for individuals to be within an hour of the nearest healthcare facility, this proved unfeasible in the Manxili region of South Africa. The scientists classified the region as unstable, with a geographical landscape that is unfavourable for pregnant women. In this context, Traditional Birth Attendants (TBAs) provide their services to expectant mothers because of the limited access to healthcare facilities²⁵. In Bangladesh, a study indicated that inadequate roads and adverse weather conditions disadvantage women; during the rainy season, the sole available mode of transportation is by boat, compelling women to rely on traditional birth attendants (TBAs)²⁶. A study delineated the specific tasks that Traditional Birth Attendants (TBAs) fulfil in the region at each stage of pregnancy. During the prenatal phase, Traditional Birth Attendants (TBAs) function as health educators, providing dietary counsel to mothers, including the avoidance of alcohol and smoking. They also ascertain the delivery date by analysing bodily alterations. During labour and delivery, traditional birth attendants typically advocate for the presence of a support person, particularly a mother-in-law or grandmother. During the postpartum period, traditional birth attendants assess moms for breast milk flow and vaginal blood loss, while also advising them on cleanliness maintenance²⁵.

In Nigeria, where the government endorses Traditional Birth Attendants (TBAs), the TBA advocates for health, offers prenatal and neonatal health counselling, and facilitates prompt referrals. Disparities exist in maternal health care utilisation between women in urban and rural locations. Women in metropolitan regions of Nigeria utilise contemporary healthcare services,

whereas rural women rely on traditional birth attendants during childbirth. The authors indicated that rural women favour delivering with the assistance of traditional birth attendants due to their nurturing demeanour. Furthermore, certain rural women in Nigeria favour delivering in a quiet and confidential setting with the support of a community member. TBAs in rural Nigeria are held in high esteem and are readily accessible, both in terms of transportation and affordability. The Nigerian government has instructed traditional birth attendants in rural regions about HIV; consequently, these attendants implement numerous procedures to prevent infection during deliveries. For instance, TBAs utilise gloves, and in their absence, they direct women to a healthcare institution²⁷.

However, another study conducted in Tanzania found that as much as the government supports TBAs, there is still a problem²⁸. The authors demonstrated that TBAs possess insufficient expertise on the management of pregnancy problems. TBAs additionally utilised shared gloves and employed hazardous delivery materials. Notwithstanding the obstacles faced by TBAs in their profession, women continue to seek their services.

This is attributable to multiple reasons that impede women from giving birth in a formal healthcare environment. These problems encompass inadequate road conditions, distance from the clinic, and absence of electricity and water²⁹.

A study was undertaken in Kenya involving 200 traditional birth attendants and 20 clients. The authors employed unstructured questionnaires, interviews, and focus groups, discovering that while traditional birth attendants are predominantly female, there are also male practitioners. The authors further argued that TBAs are culturally accepted within their communities and seen as a valued resource. TBAs are regularly consulted by expectant mothers. Mothers

appreciate them due to their accessibility in contrast to the unreachable health facilities³⁰. Another study also mentioned that more than half of the TBAs were untrained and yet had attended to over 200 pregnant women. Their skills were earned through inheritance³¹. Similar TBAs observe hygiene and tend to pregnant women during and after delivery^{25,28,29,31}.

In addition to the roles mentioned above, Nonetheless, a separate study conducted in Kenya revealed that the majority of traditional birth attendants do not provide post-delivery treatment a study stated that TBAs provide social support during labor and postpartum periods, something which is not available in health care centres³⁰. The authors additionally noted the tasks that Traditional Birth Attendants (TBAs) fulfil before to delivery, including assessing the fetus's position in utero and performing abdominal massage on the mother. Social support fosters a robust connection between traditional birth attendants and their customers, and is highly valued by the majority of rural women in the community. This elucidates the rationale for the enduring presence of TBAs. Consequently, it is imperative to concentrate on aiding them in enhancing women's health and mitigating maternal mortality.

2.1.7.2 Benefits of Training TBAs

The WHO reports that the worldwide maternal mortality ratio decreased by 44% from 1990 to 2015, indicating significant progress but highlighting the continued necessity to eliminate maternal mortality. The WHO indicates that the majority of fatalities transpire in sub-Saharan Africa, with severe hemorrhaging, predominantly following childbirth, as the primary reason. A maternal death audit conducted in Rwanda revealed that postpartum hemorrhage was the primary cause of death, accounting for 22.7% directly attributable to bleeding³². The majority of maternal fatalities may be averted if women in underdeveloped nations accessed

professional healthcare; yet, moms are compelled to seek aid from traditional birth attendants. The subsequent primary cause of postpartum mortality is infection. An assessment conducted in South Africa indicated that traditional birth attendants require contemporary technology to mitigate the risk of infection to women post-delivery. The authors asserted that educating traditional birth attendants will enhance their understanding and mitigate hazardous practices that may endanger mothers and infants³³.

A primary source of infection is linked to the management of the umbilical cord. A qualitative study conducted in Ethiopia including six moms, four grandmothers, and two traditional birth attendants revealed that umbilical cord care practices may lead to infections in newborns³⁴. The author's findings unequivocally indicate the necessity for training Traditional Birth Attendants (TBAs). TBA training has demonstrated efficacy in decreasing MMR. Nonetheless, the question of whether Traditional Birth Attendants (TBAs) should receive training and be permitted to manage pregnancies independently remains contentious. Due to the persistently high maternal mortality ratio (MMR), with over 99% of maternal fatalities occurring in low- and middle-income countries (LMIC), the World Health Organisation (WHO) advises that pregnant women should attend antenatal care (ANC) and obtain professional healthcare to mitigate maternal mortality^{32,35}.

2.1.8 Dietary Recommendations in Pregnancy

The Nutrition Recommendations are designed for the general populace and establish the basis for national guidelines¹⁵. A diet abundant in vegetables, fruits, berries, nuts, seeds, legumes, whole grains, seafood, specific varieties of salmon, vegetable oils, and low-fat dairy products is advisable. The Mediterranean cuisine is abundant in most micronutrients, particularly folate,

zinc, and vitamins. Although a nutritious diet diminishes the necessity for supplements, certain nutrients still warrant attention and may require supplementation. Iron, iodine, folate, vitamin B12, calcium, and vitamin D are nutrients commonly deficient.

2.1.8.1 Iron

Iron is vital for all organs, as it constitutes the oxygen-binding component of haemoglobin, which transports oxygen from the lungs to the tissues. The iron requirements of a pregnant woman escalate as gestation advances, owing to haemoglobin production, transfer to the foetus, and iron depletion during labour. A haemoglobin concentration below 110 g/L is the criterion for anaemia in pregnancy¹⁶. Deficiency has been associated with preterm birth and reduced birth weight. Obese pregnant women face a heightened risk of iron shortage compared to normal-weight pregnant women, who possess diminished maternal iron reserves. The NNR advises a daily intake of 15–18 milligrammes based on deposits and current iron levels; during lactation, a recommendation of 15 milligrammes is made.

Expectant mothers often use supplements. Postpartum haemorrhage is a danger associated with anaemia, a prevalent issue in several countries. Dietary sources of iron include blood-based foods, meat, fish, whole grain cereals, spinach, and some fruits. Owing to the low content and high absorption of iron in human milk, a full-term, healthy newborn, whether breastfed or formula-fed, does not necessitate additional iron during the initial 4–6 months¹⁷.

2.1.8.2 Folate (vitamin B9)

Folate is a water-soluble vitamin present in liver, vegetables, especially legumes, green leafy vegetables, berries, and root vegetables. The vitamin is heat-sensitive, resulting in significant losses during cooking. Folic acid, the synthetic variant of folate, exhibits greater stability and is present in dietary supplements and fortified foods. Folate is essential for the synthesis of new cells, especially those that divide fast and red blood cells. The vitamin is essential for ribonucleic acid (RNA) and protein synthesis. Introduction to the manufacture of deoxyribonucleic acid (DNA). Certain medications (Folic Acid Antagonists) impede the body's ability to absorb or metabolise folic acid, thereby elevating the risk of neural tube abnormalities in offspring¹⁷. Given that the neural tube shuts early in pregnancy, specifically between weeks 3 and 4, sufficient folate levels are necessary prior to conception to prevent neural tube abnormalities. This vitamin also prevents megaloblastic anaemia in pregnancy. Some cereals are fortified with folic acid in many nations, however this is not the case in Sweden. The recommendations of the Swedish National Food Agency (NFA) are relevant in Sweden, with guidelines during pregnancy and lactation derived from the National Nutrient Reference. The NFA advises that all women considering pregnancy should consume 400 microgrammes of folic acid daily throughout the first trimester. The advised daily intake of folate during pregnancy and lactation is 500 microgrammes, owing to the accelerated growth of tissues.

The peak quantities of folate in human milk are observed between 3 and 6 months postpartum. Folate levels in human milk fluctuate throughout breastfeeding. Midwives serve as the principal providers of prenatal care and are designated by NFA as the profession that offers women specialised nutritional guidance. The guidance aligns with the NNR's

recommendations, advocating for a varied diet, a minimum of 500 g of fruits and vegetables daily, and 500 mL of low-fat dairy products, such as milk or yoghurt, each day. Beneficial sources of unsaturated fat comprise fish, crustaceans (2–3 times weekly), and vegetable oils. Consumption of some fish species is restricted due to dioxins, PCBs, and mercury, with a maximum recommended intake of 2–3 times annually. Meat, poultry, eggs, beans, lentils, and peas are advised, in conjunction with bread, potatoes, rice, pasta, and bulgur wheat, ideally derived from whole grains. It is recommended to consume water during meals and when experiencing hunger. A reduction in the intake of refined sugar goods, including cakes, candies, and soft drinks, is also advised¹⁸.

2.1.8.3 Iodine Supplementation in Pregnant Women

Iodine is an essential ingredient for the synthesis of thyroid hormone. During pregnancy, there is an approximate 50% increase in iodine requirements to accommodate the elevated synthesis of thyroid hormones, the foetal demand for maternal iodine, and the heightened renal excretion of iodine due to the physiological changes of pregnancy. Iodine is crucial for optimal brain development in the foetus and young kid. WHO and UNICEF advocate for universal salt iodisation as a global policy to guarantee adequate iodine consumption for all women. In regions with moderate to severe iodine deficiency, the study indicated that iodine supplementation prior to or during early pregnancy eradicates new instances of cretinism, enhances birth weight, diminishes perinatal and infant mortality rates, and generally elevates developmental scores in young children by 10 to 20%. Moderate maternal iodine shortage may lead to thyroid malfunction; however, its impact on cognitive and/or neurological function in offspring is yet unclear. Iodine-deficient populations are projected to incur a mean decline in intellectual capacity of 12 to 13.5 points. In almost all areas impacted by iodine shortage, salt

iodisation is the most economical method for providing iodine and enhancing mother and infant health.

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Table 2.2: WHO recommended dosages of daily and annual iodine supplementation

Population Group	Daily dose of iodine supplement (µg/d)	Single annual dose of iodized oil supplement ^(mg/y)
Pregnant women	250	400
Lactating women	250	400
Women of reproductive age (15-49 years)	150	400
Children < 2 years	90	200

Source: WHO & UNICEF, 2018.

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Over 1.8 billion individuals globally are projected to have inadequate iodine intake, rendering them susceptible to iodine deficiency. Europe has the highest percentage of individuals with inadequate iodine intake (44%), but South East Asia has the largest absolute number (540 million) of individuals with insufficient iodine consumption. Due to the increased iodine demands during pregnancy and lactation, as well as the significance of thyroid hormones for the growth and development of the neurological system, it is essential to maintain sufficient iodine levels in women and young children. Nevertheless, due to the restricted number of countries that have conducted surveys on pregnant women and women of reproductive age at national or substantial sub-national levels, there is an inadequate amount of data to accurately assess the regional or worldwide prevalence of poor iodine intake in these critical demographics.

Nutritious food is crucial at every life stage, particularly during gestation. The dietary decisions made during pregnancy can impact both maternal and foetal health for many years. The consumption of nutrients is crucial for the health of pregnant mothers and the foetus. Insufficient nutrient intake can result in maternal anaemia, heightening the risk of other maternal morbidities and mortality, as well as foetal growth retardation and low birth weight. Pregnant women do not require increased amounts of specific nutrients, making it crucial for them to select a nutritious diet wisely. Dietary guidelines have been established by numerous private and governmental organisations. These guidelines aim to mitigate the risk of getting specific diseases. One of these regulatory agencies is the Food and Nutrition Board of the National Academy of Sciences, United States of America (USA). Suggested nutritional intakes that fulfil the requirements of nearly all healthy individuals of comparable age and gender. The Recommended Dietary Allowance (RDA) has emerged as the foremost nutrient standard in the

United States and globally. The daily dietary group needs during gestation are detailed in Table 2.3. The figures in the central column indicate the recommended daily servings from each food group. One serving corresponds to each of the foods listed in the column on the right. One serving of bread and porridge (corn flakes) is equivalent to half a cup of rice.

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Table 2.3: Daily Food Group Requirement During Pregnancy

Food Group	Number of serves	1 serve
Breads, Cereals, Rice, Pasta, Noodles	8-12	1 slice bread / medium bread roll / cup cooked rice, pasta, noodles / cup breakfast cereal flakes % cup muesli or oats
Fruit	4	1 piece medium sized fruit 2 pieces smaller fruit 20 grapes or cherries / cup juice 1 cup diced/canned fruit 1 / tbsp sultanas
Vegetables, Legumes	5-6	1 medium potato/yam / medium sweet potato 1 cup lettuce or salad vegies / cup cooked vegetables
Meat, fish, poultry, eggs, nuts, legumes	1 /	65 - 100g cooked meat/chicken 80-120g cooked fish 2 small eggs 1/3 cup cooked beans, lentils, chick peas, split peas or canned beans 1/3 cup peanuts/almonds
Milk, yogurt, cheese	2	1 cup milk 40g (2 slices) cheese 200g yoghurt 1 cup custard
Extra Foods	0-2/	3-4 sweet biscuits 30 g potato crisps 2 scoops ice-cream 1 tbsp(20g) butter,margarine, oil

Ministry of Health, (2018).

2.1.9 Recommended Nutritional Intake for Pregnant Mothers

2.1.9.1 Vitamins B6 and B12

The American Congress of Obstetricians and Gynecologists advises a prenatal diet for pregnant women that includes 1.9 mg of vitamin B6 and 2.6 mg of vitamin B12. B6 is essential for the synthesis of red blood cells required by pregnant mothers and their infants. Sources abundant in vitamin B6 comprise fish, cattle, and fowl. Sources of this vitamin from fruits and vegetables include potatoes, spinach, bananas, and avocados. Besides facilitating the formation of red blood cells, vitamin B12 also supports the functioning of the central nervous system. This vitamin is present in eggs, dairy products, and poultry.

2.1.9.2 Vitamins A, C, and D

Pregnant women require seven hundred seventy (770) microgrammes of vitamin A and eighty-five (85) microgrammes of vitamin C daily during gestation. Vitamin A is essential for maintaining good skin and vision, and is present in carrots, green leafy vegetables, and sweet potatoes. The infant requires vitamin C for the maintenance of healthy teeth, gums, and bones, which is present in tomatoes, citrus fruits, cabbage, and broccoli. Vitamin D is essential for the development of an infant's teeth and bones. The advised daily intake of vitamin D is two hundred (200) International Units, which is present in milk, salmon, sardines, and egg yolk.

2.1.9.3 Calcium Supplementation in Pregnant Women

Numerous studies indicate that calcium supplementation during pregnancy may effectively reduce the incidence of pregnancy-induced hypertension. The outcomes of trials assessing the impact of supplements on maternal bone mineral density, foetal mineralisation, and preterm birth are, however, less definitive. Excessive calcium intake may elevate the risk of urinary

calculi and urinary tract infections, while also diminishing the absorption of other vital minerals.

The WHO reports that it has been commonly noted that women of reproductive age do not meet the dietary recommended intake for calcium. Women who consistently ingest inadequate calcium levels (<500 mg/day) may face heightened bone loss during pregnancy. Women who commence pregnancy with sufficient calcium consumption may not require supplementary calcium; however, those with inadequate intakes (<500 mg) may necessitate greater quantities to fulfil the bone requirements of both mother and foetus.

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Table 2.4: Scheme for calcium supplementation in pregnant women

Dosage	1.5-2.0 g elemental calcium/day
Frequency	Daily
Duration	Supplementation may start at week 20 onward
Target group	All pregnant women, particularly those at higher risk of hypertension
Settings	Areas with low calcium intake

Source: WHO, 2018

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2.1.9.4 Micronutrients During Lactation

During lactation, there is increased need for micronutrient requirements. Table 4 reveals the daily requirements for nutrients:

Table 2.5: Daily micronutrient requirements for lactating women

Nutrient	Daily Requirement
Vitamin A	850 gg. RE
Vitamin D	5gg
Vitamin E	12mg a -TE
Vitamin K	55gg
Vitamin C	95mg
Niacin	17mg
Folate	500gg
Calcium	1000mg
Phosphorous	1200mg
Magnesium	355mg
Iron	15mg
Zinc	19mg
Iodine	200gg
Selenium	42gg

Source: FAO/WHO, 2018

2.1.9.5 Dietary supplementation

The NFA advises that women who could get pregnant should ingest 400 microgrammes of folic acid daily until the twelfth week of pregnancy to avert neural tube abnormalities. Vegans ought to obtain vitamin B12 and vitamin D through supplements or fortified meals. Vitamin D tablets are advised for women who do not ingest fortified meals or who wear veils. Dietary supplements and herbal products should generally be approached with caution, and specific products, such as ginseng, should be completely avoided¹⁹.

Exposures to avoid or reduce

Alcohol: While research suggests that moderate alcohol intake during pregnancy does not correlate with developmental problems in mid-childhood, Swedish guidelines advocate for complete abstinence. Alcohol intake is associated with spontaneous abortion, growth limitation throughout prenatal and postnatal stages, and neurological birth abnormalities. During nursing, the guidelines allow for the drinking of minimal quantities of alcohol, even though alcohol offers no advantages for lactation. Current study indicates that a modest consumption of alcohol during lactation, specifically 1–2 glasses of wine (equal to 12 g of alcohol or 12–15 ml) once or twice weekly, presents no medical danger. The amount of alcohol transmitted to newborns via breast milk is minimal and deemed non-harmful (44–46).

Caffeine: Inconsistent research findings complicate health practitioners' ability to offer guidance on caffeine consumption to pregnant women. Caffeine intake is restricted to 300 mg daily. This equates to three cups of coffee (1.5 dL each cup) or six glasses of black tea. Research has indicated the potential for negative birth outcomes; nevertheless, the latest Cochrane Review determined that there is inadequate evidence to confirm or deny the efficacy

of caffeine avoidance on birthweight or other pregnancy outcomes, owing to the quality of the research analysed²⁰.

Mercury: may induce harm to the brain and nervous system in substantial amounts. Mercury can be conveyed to the newborn via the placenta and maternal breast milk. It is a metal that accumulates in fish such as perch, pike, walleye, and burbot. Avoid fresh tuna, swordfish, huge halibut, shark, and ray due to their elevated mercury amounts per gramme. Canned tuna is a different species from fresh tuna and does not possess higher mercury levels²¹.

Dioxin and PCBs: This may result in behavioural issues. Moreover, they can influence the immunological and endocrine systems, in addition to reproduction. These have become pervasive organic contaminants in the environment. Consumption of herring, wild salmon, and trout from the Baltic Sea and the Gulf of Bothnia is discouraged. This is also applicable to indigenous Vanern and Vattern salmon, trout, and whitefish. Given that these poisons are transmitted to the foetus and breastfeeding infants via the placenta and breast milk, it is imperative for women of reproductive age to reduce their exposure.

The bacterium *Listeria monocytogenes* is omnipresent in the environment. Listeriosis can also occur in foods that have been stored for prolonged durations and subsequently ingested without heating, including vacuum-packaged smoked and pickled salmon, soft cheeses, and sliced cold meats. When items are cooked to temperatures over 70 °C, *Listeria* bacteria are eradicated. Pregnant women may have flu-like symptoms or remain asymptomatic. In severe cases, transmission to the foetus during infection may lead to miscarriage or a very unwell child. The infectious agent The host of *Toxoplasma gondii* is the cat, which excretes the parasite through

faeces²². Similar to cat faeces, other animals, including sheep and pigs, can be contaminated and serve as a source of infection for humans. Moreover, contaminated soil, food, and fruit represent possible sources of infection. The parasite can infect the foetus via the placenta, resulting in miscarriage, birth abnormalities, or congenital illness. The parasite succumbs when subjected to a temperature of at least 65 °C or when frozen at –18 °C for a minimum duration of three days.

Weight gain and obesity

Women's weight gain during pregnancy varies significantly. The percentage of Swedish women enrolled in antenatal care who were overweight or obese (BMI 25) increased from 25% in 1992 to 38% in 2012. 25% of expectant women receiving maternal care in 2013 were overweight, and 13% were obese²². The Institute of Medicine's recommendations are the most widely used in Europe, including in Sweden. The guidelines recommend an 11.5–16.0 kg gestational weight gain for women with a normal BMI at enrollment (BMI 18.5–25); a lower weight gain (7.5–11.5 kg) for women with an overweight BMI (BMI 25–30); and a weight gain of 5–9 kg for obese women (BMI 30)¹²¹. Overeating occurs when energy consumption exceeds energy expenditure, resulting in excess body weight and obesity over the long term¹²². Increasing meal size and skipping meals throughout the day are also associated with obesity¹²³.

Excessive weight gain during pregnancy poses a risk of difficulties for both the mother and the newborn. Reports indicate metabolic problems include gestational diabetes, hypertension, and thromboembolism, along with their impacts on child growth and obesity. Rising incidence of caesarean sections and elevated birth and placental weights constitute further difficulties. Asphyxia in term newborns is linked to adverse outcomes and prolonged hospitalisations.

Moreover, lactation rates seem to be diminished in obese women, which is detrimental to both the mother and the kid²³.

Behavioral changes; physical activity and diet

Pregnancy is a pivotal life experience that profoundly encourages women to choose a healthy lifestyle. Motivational interviewing (MI) is a method employed in Swedish antenatal care to enhance motivation for lifestyle changes and behavioural modification. The aim is to assist patients in their attempts to eliminate a detrimental habit. The approach was developed by Miller and Rollnick, influenced by the theoretical model of Prochaska and DiClemente. The National Board of Health and Welfare has delineated the educational prerequisites and directives for MI¹³⁰. Physical activity is advantageous and secure for pregnant women, and it has been linked to less weight gain. A meta-analysis revealed that the effect of physical exercise was less than that of dietary intervention²⁴.

Recent data suggest that women experiencing significant prenatal weight increase are more prone to difficulties in weight retention and in reverting to their pre-pregnancy weight during the postpartum phase. A minimum of 30 minutes of daily physical activity is advised to achieve and sustain a healthy weight. The NNR for individuals, including pregnant women, is contingent upon the nature and degree of physical exercise. A minimum of 150 minutes of moderate-intensity physical activity each week is necessary. Silva-del Valle et al. identified a link between the Mediterranean diet and a reduced increase in BMI during pregnancy. Women who adhered more closely to the diet gained less weight and were more likely to fall within the BMI range advised by the Institute of Medicine. A Mediterranean-style diet is purported to promote foetal growth. Inadequate adherence throughout pregnancy correlated with

diminished birth and placental weight, as well as an elevated risk of hyperinsulinemia at birth²⁴. A review indicates that both undernutrition and overnutrition can lead to the onset of prenatal diabetes and epigenetic modifications that may predispose individuals to future type 1 and type 2 diabetes.

A Swedish study shown that weight treatments and education significantly decreased mean gestational weight growth by 1 kg ($p= 0.029$) relative to conventional care. Phelan et al. established that behavioral lifestyle treatments reduced gestational weight gain in women of normal weight. The therapies also inhibited postpartum weight retention in women of normal, overweight, and obese classifications. Minor alterations in women's nutritional intake have been found to exert minimal influence on their eating habits. A study conducted in Australia revealed that, despite women's belief in their healthy diet, they failed to meet the recommended intake of fruits, dairy products, and other necessary items²⁵.

Vitamin D physiology and synthesis

Vitamin D receptors are located in the organs, tissues, and cells of the body, as well as in the placenta-decidua during pregnancy. Vitamin D is crucial for the regulation of calcium and phosphorus homeostasis and participates in various biological processes, including cell proliferation and differentiation in target tissues. Vitamin D exists in two forms: cholecalciferol (vitamin D3) and ergocalciferol (vitamin D2). One source is exposure to sunshine. 7-dehydrocholesterol in the epidermis is transformed into vitamin D3 by the influence of the sun's UVB (ultraviolet B radiation; wavelengths 290–315 nm) rays.

Dietary sources of vitamin D3 comprise oily fish, eggs, fortified dairy products, and vitamin D3 supplementation. Vitamin D2 is found in mushrooms and specific nutritional supplements.

The liver metabolises vitamin D₃ and vitamin D₂ into calcidiol 25(OH)D₃ and 25(OH)D₂. Renal processing perpetuates the controlled transformation of 1,25(OH)₂D₃ into the physiologically active steroid hormone calcitriol. The synthesis of calcitriol is influenced by levels of calcium, phosphate, and parathyroid hormone, and it operates in conjunction with parathyroid hormone to regulate calcium and phosphorus homeostasis. The synthesis of vitamin D in the skin is affected by various factors, including solar exposure duration and intensity, skin type, geographical latitude, and seasonal variations. In the Ume region (latitude 63.8°N), ultraviolet radiation is enough for vitamin D₃ production from mid-April to mid-September, predominantly during daytime hours. It is unfeasible to synthesise within the remaining seven months²⁶.

2.1.9.6 Vitamin D in relation to pregnancy and after birth

The importance of vitamin D during pregnancy has been emphasised in recent years. The demand for calcium and vitamin D escalates throughout pregnancy and lactation owing to foetal development and neonatal growth, especially in relation to skeletal development and mineralisation. Throughout gestation, the body modifies its metabolism by enhancing the synthesis of calcitriol (1,25(OH)₂D) alongside hormonal alterations, including prolactin, placental lactogen, calcitonin, and oestrogen. Approximately 30 grammes of calcium is deposited by the neonate, predominantly during late gestation. The maternal gut and kidneys optimise the absorption and excretion of calcium and phosphate to fulfil this requirement. A multitude of research, meta-analyses, and reviews have associated vitamin D insufficiency with negative health consequences in pregnant women and infants worldwide. Vitamin D deficiency is associated with a heightened risk of gestational diabetes, pre-eclampsia, preterm birth, small-for-gestational-age newborns, and reduced bone mineral density.

Contradictory findings have also been reported, indicating no connection with premature birth. The definition of inadequacy is disputed, and there seems to be no agreement on the ideal level. Serum or plasma concentrations of 25(OH)D, the aggregate of D2 and D3, are assessed to evaluate vitamin D status. The concentration of 25(OH)D is influenced by changes in vitamin D production or consumption; otherwise, concentrations remain steady. The Institute of Medicine issued recommendations establishing a serum concentration threshold of no less than 50 nmol/L; this thesis adheres to these guidelines. The vitamin D concentration in human milk is negligible, and an infant's vitamin D reserves are insufficient and exhausted by 8 weeks of age²⁸. However, lactation contributes approximately 200 mg of calcium per day to the infant via breast milk.

Basic regulation of food intake

An intricate control system meticulously governs food consumption and appetite. The gut, brain, and adipose tissue in the human body interact with key organs to regulate food intake and maintain energy metabolism. A variety of appetite-stimulating and appetite-suppressing hormones, peptides, and neurosteroids are transmitted by the nervous system alongside the interplay of multiple cellular components. Multiple nuclei within the hypothalamus regulate food consumption by altering circulating hormones and neuronal activity directed towards brainstem nuclei. Two complementary systems govern food consumption: the homeostatic system and the pleasure (hedonic) system.

The homeostatic system modulates energy expenditure when energy reserves are diminished. Pleasure signals can amplify the craving for appetizing meals or substances by modulating reward mechanisms. Cognitive and emotional influences can override the homeostatic

metabolic system, resulting in an imbalanced energy state. During gestation, the concentrations of steroid hormones that regulate Gamma-aminobutyric acid-A (GABA-A) receptors, especially allopregnanolone, increase markedly²⁹.

Factors associated with nutritional status of pregnant women

Early age at marriage

In the GCC nations, early marriage remains a contributing factor to various pregnancy-related health complications among women. This is particularly applicable in both rural and urban areas. Numerous studies indicated that a significant number of women entered into matrimony before to the age of sixteen. Adolescent pregnancy may lead to maternal death and low birth weight infants (LBW < 2.5 kg), adversely affecting infant survival rates. In Bahrain, it was established that moms aged 15 to 19 had a higher propensity to have kids with low birth weight (2% compared to 7%). Alongside adolescent pregnancy, the likelihood of low birth weight (LBW) rose with each subsequent pregnancy. The prevalence of low birth weight (LBW) was found to be 10.6% among first-time moms in Bahrain, in contrast to 6.3% among mothers with one or more offspring³⁵.

Multiple pregnancies

Frequent pregnancies without adequate intervals may lead to numerous health and nutritional complications for both the mother and the embryo. Statistics indicate that the fertility rate among Gulf moms is somewhat elevated, varying from 4.6 per 1,000 women aged 15-44 in Bahrain to 7.1 per 1,000 women in Oman and Saudi Arabia. Multiple births often diminish a mother's haemoglobin levels due to closely spaced pregnancies exhausting her iron reserves, especially if she does not use iron supplements throughout gestation³⁶.

Unhealthy dietary practices

Various detrimental dietary habits during pregnancy can influence the infant's weight. Few expectant mothers are actively enhancing their nutrition. Only 31% of Bahraini women reportedly increased their consumption of fresh fruit during pregnancy. As a result, the intake of specific nutrients may be influenced. In Kuwait, Prakash et al. found that the consumption of calcium, iron, and vitamin C by pregnant women was below 75% of the US recommended daily allowance (RDA), and all nutrients, except protein, were below the RDA for breastfeeding women.

Conventional views and perspectives

Conventional nutritional views are a notable risk factor during pregnancy. In certain areas of the Gulf, some pregnant women believe that excessive food intake will lead to an excessively large child, whereas others think they should eat for two. Numerous pregnant women contend that iron supplementation could lead to foetal macrosomia, potentially resulting in a challenging delivery or even miscarriage.

Societal transformation and way of life

In numerous countries, a significant proportion of women are unemployed, and a limited number participate in physical activity. These factors substantially increase the risk of overweight and obesity. The presence of housemaids, autos, televisions, and advanced household appliances has diminished women's physical activity, rendering a sedentary lifestyle commonplace. Moreover, the consumption of fast food and other high-fat foods has surged significantly. These variables contribute significantly to weight gain in pregnant women³⁷.

Family income

The family's income and economic circumstances are critical personal factors that affect food choices during pregnancy. A woman with a robust financial foundation can access health care benefits, acquire high-quality food and services, and identify suitable products and equipment for health-promoting behaviours. An individual with a diminished income will possess limited alternatives for improving wellness. During the first trimester of pregnancy, reduced family income correlates with suboptimal health behaviours³⁸.

Multiple studies have demonstrated that low-income women exhibit more disordered nutrition behaviours. Financial instability during pregnancy impedes the establishment of nutritious dietary habits. In these instances, moms face an elevated chance of delivering infants with low birth weight. Lee et al. posited that familial wealth was correlated with dietary insufficiency. Low income correlates with an unhealthy diet, and moms with low income are related with low birth weight. The dietary quality of low-income women may deteriorate due to insufficient cash to acquire nutrient-dense foods. Women with low income may acknowledge the necessity of a good diet, yet they lack the financial means to acquire the requisite foods³⁹. Women with limited financial resources are unable to engage in healthful dietary practices during early pregnancy, putting them at risk for perinatal complications. Low-income expectant women typically consume fewer fruits and vegetables, lean protein sources, and whole grains, which are all relatively expensive foods.

Perceived benefits of healthy eating

Perceived advantages are expected advantageous results or reinforcing effects of health behaviour. The conviction that modifying one's behaviour will reduce a danger. The perceived benefit is an individual's assessment of the value or utility of a new behaviour in mitigating the risk of illness development. Individuals are inclined to select meals that are nutrient-dense, low in animal fats and processed carbs, high in fibre, and low in sodium and additives, owing to their awareness of the advantages of healthy dietary practices. In moms undergoing preterm delivery, the perceived benefits of health-promoting behaviours were identified as predictors of actual health-promoting behaviours⁴⁰.

Healthful eating has advantages for pregnant women. Consuming a balanced diet involves ingesting a diverse array of nutritious, invigorating, and palatable meals that support pregnancy nutrition and enhance mood. A nutritious diet correlates with increased weight gain in mothers and favourable birth outcomes. The advantages of nutritious food encompass weight management, disease prevention, physical fitness, increased energy levels, sustained health, enhanced appearance and well-being, and prolonged lifespan. The most often picked benefits of healthy eating in a study poll included disease prevention (73.6%), maintenance of health (69.4%), excellent quality of life (49.7%), weight management (47.0%), fitness (39.4%), longevity (28.8%), and increased energy levels (28.2%). The perceived advantages of healthy eating for women encompassed improved appearance and well-being, prevention of excessive weight gain, and reduced risk of delivering an oversized infant.

Identified obstacles to nutritious dietary practices

Perceived obstacles are identified as variables that obstruct health-promoting behaviours and encompass views of the possible disadvantages of behavioural modification. Perceived barriers are the actual or imagined views of hurdles that hinder behaviour modification, action initiation, or commitment to a behaviour. Time, expense, inconvenience, accessibility, and actual performance may provide challenges. In the Health Promotion Model, obstacles are modifying factors that directly impede the execution of health-promoting behaviours, such as healthy eating, or indirectly hinder commitment to the behavioural modification plan. For example, if the barriers to enhancing fruit and vegetable consumption are time constraints and limited access to affordable produce, then the difficulty to obtain economical produce diminishes the probability of boosting fruit and vegetable intake. A scarcity of time would hinder adherence to a plan, as more time would be necessary to obtain fresh, affordable produce⁴².

A study identified several hurdles to healthy eating, including time limits (24%), relinquishing preferred foods (23%), a hectic lifestyle (17%), resistance to change (21%), food preparation (19%), cost (15%), others' preferences (13%), dining out (11%), and reluctance to change (15%). A study in Bangladesh identified several barriers to increasing dietary intake during pregnancy, including discriminatory food allocation (90%), lack of decision-making power (85%), insufficient family support (67%), economic/access constraints (50%), illness (46%), concerns about foetal size (20%), large family size (7%), and discomfort with increasing intake (7%)⁴³.

Perceived dietary self-efficacy

Perceived self-efficacy is an individual's assessment of their ability to strategise and implement a certain health behaviour, reflecting their confidence in successfully executing that behaviour. Concerning health functioning, "efficacy beliefs predominantly influence individuals' willingness to alter their health habits and their success in implementing and sustaining such changes." Self-efficacy refers to an individual's confidence in their ability to adhere to a healthy diet. Dietary self-efficacy denotes the confidence an individual have in maintaining a healthy, balanced diet amongst stressful circumstances, such as following a diet or choosing better food selections at social gatherings. Self-efficacy is a competence-oriented, forward-looking, and functional construct that can predict, elucidate, and modify health behaviours. Consequently, an individual who perceives themselves as competent and effective in controlling their health is more inclined to participate in health-promoting behaviours more frequently than one who feels incompetent. Enhanced perceived self-efficacy elevates the probability of committing to and participating in health-promoting activities⁴⁴. Consequently, perceived dietary self-efficacy is a crucial factor that improves the behavioural outcomes related to healthy eating commitment in pregnant women.

2.2 Theoretical Review

2.2.1 Health Belief Model (HBM)

The Health Belief Model (HBM), established in the early 1950s by social psychologists Hochbaum, Rosenstock, and Kegels, serves as a theoretical framework aimed at elucidating and forecasting health behaviours with an emphasis on individual attitudes and beliefs. The

model was originally developed to comprehend the reasons behind individuals' reluctance to adopt disease prevention techniques or undergo screening tests for early detection, but it has since been widely utilised to analyse diverse health behaviours, including the nutritional habits of pregnant women.

Fundamental Elements of the Health Belief Model

The Health Belief Model asserts that a person's choice to participate in a health behaviour, such as implementing proper nutritional practices during pregnancy, is determined by six fundamental elements:

1. **Perceived Susceptibility:** This denotes an individual's conviction on the probability of contracting a disease or ailment. For pregnant women, it entails their comprehension of how inadequate diet might impact their health and that of their unborn child. Pregnant women who recognise a significant risk of malnutrition are more inclined to undertake measures to enhance their diet.
2. **Perceived Severity:** This pertains to the conviction regarding the gravity of acquiring an illness or neglecting its treatment. Pregnant women may be motivated to pursue improved nutritional choices and guidance from Traditional Birth Attendants (TBAs) by acknowledging the serious consequences of inadequate nutrition, including low birth weight, foetal developmental difficulties, and pregnancy complications.
3. **Perceived Benefits:** This element pertains to the conviction of the effectiveness of the recommended measure in mitigating the danger or severity of the illness. Pregnant women who perceive that proper diet can result in favourable health outcomes for themselves and their

infants are more inclined to comply with nutritional standards and pursue assistance from traditional birth attendants.

4. Perceived Barriers: These refer to the perceived impediments to executing a suggested health intervention. Pregnant women may encounter obstacles such as financial limitations, inadequate access to nutritional meals, or insufficient understanding regarding proper nutrition. Comprehending these obstacles can enable TBAs to deliver focused assistance and remedies.

5. Cues to Action: These are stimuli that incite persons to engage in action. Triggers for action for pregnant women may encompass guidance from healthcare professionals, educational resources, reminders from traditional birth attendants, or noticeable health enhancements in other pregnant women adhering to sound eating habits.

6. Self-Efficacy: This denotes the confidence in an individual's capacity to act. Pregnant women who possess confidence in their capacity to enhance their nutrition and make nutritious choices are more inclined to adopt and maintain such behaviours. TBAs can significantly enhance self-efficacy through education, encouragement, and practical assistance.

Utilisation of HBM in Assessing the Nutritional Status of Pregnant Women Engaging Traditional Birth Attendants

Implementing the Health Belief Model (HBM) to assess the nutritional condition of pregnant women through Traditional Birth Attendants (TBAs) necessitates addressing these elements to promote behavioural modification within this demographic. Below is the application of each component:

1. **Perceived Susceptibility:** Informing pregnant women about the probability of acquiring illnesses or complications resulting from inadequate nutrition can enhance their perceived susceptibility. For instance, elucidating the correlation between malnutrition and preterm birth or developmental complications in the infant can enhance pregnant women's awareness of their susceptibility.
2. **Perceived Severity:** Emphasising the grave repercussions of inadequate nutrition, such as anaemia, preeclampsia, or foetal growth limits, can augment pregnant women's perception of severity. Employing real-world examples and facts regarding the effects of malnutrition during pregnancy within their community might render the hazards more concrete.
3. **Perceived Benefits:** Illustrating the advantages of sound dietary practices, including enhanced maternal health, optimal foetal development, and less risk of pregnancy problems, can incentivise pregnant women to embrace these behaviours. Demonstrating immediate, observable advantages, such as heightened energy levels and enhanced well-being, helps strengthen this element.
4. **Perceived Barriers:** It is essential to address and mitigate obstacles to optimal nutritional behaviours. This may involve supplying information on economical, nutritious foods, conducting cooking workshops, or facilitating access to nutritional supplements. TBAs can assist pregnant women in overcoming cultural or social obstacles to adopting healthier meals.
5. **Stimuli for Action:** Incorporating visual and audible reminders throughout the community might function as prompts for action. Posters in clinics, educational workshops during antenatal visits, and community health discussions conducted by traditional birth attendants can consistently remind pregnant women to adhere to sound nutritional practices.

6. Self-Efficacy: Enhancing pregnant women's confidence in their capacity to uphold sound nutritional practices is crucial. Interactive workshops in which women acquire knowledge on balanced meals, engage in meal planning, and exchange experiences might enhance their self-efficacy. Affirmative reinforcement from Traditional Birth Attendants and peer support organisations can enhance self-assurance.

Illustration of HBM Implementation in Nutritional Interventions

Examine a community-oriented initiative aimed at enhancing the nutritional well-being of expectant mothers with the involvement of traditional birth attendants. The program comprises:

1. Educational Sessions: Instruction on the significance of adequate nutrition, the dangers linked to malnutrition, and pragmatic dietary recommendations.
2. Demonstrations: Practical exhibitions of meal preparation use locally sourced and economically accessible nutritional ingredients.
3. Accessible Resources: Guaranteeing the availability of nutritional supplements and information at TBA centres and community health stations.
4. Reminders and Reinforcements: Utilise posters, instructional materials, and reminders during maternity visits to emphasise the significance of proper nutrition.
5. Feedback Mechanism: Offering feedback and incentives for sustained compliance with nutritional requirements.

By addressing all elements of the HBM, such a program might successfully encourage pregnant women to adopt and sustain optimal nutritional practices, hence enhancing maternal and foetal health outcomes.

The Health Belief Model provides a thorough framework for comprehending and affecting health behaviours by examining beliefs and perceptions around health matters. The Health Belief Model (HBM) might inform the creation of treatments targeting perceived vulnerability, severity, advantages, barriers, cues to action, and self-efficacy regarding the nutritional health of pregnant women using Traditional Birth Attendants (TBAs) in certain Local Government Areas (LGAs) in Ogun State, Nigeria. Utilising the findings from this model, TBAs can enhance their support for pregnant women in making informed nutritional choices, hence improving maternal and foetal health outcomes.

2.2.2 Theory of Reasoned Action

The theory of reasoned action is a framework for forecasting behavioural intention, incorporating both attitude and behaviour predictions. The ensuing distinction between behavioural intention and behaviour allows for the elucidation of elements that constrain the impact of attitudes. Martin Fishbein and Icek Ajzen formulated the Theory of Reasoned Action, which evolved from earlier research originating with the theory of attitude and subsequently progressed to the examination of attitude and behaviour. The hypothesis emerged mostly from dissatisfaction with conventional attitude-behavior research, which

predominantly revealed weak connections between attitude assessments and the execution of voluntary behaviours⁴¹.

Ajzen and Fishbein introduced the theory of reasoned action (TRA), originating from social psychology. The TRA consists of three primary constructs: behavioural intention (BI), attitude (A), and subjective norm (SN). The Theory of Reasoned Action posits that an individual's behavioural intention is contingent upon their attitude and subjective norms ($BI = A + SN$). If a someone plans to engage in a behaviour, it is probable that they will execute it⁴².

Behavioural intention evaluates the degree of an individual's motivation to engage in a specific behaviour. Attitude is defined as the product of beliefs regarding the consequences of behaviour and the individual's assessment of those consequences. The subjective norm is defined as the amalgamation of perceived expectations from relevant individuals or groups and the intents to comply with these expectations. "The individual's perception that most significant others believe he should or should not partake in the behaviour in question." 41.

A person's voluntary behaviour can be predicted by their attitude towards that behaviour and their perception of how others would view them if they engaged in it. A person's attitude, together with subjective norms, influences their behavioural purpose.

Fishbein and Ajzen propose that attitudes and norms do not exert equal influence in forecasting behaviour. Indeed, these elements may have varying influences on behavioural intention based on the individual and the context; hence, each factor is allocated a weight in the predictive formula of the theory. You might be an individual who is indifferent to the opinions of others, for example. If this were the case, subjective norms would have minimal predictive ability regarding an individual's behaviour. The same author delineates each of the three components

of the theory and employs the example of initiating a standard training program to exemplify the idea. 23:

Attitudes: the aggregate of beliefs towards a particular behaviour, assessed by their evaluations. Some may contend that exercise is advantageous for health, enhances physical beauty, demands excessive time, and is painful. Each of these ideas might be prioritised; for instance, health concerns may hold greater significance for an individual than considerations of time and comfort.

Subjective norms: Analyses the impact of an individual's social environment on behavioural goals; the beliefs of others, assessed by the significance attributed to each opinion, will affect one's conduct. An someone may possess several pals who are enthusiastic about exercise and consistently encourage them to participate. Nonetheless, a partner may prefer a sedentary lifestyle and deride people who engage in physical activity. The convictions of these individuals, prioritised by the significance assigned to each position, will affect an individual's intention to exercise, hence determining whether the individual engages in physical activity.

Behavioural intention: Research indicates that a combination of attitudes and subjective standards for a behaviour might forecast actual behaviour. Your attitudes towards exercise and subjective norms, each carrying distinct significance, will influence your intention to engage in exercise, which will then dictate your actual behaviour.

2.3 Empirical Review

A study evaluated the perceptions, motivations for utilisation, and engagement with exclusive Traditional Birth Attendant services during current pregnancies among rural pregnant women in Lagos, Nigeria. A descriptive cross-sectional study was performed including 347 pregnant women recruited from traditional birth attendant facilities in the Ikorodu Local Government Area of Lagos. Data were gathered by an interviewer-administered questionnaire and analysed utilizing SPSS version 25. Bivariate and multivariate analyses were performed with a significance threshold established at $p < 0.05$. The outcome measures encompassed perspective, utilization of just TBA services during the current pregnancy, and rationale for usage. Positive perception denotes the favorable thoughts, beliefs, or opinions held by participants regarding the TBA. All respondents held a favorable view of Traditional Birth Attendants (TBAs); the majority (70.3%) exclusively utilised TBAs, while 29.7% integrated TBA services with those of healthcare institutions during the current pregnancy. Respondents mentioned recommendations from former users (81.6%), welcoming and hospitable staff (77.2%), perceived spiritual protection (75.2%), and prior usage (68.6%) as reasons for exclusively utilising TBA services. Factors influencing the exclusive use of Traditional Birth Attendants (TBAs) included the respondents' educational attainment; individuals with secondary (aOR = 0.261; 95% CI; 0.108–0.629) and tertiary (aOR = 0.352; 95% CI; 0.162–0.769) education exhibited reduced utilisation, whereas the absence of health insurance coverage (aOR = 3.017; 95% CI; 1.476–6.166) correlated with increased utilisation of TBAs. The participants in this study held a favourable view of TBA services. It is proposed that the government and other healthcare stakeholders implement continuous training and an effective monitoring mechanism for Traditional Birth Attendants (TBAs) to enhance women's birthing experiences⁴⁰.

A study investigated the utilisation of conventional maternity health care among 120 rural women across three local government districts in Oyo State, Nigeria. The survey was administered via a questionnaire. The findings indicated that the mean age of the participants was 35 years; the majority were married, lacked formal education, were engaged in trading or farming, and had a poor monthly income. The principal rationale for the implementation of TBA was the escalation of hospital expenses. The principal sources of information were relatives. The primary services utilised included alcoholism treatment, umbilical cord management, and neonatal circumcision. In all, 57.5% of respondents utilised TBA seldom. Significant correlations existed among educational attainment, age, household size, income, information sources, selection criteria, and the use of Traditional Birth Attendants (TBA). They recommend that the government enhance knowledge of the risks linked to TBA practices, decrease hospital expenses, guarantee proficient staffing in healthcare institutions, and adequately train TBAs⁴¹.

A study examined the informational and training requirements of Traditional Birth Attendants (TBAs) in several rural communities of Oyo State. A multi-stage sampling method was employed to choose Traditional Birth Attendants (TBAs) from the study area, resulting in a total of 120 respondents constituting the sample size for this research. Data regarding the socioeconomic characteristics of respondents, available training sources, delivered services, challenges encountered by traditional birth attendants (TBAs), and the informational and training requirements of TBAs were collected. The data were examined via descriptive statistics, Pearson Product-Moment Correlation (PPMC), and chi-square tests. The study's results indicated that the average age of respondents was 44.8 ± 9.9 years, with 93.3% being married. Training sources for TBAs include community health workers (98.3%) and

specialised health workers (82.5%). Services provided by TBAs include prenatal care (92.5%), breastfeeding education (87.5%), and referral services (43.3%). The average scores for restrictions indicate that the management of severe bleeding (0.92), management of retained placenta (0.85), and inadequate knowledge and training (0.54) were identified as the primary constraints. The study's findings indicated that all respondents (100%) expressed a significant need for information and training on the referral of unwell infants, infant weight, and immunization guidance. The Chi-square analysis indicates a significant relationship between sex ($\chi^2=4.611$, $p<0.05$) and religion ($\chi^2=7.397$, $p<0.05$) with the knowledge and training needs. Moreover, age ($r = 0.238$, $p < 0.05$) and work experience ($r = 0.236$, $p < 0.05$) exhibited a substantial correlation with the knowledge and training requirements of the respondents. The study advised that policymakers on reproductive health should provide collaborative possibilities with traditional birth attendants and skilled health professionals, fostering mutual trust and respect to maintain a sustainable health sector in the nation⁴².

A study investigates socio-demographic obstacles to the use of contemporary maternal health care services among 475 women of reproductive age, both rural and urban, who rely on traditional birth attendants for pregnancy-related care and childbirth in Osun State, Southwestern Nigeria, employing a multi-stage sample method. The study investigated the location of antenatal and delivery care among respondents in the study area, assessed the correlation between socio-demographic barriers to the utilisation of modern maternal health care services (MHCS) and respondents' knowledge of these services, and established the relationship between socio-demographic variables and the utilisation of modern MHCS within the study population. A self-administered semi-structured questionnaire was employed for data collection. Data were examined utilising SPSS (version 25) for both descriptive and inferential

statistics, with the significance level established at <0.05 . The findings indicated that all participants in the study employed the services of Traditional Birth Attendants for antenatal care; nevertheless, a portion of urban women (22.7%) and rural women (17.7%) utilised modern maternal healthcare services for delivery care. No statistically significant correlation exists between age at marriage and knowledge of current maternal health care services for urban women ($p>0.05$), however a statistically significant association is there for rural women ($p<0.05$). Socio-demographic obstacles to the use of modern maternal healthcare services in the study encompass beliefs in supernatural pregnancy protection, spousal decision-making, religious influences, education level, and income, $p<0.05$. Nonetheless, no statistically significant association exists between maternal age, marital status, and occupation with the utilisation of modern maternal health care services for both respondent categories ($p>0.05$). Strategies to promote the use of contemporary Maternal Health Care Services (MHCS) among respondents in the research region should encompass comprehensive information dissemination regarding Modern MHCS, public awareness initiatives, and the engagement of partners in maternal health planning⁴³.

A study including 17,196 British births examined the neonatal death rate across five social classes and determined that the infant mortality rate from 20 weeks of gestation to the first week of life escalates when familial socioeconomic level diminishes⁴⁵. As a result, the foetus has an elevated risk of developmental delay and mortality. The fetus's prognosis will be affected by nutritional education regarding an appropriate diet throughout pregnancy. A woman cannot be anticipated to maintain a sufficient diet if she is uninformed about her nutritional needs and the requisite dietary modifications during pregnancy⁴⁶.

A California study including 683 participants educated low-income pregnant women on 20 enhanced dietary practices, budget-conscious shopping and cooking techniques, as well as fundamental knowledge on nutrition, food storage, sanitation, and food handling. The research indicated an enhancement in the nutritional status of women who followed these guidelines. This study enables us to postulate that a deficiency in essential knowledge correlates with poor nutritional status, while an enhancement in dietary knowledge is associated with improved nutritional status. The alteration in nutritional status demonstrates information processing, learning, and improved judgement, all of which are elements of Roij's cognator mechanism⁴⁷.

Preliminary doctrines and convictions regarding appropriate food consumption influence dietary habits. The dietary choices made throughout infancy and childhood will profoundly impact adult food preferences. Moreover, adverse food experiences, including nausea and regurgitation post-consumption, substantially influence food aversions. Pregnancy is a phase significantly shaped by nutritional attitudes. Alongside the aforementioned factors, dietary practices will also be shaped by specific views around consumption during pregnancy. Factors affecting a woman's nutrition during pregnancy include widespread ideas, such as the idea that a woman's appetite should augment during this period or that she should limit her food consumption to avoid delivering a huge infant. A common misconception is that a pregnant woman will crave calcium- and energy-dense foods while eschewing protein-rich items. Specific cravings, including watermelon, pickles, and ice cream, are based on the notion that pregnant women "ought" to desire particular items. Some contend that excessive intake of a preferred cuisine would adversely affect the infant. Excessive eating of strawberries during pregnancy will lead to the formation of a strawberry birthmark. Pica represents an alternative manifestation of craving that influences dietary habits. Pica refers to the ingestion of non-

nutritive substances, like soil, clay, and laundry starch. The aetiology of pica remains inadequately comprehended; yet, when queried, women express a compulsion to consume non-nutritive substances, likening the sensation to the experience of running out of smokes. A study conducted by Lackey (2008) found that 23% of Black pregnant women and 27% of White pregnant women participated in pica behaviour.

A research on respondents' nutritional knowledge revealed that 81.1% recognised that insufficient and unbalanced nutrition during pregnancy affects both the mother and the kid. Less than two-fifths (38.9%) recognised that iron requirements escalate during pregnancy, and an even smaller proportion was informed on calcium and zinc. A majority (75.4%) indicated that pregnant women ought to augment their daily intake of fruits and vegetables. Sixty-six percent of healthcare staff recognised that inadequate folate/folic acid is the primary cause of neural tube birth abnormalities. A statistically significant correlation existed between socio-demographic factors, including age, married status, religion, and ethnicity, and the level of nutrition knowledge among healthcare practitioners.

Nutrition knowledge was significantly correlated with the cadre, period of practice, and engagement in the treatment of critically malnourished children among healthcare personnel. Individuals with BNSc and MSc/Postgraduate degrees exhibited markedly superior understanding compared to those lacking university degrees ($p < 0.001$)⁵⁰. Individuals under 40 years of age exhibit markedly inferior dietary knowledge compared to those over 40. Unmarried respondents were almost nine times more likely than married respondents to possess sufficient nutrition knowledge (CI = 8.791, 95% CI: 3.125–24.732). Respondents with fewer than 10 years of experience had significantly lower probabilities of holding sufficient

nutrition knowledge compared to those with over ten years of work experience. Individuals in the professional tiers DDNS/ADNS/CNO were roughly twice as likely as those in the lower tier to possess exceptional nutrition expertise. Christians were approximately six times more likely than Muslims to possess sufficient nutrition knowledge (OR = 5.810, 95% CI: 3.321–10.164).

All 41 (100%) centres were found to have permanent seating in the educational venue, were structured for sessions, and employed various teaching resources to instruct expecting women on nutrition. Despite the availability of movies, TV screens, posters, and charts for nutrition instruction, only a minority utilised visual aids throughout the sessions (22%), had audio aids accessible (22%), and demonstrated meal preparation with fresh ingredients (19%). Regarding message delivery, the health professionals positioned themselves before the moms and conveyed information, with a significant majority of pregnant women (85.4%) engaging actively. In 61% of the facilities, nurses and midwives conducted individual meetings with expectant mothers when required⁵¹. Concerning nutrition, all health care providers addressed food and hand cleanliness, the importance of a balanced diet, and specific nutrients such as Folic Acid, Iron, and Calcium. Sixty-one percent (61%) focused on maternal nutrition in the context of hypertension and diabetes.

A 2018 study investigating the impact of nutritional education rooted in the health belief model on the nutritional knowledge and dietary practices of pregnant women found no significant difference ($P=0.26$) in the mean nutritional knowledge ratings between the intervention and control groups at baseline; however, the variation was highly significant ($p<0.001$) at the conclusion of the nutritional education. The paired t-test indicated that the mean nutritional

knowledge score rose from 6.9 to 13.4 ($p < 0.001$) in the intervention group. At the conclusion of the nutrition education, all participants in the intervention group were aware of the sources of macronutrient- and micronutrient-rich foods, as well as the implications of micronutrient insufficiency during pregnancy for both the mother and foetus. In baseline, the nutritional knowledge variable of the two groups did not differ substantially ($p = 0.005$), however the difference was significant in the post-test ($p = 0.005$)⁵².

Lutter asserts that maternal information affects the dietary practices of expecting women. Mothers with superior nutritional awareness are likely to make healthier food choices compared to those with worse information. A study examining the association between nutrition knowledge, attitudes, dietary patterns, and the nutritional status of females in Nairobi City revealed a substantial correlation between nutrition knowledge and nutritional status. Elevated Mid Upper Arm Circumference (MUAC) correlated with enhanced understanding. In a study conducted in South Sumatera, expecting moms shown that enhanced knowledge resulted in improved nutritional status, with this knowledge gain correlating with a higher MUAC^{53,54,55}.

Adolescents' youth has been associated with insufficient nutritional knowledge and comprehension of current social issues. A deficiency in nutritional understanding was found to relate to inadequate eating behaviours. There exists a substantial association between nutritional knowledge and nutritional status. Pregnant women possessing comprehensive nutritional understanding ingested a diverse array of meals. A study in Sudan examined the correlation between adolescents' nutrition knowledge, attitudes, and dietary practices. Mothers

possessing enhanced nutritional awareness exhibited higher food selection and dietary diversification^{56,57}.

Respondents to a study of expectant adolescents were asked a number of questions about nutrition during pregnancy⁵⁸. A significant proportion of respondents (73.8%) recognised the elements of a balanced diet, whereas 65.6% identified the food types that most effectively protect the body from disease. Nonetheless, hardly a minority (36.1% and 36.1%, respectively) comprehended the importance of augmenting calorie intake and other nutrients during gestation. Merely 33.6% recognised the correlation between inadequate dietary practices and birth weight.

Figure 4.2 illustrates the computed nutrition knowledge scores categorised as low (40), moderate (41-69), and high (>70). The average score for knowledge was 46.4, 6.8. Figure 4.3 indicates that approximately 47.5% of the mothers have moderate dietary knowledge. Merely 13.5% had a good degree of knowledge⁵⁹. The subsequent FGD responses confirm that most women have inadequate dietary knowledge. "I had not previously encountered a nutritional requirement before pregnancy." Sixty. A pregnant lady should ingest a substantial amount of food to nourish herself and her foetus. FGD recommends that pregnant women should consume a substantial amount of milk. "If the mother neglects proper nutrition, she will have a premature infant." "If the mother neglects proper nutrition, she will have a premature infant." "An ill mother will render her child unwell." An ill woman may give birth to a sick child. The traditional notion that excessive maternal feeding of an infant may result in the child being too large for a vaginal delivery, hence requiring a caesarean section. "Inadequate food consumption can lead to suboptimal nutritional status." A separate research of pregnant teens

indicated that 44.9% possessed excellent nutritional awareness, 31.9% had moderate understanding, and 23.2% exhibited low knowledge.

A separate investigation into nutritional education as a factor influencing vitamin and mineral supplementation during pregnancy revealed that the prevalence of folic acid supplementation was 48%, iron supplementation was 45.3%, and multivitamin consumption was 68%⁶¹. Enhanced nutritional awareness was independently correlated with the utilisation of folic acid (adjusted odds ratio [aOR], 4.7; 95% confidence interval [CI], 1.6-13.8), iron (aOR, 2.6; 95% CI, 1.2-5.7), and multivitamins (aOR, 2.8; 95% CI, 1.2-6.8). The utilisation of folic acid was independently correlated with a greater degree of formal education (aOR = 5.2%; 95% CI = 2.1% to 12.8%) and an earlier initiation of prenatal care (aOR = 3.4%; 95% CI = 1.0% to 11.0%). Women possessing greater education (aOR, 2.3; 95% CI, 1.1-4.9), exceeding 10 prenatal visits (aOR, 7.2; 95% CI, 3.4-15.0), and those who received lactation counselling exhibited an increased likelihood of using iron during pregnancy. Comparable findings emerged when examining the determinants of multivitamin consumption: over 12 years of schooling (aOR, 3.4; 95% CI, 1.4-7.9) and sufficient prenatal care (aOR, 9.4; 95% CI, 4.5-19.5). A study examining the nutritional knowledge, attitudes, and practices of expecting women in relation to the food guide pyramid indicated that 26% possessed a high level of knowledge, 46% exhibited a moderate level of knowledge, and 28% shown a low level of understanding concerning nutrition during pregnancy⁶².

A separate investigation of the nutritional knowledge, attitudes, and practices of pregnant women with HIV indicated an average score of 67% (8 out of 12 points) for nutritional knowledge. 58% (n=190) of 324 respondents accurately answered 'false' to the assertion that

"a high-fibre diet is dangerous for HIV-infected individuals"; 24% (n=79) of 324 respondents correctly identified the statement "antioxidants are dangerous for PLWHA" as false; and 67% (n=216) of 324 respondents correctly recognised the claim "eating vegetables prevents HIV" as false. Educational attainment ($p = 0.003$), mode of transportation ($p = 0.044$), and body mass index ($p = 0.002$) exhibited significant associations with nutritional awareness, as established using bivariate analysis. Significant positive relationships were seen between nutritional knowledge and attitude ($r=0.155$, $p=0.005$), nutritional knowledge and practice ($r=0.456$, $p=0.001$), and nutritional attitude and practice ($r=0.230$, $p=0.001$). Dietary patterns exhibited a positive correlation with monthly income ($r = 0.177$, $p = 0.001$). A notable negative association exists between household size and nutritional practices ($r=-0.124$, $p=0.027$).

Prior to the educational intervention, the levels of nutritional awareness among pregnant women were assessed as low (31%), moderate (66%), and good (3%), based on a study examining the impact of nutrition on nutritional awareness. Post-educational intervention, the respective rates were low (6%), moderate (63%), and high (31%). The nutritional education intervention enhanced pregnant women's understanding of optimal nutrition from 3% prior to the intervention to 31% subsequent to it, irrespective of age or literacy level ($P 0.01$).

A study investigating the impact of maternal education and socioeconomic level on maternal nutritional awareness and behaviours for iron-rich foods and iron supplements indicated that 44% of women were aged 21 to 25⁶³. 22% of the participants were illiterate, in contrast to 7.3% of their spouses. Twenty-five percent of respondents had finished the eleventh grade. In the examined sample, 12 percent of respondents obtained master's degrees. Forty-five percent of respondents earned between 5,000 and 10,000 rupees monthly, and thirty-eight percent earned

between 10,000 and 20,000 rupees monthly. Merely 17% of the populace earned in excess of 20,000 rupees monthly. The majority of women visiting the clinic were in their third trimester of pregnancy. 29% of participants were undergoing their initial pregnancy, 18% had one offspring, and 22% had two. The majority of respondents (66%) were familiar with anaemia as a health concern, whilst 34% were not aware of the illness.

When asked about the causes of anaemia, 42% of respondents could not identify any. Pregnancy was identified as the primary cause by 36% of respondents. Merely 22% attributed it to a lack of iron-rich meals. It was apparent that when educational attainment rose, understanding of the causes also grew ($P.001$). Overall, awareness of iron-rich diets was inadequate. Merely 24% recognised beef, and a comparable percentage acknowledged green leafy vegetables as sources of iron. 18% were oblivious to dietary sources abundant in iron. A substantial connection ($P.001$) was identified between educational attainment and awareness of iron-rich diets. Subjects with a higher educational background possessed a superior comprehension of iron-rich diets compared to illiterate ladies. Over half (51%) of participants were oblivious to Vitamin C's advantageous effect on iron absorption. Despite the insufficiency of information, it exhibited a significant correlation with educational attainment ($p<.003$). An examination of the impact of nutrition education on maternal haemoglobin levels revealed that such education, along with an iron-rich dietary regimen during pregnancy, resulted in enhanced maternal weight gain and increased consumption of iron-rich foods⁶⁴. At the endpoint, there was a significant improvement in the hemoglobin concentration of expectant women in the intervention group compared to the control group⁶⁸.

A research evaluating pregnant women' understanding of maternal nutrition assessed respondents' knowledge through the following questions: What defines sustenance, A nutritionally balanced diet, The importance of food or enough nutrition throughout gestation, The dietary regimen during pregnancy is distinct from previous dietary plans. Sources of protein, carbohydrates, iron, iodine, and vitamin A. Adverse consequences of malnutrition on both the mother and kid. During the present pregnancy, the husband or other family members affect the variety and frequency of dietary intake.

The analysis of the quantitative focus group discussion data indicated that merely two respondents identified the primary food groups and prevalent sources of protein, carbohydrates, iron, iodine, and vitamin A, even though the majority of respondents articulated the significance of foods during pregnancy in diverse manners. The majority of participants contended that family members did not affect or dictate the nature and frequency of their dietary intake. Women aged 27 who are pregnant indicated that nutrition is crucial not just during gestation but also throughout non-gestational periods for various reasons, including the maintenance of health. Nonetheless, I lack knowledge on the definitions and prevalent sources of protein, carbs, iron, iodine, and vitamin A. A 35-year-old pregnant woman reported that the quantity and frequency of food consumed during and previous to her pregnancy in her home and the surrounding region are the same. I am concerned about the family's food supply, especially for those involved in agricultural pursuits, due to their constant work commitments⁶⁵.

Among the 419 respondents in the quantitative survey, 52.5%, 50.6%, 72.3%, and 71.8% recognised the importance of nutrition during pregnancy for energy and body temperature

regulation, optimal bodily function, foetal growth and development, and infection prevention, respectively. Nevertheless, 47.5%, 49.4%, 27.7%, and 28.2% of participants were oblivious to the importance of food. Iron is essential during pregnancy for energy production, physiological function, foetal growth and development, and immune defence. Concerning respondents' understanding of the definition of food, only 42.2% accurately identified its meaning, and 57.8% were unaware of it. The inquiry concerning the primary food groups or balanced diet revealed that a majority of respondents (74%) lacked knowledge of these concepts, while a minority (26%) demonstrated understanding⁶⁶.

A significant proportion of respondents exhibited insufficient nutritional knowledge for common food sources of protein, carbohydrates, iron, vitamin A, and iodine, with percentages of 70.6%, 79.0%, 80.7%, 78.3%, and 88.1%, respectively. Nonetheless, the remaining percentages of 29.4%, 21%, 19.3%, 21.7%, and 11.9% accurately recognised prevalent dietary sources of protein, carbohydrates, iron, vitamin A, and iodine. Concerning insufficient nutrition during pregnancy, merely 34.8% of participants acknowledged that it may lead to miscarriage or preterm birth, whilst 65.2% expressed uncertainty. Based on their answers to the knowledge-evaluation questions, 64.4% of respondents demonstrated understanding about nutrition during pregnancy⁶⁶.

This study's bivariate analysis demonstrated a strong correlation between the husband's educational level and nutritional knowledge during pregnancy ($p < 0.05$). Furthermore, bivariate analysis revealed that age, maternal educational status, family income, nutritional information during pregnancy, number of previous pregnancies, and inter-pregnancy interval exhibited significant statistical correlations with maternal knowledge of nutrition during pregnancy

($p < 0.001$), while family size and respondents' place of residence showed no correlation ($p > 0.05$). Following bivariate analysis, the statistically significant predictors were employed to do multivariate analysis. Individuals with an estimated monthly income exceeding 1000 birr were 5.7 times more likely to possess knowledge about nutrition during pregnancy compared to those with an estimated monthly income below 1000 birr (AOR=5.67, 95% CI: 2.08-15.44). Furthermore, individuals with an estimated monthly income surpassing 2000 birr were 6.0 times more likely to be knowledgeable than those with an estimated monthly income below 2000 birr⁶⁷.

A multivariate study indicated substantial positive correlations between a woman's educational attainment and her probability of possessing nutritional knowledge during pregnancy ($p < 0.01$). Those possessing a primary education exhibited significantly higher odds of nutritional awareness during pregnancy compared to those lacking any education (AOR=3.09, 95% CI: 1.65-5.3). Subsequent multivariate analysis revealed that the respondent's age, her husband's educational attainment, the number of prior pregnancies, and the intervals between pregnancies were not significantly correlated with maternal understanding of nutrition during pregnancy. This study identified a significant statistical link between nutritional information provided during pregnancy and the nutritional knowledge of moms during that period ($p < 0.001$). In a multivariate study, expectant women with nutrition information were 3.59 times more likely to possess knowledge about nutrition compared to pregnant women without such information (AOR = 3.59, 95% CI = 2.03-6.35)⁶⁸.

A study indicated that 230 people (60.9%) were competent, whereas 148 participants (39.1%) were not. One-third of the polled moms claimed that insufficient food sources were the cause

of malnutrition. Over one-third (34%) of participants were oblivious to the health risks linked to an iron-deficient diet during pregnancy. Logistic regression results indicated that the probability of knowledge was 2.5 times higher among secondary school participants compared to those who did not attend school (adjusted odds ratio (AOR) = 2.5, 95% confidence interval (CI): 1.22, 7.75). Merchant women were seven times more likely to possess knowledge compared to carers (AOR = 7.02; 95% CI: 2.80, 17.09). Furthermore, multiparous women exhibited a 4.8-fold increase in knowledge compared to primigravida women (AOR = 4.77; 95% CI: 1.15–8.2)⁶⁹.

In another study, an expecting lady was deemed educated if her knowledge score was 6 or more out of 9, and labelled as uninformed if her score was below 670. The elements of pregnant women's knowledge encompassed dietary variety, increased caloric intake during gestation, utilisation of iodised salt, duration and sources of iron supplementation, necessity for supplements alongside regular nutrition, and dietary limitations during pregnancy. The overall mean score for pregnant women's understanding of suitable nutrition was 5.5 (SD 0.5). 53.9% of the study participants possess sufficient knowledge regarding appropriate nutrition throughout pregnancy. Fewer than half of pregnant women (43.8%) deem it essential to consume a diverse array of meals throughout pregnancy, whereas 270 (66.5%) recognise the necessity of increased food intake during this period. Out of 129 individuals (31.8%), meat, liver, and fish were recognised as good sources of iron; 145 participants (34.7%) selected vegetables as a good source, while 132 participants (32.5%) were uncertain. Three hundred twenty-three participants (79.6%) recognised the utilisation of iodised salt during gestation. Only 144 participants (35.5%) said that the length of iron tablet administration was six months, whereas 113 participants (27.8%) reported three months, and the remaining individuals were

uncertain. One-third (275) of the pregnant participants in the study recognised the necessity of supplementation with vital minerals and vitamins during gestation. 335 (82.5%) and 263 (64.8%) of the survey participants recognised that maternal malnutrition would lead to difficulties for both the foetus and the mother, respectively.

This study revealed a substantial enhancement in awareness among expecting women who received nutrition instruction. Following nutrition education, the nutritional understanding of expectant women improved from 53.9 (95% CI: 48.9, 58.8) to 97% (95% CI: 94.8, 97.0%). The knowledge of pregnant women significantly improved across all components, with the exception of understanding the consequences of maternal undernutrition resulting in fatal complications (82.5%, 95% confidence interval [CI]: 78.4, 86.1 to 89.4%, 95% CI: 85.9, 92.4%). The proportion of pregnant women aware of diverse food consumption increased from 43.8% to 85.5%. Correspondingly, awareness of iodised salt utilisation, maternal problems stemming from insufficient nutrition during gestation, duration of iron supplementation, and dietary sources of iron rose from 79.6% to 95.6%, 64.8% to 91.4%, 35.5% to 92.1%, and 31.6% to 86.9%, respectively.

An Australian study assessed pregnant women's understanding of the Australian Guide to Healthy Eating (AGHE). The participants exhibited the highest levels of understanding in "food safety practices during pregnancy" (84.22% correct), "diet–health relationship" (71.16% correct), and "nutrient sources" (66.8% correct). The categories with the lowest results were "multivitamins and supplements during pregnancy" (48.40% correct) and "importance of key nutrients during pregnancy" (46.5% correct).

Approximately 65.2% of respondents (n=261) indicated a lack of familiarity with the AGHE for expecting mothers. Despite 34.8% of respondents (n=139) reporting familiarity with the

AGHE recommendations, their knowledge on the recommended intake of the five primary food groups did not differ from that of individuals unaware of the AGHE ($P=0.63$). Participants were instructed to choose the accurate number of daily servings for each of the five primary food groups in the Australian Guide to Healthy Eating (AGHE) from a list of multiple-choice answers. The respondents exhibited a significant awareness of the appropriate intake of "extras" (86.5%, $n=346$) but a diminished understanding of the recommended intake of dairy products (56.5%, $n=223$). Fewer than half of the participants were cognisant of the advised consumption levels for fruits and vegetables (45%, $n=179$), bread and cereals (34.5%, $n=138$), and meat and its substitutes (28.5%, $n=114$).

The ingestion of these non-nutritive products may provide a sensation of satiety, thereby reducing the intake of nutritious foods. Previously refuted medical hypotheses have bolstered views in food restriction. A woman with a small pelvis was prescribed the Prochownick diet, which included fluid restriction, limited carbohydrate intake, and high protein consumption. This diet was thought to produce a little child. Subsequently, its application was broadened to encompass all women, rather than solely those with pelvic limitations. This diet and other obsolete knowledge that is genuinely harmful to foetal health remain common today. Additional variables constraining food consumption encompass cultural and religious beliefs 40. These limitations are enforced due to the potential adverse effects of specific foods on pregnancy and delivery outcomes 52. Consequently, a woman's cultural and personal views will substantially influence her nutritional decisions throughout pregnancy. Certain cravings may be benign. Self-imposed or cultural constraints may substantially affect the sufficiency of consumed food, significantly restricting vital nutrients and vitamins necessary for foetal growth and development. The foetus is directly influenced by the mother's nutritional

condition, making nutritional status throughout pregnancy a critical variable to assess. To offset the elevation in metabolic rate during pregnancy, a woman's eating practices must be modified. An elevated basal metabolic rate requires an increase in caloric intake for optimal physiological performance. A woman's caloric intake should surpass her expenditure during pregnancy. This imbalance will facilitate the accumulation of glycogen, fat, and protein, essential for foetal growth and development, while concurrently sustaining the woman's physiological functioning.

A separate study investigated the relationship between particular nutrients in the diets of pregnant women and the birth weight of their infants. Women from diverse social strata contributed the data. Every pregnant lady completed a nutritional intake questionnaire at various stages of her pregnancy. The data collected indicates a positive association between the infant's birth weight and the quality of the mother's nutrition.

A South African study entitled "Impact of Nutrition Education on the Nutrition Knowledge of Public-School Educators" involved the completion of questionnaires by 90 educators and principals from 45 institutions across all nine provinces of South Africa for the baseline survey. The findings revealed that nutrition instruction was predominantly incorporated into the Life Orientation curriculum (97.8%), whereas 2.2% of the curriculum was allocated to Natural Science. The majority of schools incorporated nutrition instruction across all grades (0-12), with participation rates varying from 68.9% in Grade 0 to 95.6% in Grade 8. Twenty percent of schools allocated over two hours weekly to nutrition teaching. Sixty percent of schools allocated less than one hour per week to nutrition education. The findings also disclosed the nutritional education resources accessible to educators at the institution. Most schools (95.6%) possessed nutrition education texts; nevertheless, hardly 24.4% of nutrition instruction was

imparted via formal lectures. Despite 44.8% of respondents reporting the utilisation of food models and 26.7% indicating the use of food puzzles, these findings are dubious due to the limited availability of food models and puzzles in South Africa, necessitating their importation from the United States at a prohibitive expense (R6,800 for 50 food models in 2005). A small proportion of schools (11.1% and 6.6%, respectively) utilise nutrition education games and cards.

The predominant sources of nutrition knowledge among educators were textbooks (88.9%), seminars (77.8%), and local television shows (73.0%). Despite the provision of nutrition instruction in most observed primary schools and for students across all grades, the baseline survey findings revealed that the allocated time for nutrition education was minimal each week. This aligns with studies conducted in the United States, which revealed that health and nutrition instruction is not prioritised equally with other subjects in school curriculum planning. While respondents deemed the nutrition curriculum sufficient on the issues addressed, there remain gaps in the curriculum, including food security and the identification of underweight children. Educators, however, did not express a necessity to incorporate these subjects into the Life Orientation curriculum. The educators stated that students, their guardians, instructors, and NSNP volunteers necessitate nutrition education. The data indicated that classroom NEP alone is inadequate to affect children's eating habits, necessitating the involvement of all stakeholders, including educators and childcare providers. A substantial link exists between an educator's expertise and training and their ability to instruct this subject. Research indicates that educators allocate more time to subjects in which they have acquired sufficient training. The educators involved in this pilot project possessed average to insufficient nutrition

knowledge before the NEP and shown a lack of confidence in teaching nutrition within the Life Orientation curriculum.

The predominant sources of nutrition information among the educators in this survey were textbooks (88.9%), seminars (77.8%), television (73.3%), and magazines (68.9%), whereas only 33.3% and 26.7% acquired nutrition education during their academic studies and in-service training, respectively. Supplementary research indicates that educators exhibit a deficiency in confidence when instructing subjects in which they possess inadequate understanding. This survey indicated that most institutions provided Life Orientation for fewer than one hour per week. Nutrition constitutes one of the numerous life skills encompassed in the Life Orientation curriculum; yet, its implementation in South African schools is markedly inferior to the suggested minimum of 50 hours of nutrition teaching necessary to promote behavioural change in children. The absence of training and support for educators constitutes one of the several challenges encountered in the implementation of wellness programs and curricula in educational institutions. Additional concerns encompass suitable guidelines, temporal limitations, competing academic priorities, financial resources, and diminished educator engagement rates.

A distinct study examined the impact of nutrition education on pregnancy-specific nutritional knowledge and healthy dietary practices among pregnant women in Addis Ababa. Following nutrition education, pregnant women's understanding of nutritional guidelines during pregnancy significantly improved from 53.9% to 97.0%, and their pregnancy-specific dietary behaviours rose from 46.8% to 83.0%. In this survey, 59% of expecting women obtained their information from midwives and nurses. In contrast to a study conducted in Gambia, which revealed that 35% of participants received nutritional and dietary information from their ANC

providers, this study indicated that 45% of individuals received such information from their ANC providers. Despite the research findings surpassing those of the Gambia study, considerable effort remains necessary to enhance nutrition education to deliver essential information for preventing the intergenerational consequences of malnutrition.

The survey found that 53.9% of mothers possess sufficient knowledge about maternal nutrition during pregnancy. The findings of this study align with those of a research conducted in the United States, where over fifty percent of the assessed women demonstrated basic and important understanding of the significance of nutrition during pregnancy. This result is subpar compared to the Malaysian study: In Swaziland, 65.7% to 67% of moms demonstrated awareness on maternal nutrition. This examination produces more favourable outcomes than the Egyptian study, when 46% of moms demonstrated expertise of maternal nutrition. Similarly, a survey conducted in East Wollega revealed that 52.5% of respondents in another region of Ethiopia recognised the importance of nutrition during pregnancy for energy and thermogenesis.

This disparity may be due to socioeconomic and cultural variations among the study participants. In this study, 64.8% of pregnant women recognised that maternal malnutrition may lead to foetal problems. The findings of this study surpassed those from East Wollega, Ethiopia, where 34.8% of pregnant women recognised that insufficient nutrition during pregnancy may result in difficulties, including miscarriage and early birth. A separate cross-sectional study in India revealed that 27.4% of mothers knowledgeable about maternal nutrition during pregnancy were at risk of experiencing maternal problems.

This mismatch may stem from varying ideas regarding the causes of disease across different regions, influenced by disparities in knowledge, culture, and spirituality. The survey indicated

that 66.5% of participants recognise the necessity of increased food consumption during pregnancy relative to non-pregnant conditions. This is less than the Pakistani study, which indicated that 84% of women were aware of how to augment or incorporate additional food items into their diet during pregnancy compared to non-pregnant conditions. This mismatch may stem from varying ideas regarding the causes of disease across different regions, influenced by disparities in knowledge, culture, and spirituality. The survey indicated that 66.5% of participants recognise the necessity of increased food consumption during pregnancy relative to non-pregnant conditions. This is lower than the Pakistani study, which indicated that 84% of women were aware of ways to enhance or supplement their nutrition during pregnancy compared to non-pregnant conditions.

The study indicated that merely 35.5% of individuals acknowledged a period of Iron supplementation during pregnancy of 6 months, while 27.8% claimed a duration of 3 months, and the remainder were uncertain. Despite the promotion of iron supplementation during pregnancy through television and radio in Ethiopia, over fifty percent of the study participants were deficient in essential knowledge about iron supplementation, as indicated by the findings of this study 80. This is due to women's limited access to information; hence, targeted education and promotion of iron supplementation during pregnancy should be prioritised through diverse information dissemination methods in the study region to effectively reach the intended audience.

Furthermore, 46.8% of pregnant women exhibited exemplary nutritional practices during pregnancy, as indicated by the study's findings. A research in Swaziland revealed that 51% of pregnant women exhibited exemplary nutritional behaviours during pregnancy. Conversely, a

separate study conducted in Malaysia (74%) and Pakistan (65%) identified a greater percentage of pregnant women exhibiting exemplary nutritional behaviours. The disparities in socioeconomic level, cultural attitudes, and access to nutrition and healthcare services among the study participants may explain these variations. In this study, 69.7% of pregnant women consumed at least one additional meal relative to their pre-pregnancy dietary habits. A separate study in Wondo Genet, Ethiopia revealed that 75.2 percent of pregnant women did not partake in any supplementary meals. Economic inequalities and deficiencies in information may have contributed to this inequality. This study indicates that 42.4% of pregnant women consumed dairy products and 46.0% consumed green vegetables, aligning with the recommended daily amounts during pregnancy. The outcomes of this study aligned with an American study indicating that 42.7% of participants exhibited a daily milk intake behaviour. In contrast to this research, 58.9% of participants in a study done in the United States indicated a daily practice of consuming fresh veggies. These discrepancies may result from variations in diet and knowledge between the two cultures. The compliance with Iron supplements was 69% one week before this study's survey, which is comparable to the findings from the United States (63.7%) and India (62%) about prenatal moms ingesting Iron folate tablets. The resemblance of these results may be ascribed to the use of analogous intervention measures, encompassing supplementation, individualised education, and iron supplementation. 27.3% of study participants abstained from one or more dietary groups during their pregnancy.

A study conducted in Wondo Genet, Ethiopia, revealed that 21% of pregnant women were avoiding specific dietary groups. This study identified the primary reasons for avoiding food groups as follows: experiencing nausea and vomiting post-consumption (39.6%), hating the food (49.5%), and being advised by others that it could adversely affect pregnancy or due to

dietary taboos (9.9%). This research indicates that a prior study in Shashaman, Ethiopia, found food taboos as a contributing factor. The discrepancies between the two studies may stem from the variations among the study participants. This study focused on urban communities, namely pregnant women, who are likely to possess superior education and enhanced access to nutritional information throughout pregnancy compared to rural mothers. Cultural beliefs, regardless of their validity, often shape behaviour. Nevertheless, this discovery provides a beacon of hope that these beliefs and taboos may be progressively surmounted as access to education and healthcare services increases. In this study, pregnant women predominantly refrained from consuming meat, cereals, dairy products, veggies, and spicy meals. Nearly indistinguishable from what pregnant ladies in Shasha mane, Ethiopia refrained from consuming meat, cereals, dairy products, veggies, and spicy meals. Nearly indistinguishable from what pregnant ladies in Shasha mane, Ethiopia refrained from.

In this study, following the implementation of nutrition education, the percentage of pregnant women possessing adequate nutritional knowledge during pregnancy rose from 53.9% to 97.0%, supporting the results of a prior study conducted in Iran, where the beneficial impact of nutrition education on knowledge enhancement varied from 3% to 31%. This aligns with a study conducted in India, which revealed an enhancement in total nutritional knowledge, with the mean score rising from 22 to 32.7 during the pre- and post-assessment periods. The findings indicate the effectiveness of nutrition education in improving pregnant women's understanding of nutritional practices throughout pregnancy. The significant increase in nutritional knowledge among pregnant women in this study may be due to the short interval between the pre- and post-assessments and the administration of only a single post-education assessment.

In this study, the proportion of pregnant women adhering to a pregnancy-specific diet rose from 46.8% to 83.2%. A Dutch study revealed a substantial rise in the consumption of practically all food groups among the post-Nutrition Education group compared to both the non-Nutrition Education and pre-Nutrition Education groups.

A study examining dietary intake knowledge and motivations for food restriction during pregnancy among expecting Nigerian women attending primary health care centers in Ile-Ife. The respondents' ages varied from 14 to 53, with a mean age of 27.5 years and a standard deviation of 5.3. The respondents had an average of 2.0 offspring, with a standard deviation of 1.3. A significant proportion of women are married (90.8%) and maintain monogamous families (91%). A plurality of respondents (44.5%) possessed tertiary education. Seventy-five percent of the participants identified as Christians, while eighty-eight percent were of Yoruba ethnicity. A mere 4.6% of respondents reported no income, while just 11.1% earned in excess of 50,000 (about \$315). Participants exhibited a mean knowledge score of 23.6, with a standard deviation of 4.2 years, and roughly 75.5% demonstrated excellent understanding of food intake during pregnancy. 21.5% of respondents possessed sufficient understanding of dietary consumption, whereas 3.0% exhibited insufficient knowledge.

The data indicated that a significant majority of respondents (88.3%) recognized that food consumption should escalate throughout pregnancy. Approximately 73.4% of responders recognized the necessity of increased protein intake during pregnancy. Almost all participants (96.2%) recognized that protein-rich meals, including cattle, fish, eggs, and legumes, are essential for bodily growth and repair. Most responders (88.5%) recognized that foods high in fats and oils, including palm oil, groundnut oil, butter, and margarine, are essential for the preservation of tissues and organs. A significant majority of respondents (87.7%) assert that

fruits and vegetables, abundant in vitamins and minerals, are vital for optimal health. A significant portion (44.7%) of respondents erroneously asserted that pregnant women ought to increase their carbohydrate intake. Over one-third (36.0%) of respondents explicitly indicated the necessity of increased intake of minerals and micronutrients during pregnancy. Merely 28.9% of respondents identified fats and oils as key meals necessary during pregnancy.

Pregnant women exhibited a correlation between awareness of dietary intake and socio-demographic variables. The link was significant at $P = 0.012$, with a greater percentage of respondents aged 35 or older demonstrating a comprehensive understanding of dietary intake (86.5%) compared to those aged 25–34 (77.5%) and 14–24 (68%). Individuals with university education exhibited the highest awareness of food intake (81.7%), followed by those with primary (70.8%), secondary (70.4%), and no formal education (68%) levels. A substantial link existed between educational attainment and nutritional knowledge ($P = 0.003$). The proportion of unemployed and petty-trader respondents possessing a comprehensive awareness of nutritional intake was lower compared to other categories of women, such as public servants and students.

A notable link existed between the respondents' educational attainment and their professions ($P = 0.024$). The connection was determined to be significant ($P = 0.006$). The percentage of respondents lacking adequate knowledge of food consumption was reduced among individuals with higher monthly income compared to those with no income. No substantial correlation was identified between awareness of dietary consumption and other socio-demographic variables, such as marital status, parity, religion, ethnicity, and number of offspring. Cultural taboos (36.5%) ranked as the primary factor affecting dietary choices during pregnancy, followed by the avoidance of specific foods believed to contribute to larger infants or complicate labour

and delivery (25.6%), concerns regarding adverse health effects of certain foods (13.7%), aversion to food flavors during pregnancy (12.1%), and dietary restrictions imposed by religious beliefs (12.1%).⁷⁹

A distinct study in Bangladesh examined the socioeconomic and demographic aspects affecting the nutritional health of young women who bore their first child before the age of 20, revealing a mean maternal age of 20.49 ± 2.37 years (95% CI: 20.40–20.58). This was established through the analysis of a data set comprising 2,743 young nonpregnant Bangladeshi moms (aged 24 or younger) who bore their first child before to the age of 20. The average number of offspring per mother was 1.60, with a standard deviation of 0.76. Over half of the participants (53.8%) had one child, approximately one-third (34.6%) had two children, and the remaining (11.6%) had two or more children. The average weight of all moms was 45.97 ± 8.01 kg (95% CI: 45.67–46.27), with a range from 28.00 to 104.20 kg. The average height of the moms was 150.87 ± 5.48 cm (95% CI: 150.66–151.07), with a range from 112.10 to 197.20 cm. The BMI varied from 13.09 kg/m² to 38.13 kg/m², with a mean of 20.16 ± 3.07 kg/m² (95% CI: 20.04–20.27).

The age of these women at their initial childbirth varies from 12 to 19 years, with a mean of 16.54 ± 1.67 years (95% CI: 16.48–16.56). According to BMI classifications, over half of the moms (60.5%) were of normal weight, but around one-third (32.1%) were underweight. A relatively small percentage of mothers were overweight or obese (6.2% and 1.2%, respectively), with the majority residing in metropolitan regions. 11.9% of mothers with Chronic Energy Deficiency (CED), defined by the same criteria as underweight (BMI 18.5

kg/m²), were classified as severe, 25.1% as moderate, and 62.2% as minor (grade I). Women in rural regions exhibited a higher prevalence of underweight status (38.8%) compared to their urban counterparts (25.8%). Individuals with a lower educational attainment (39.9%) exhibited a higher propensity for being underweight compared to those with a higher educational attainment (30.3%). Likewise, the husband's educational attainment influenced the nutritional status of these women.

Besides family income, BMI was also affected by income. Our study indicated that women from impoverished homes exhibited a higher likelihood of being underweight (39%) compared to those from other socioeconomic backgrounds (26.1%). Our observations indicated that non-working women (housewives) had a lower likelihood of being underweight compared to working women (32.4% versus 49.0%)⁹¹. Conversely, women with unemployed partners exhibited a higher likelihood of being underweight compared to those with employed spouses (37.7% vs. 30.8%). The Chi-square test indicated a statistically significant connection between all these variables and low BMI (underweight status) ($p < 0.001$). Our analysis of the technique and location of labour revealed that moms who gave birth at home had a higher likelihood of being underweight compared to those who delivered in hospitals or clinics (36.4% vs. 28.2%). The correlation between birthplace and low birthweight was statistically significant ($p < 0.001$). The majority of individuals who delivered vaginally at home were more likely to be underweight (35.3% compared to 27.7%). The correlation between manner of delivery and low birthweight was statistically significant ($p < 0.05$). 35.2% of women who married prior to the age of 17 were classified as underweight, in contrast to 31.0% of women who married at a later age. Moreover, over one-third of women who had their first child before the age of 17 were

classified as underweight, a notably greater percentage compared to those who gave birth at a later age (36.8% vs. 32.2%).

Our observations indicated that women with three or more children exhibited a higher likelihood of being underweight compared to those with one or two children (41.4% vs. 33.3%). All of these characteristics were statistically significantly linked with underweight ($p < 0.05$). We choose to omit overweight and obese women from the two tests and logistic regression model due to their minimal representation in our sample population (6.2% and 1.2%, respectively). In this binary model, underweight served as the dependent variable (reference case), whereas normal functioned as the independent variable (non-reference case). In this model, only variables with a substantial correlation were considered independent variables. The logistic regression coefficient and hazard ratio demonstrated that women from rural regions had a 1.478% [95% CI: 1.23–1.78; p 0.01] increased probability of being underweight compared to women from urban regions. Individuals having solely a secondary education were 2.997 times [95% CI: 1.57–5.72; p 0.01] more predisposed to being underweight compared to those possessing a higher educational attainment. The analysis of the risk of these women being underweight in connection to the educational attainment of their boyfriends or spouses produced analogous findings. working mothers.⁸¹

A separate study on sociocultural and access barriers to nutrition for pregnant women in Indonesia discovered several barriers. In resource-constrained environments, females often suffer from malnutrition during infancy and adolescence, a condition that deteriorates during pregnancy. Women often bear the responsibility of meal preparation, although women are typically the last to eat and consume the least, disregarding their nutritional requirements,

particularly in the event of pregnancy. A malnourished woman is more likely to deliver infants with low birth weight and malnutrition. Stunting and the onset of noncommunicable diseases in adulthood, including obesity, hypertension, cardiovascular disease, and diabetes, are linked to prenatal nutrition and insufficient nutrition during infancy and early childhood. Approximately fifty percent of pregnant women in Indonesia are anaemic. Anaemia in pregnant women adversely affects foetal development and elevates the risk of death and morbidity for both mother and child. This has resulted in 27.67% of youngsters in the country experiencing stunted growth²³

The Indonesian government has been endeavouring to diminish stunting rates, exemplified by the August 2017 initiation of its national plan, "Integrated Nutrition Interventions for Stunting Reduction and Prevention." Nonetheless, most cultures possess a restricted comprehension of diet and its effects on pregnancy and delivery outcomes. A multi-stakeholder strategy that tackles gender norms and engages families and communities is essential for the efficacy of reduction initiatives.

Impaired health and nutrition during gestation

Despite the recent expansion in public healthcare facilities and medical experts in Nigeria, a significant percentage of women still give birth at home. Women delivering at home may lack access to qualified delivery personnel or emergency medical services, hence elevating the risk of maternal and child mortality and morbidity. Moreover, women from poorer socioeconomic backgrounds, those in high-risk categories such as the very young or elderly, anaemic

individuals, those with inadequate nutritional condition, and those with restricted access to healthcare face an elevated risk of maternal and newborn morbidity and mortality.

In certain Nigerian communities, women encounter heightened obstacles to obtaining prenatal care due to superstitious beliefs and traditions.

Disparate access to information

In numerous marginalized areas, community health centres (CHCs) serve as the principal source for the transmission of health information. In light of the ongoing epidemic, most Community Health Centres are closed to mitigate disease transmission, and essential health information is communicated through webinars, conference calls, WhatsApp, and text messaging. Although 39% of women already possess a smartphone, not all utilise the device, resulting in persistently low levels of mobile phone and technology engagement among women. Individuals with access to a device have experienced an escalation in domestic duties, resulting in insufficient time to review these communications. Consequently, women lack essential health-related information.

Disparate effects of the pandemic

In a country where women and girls face challenges in accessing essential requirements such as nutritious food, education, clean water, and sexual and reproductive health care, the limitations imposed by COVID-19 exacerbate their difficulties in obtaining these demands. Studies indicate that low- and middle-income nations are expected to experience an increase in maternal, neonatal, and infant mortality as a result of the direct and indirect impacts of COVID-19. Women are at the forefront of the epidemic, both domestically and within the healthcare sector, and they are experiencing its repercussions most intensely. Moreover, almost sixty percent of informal sector employment in Indonesia is occupied by women, posing

challenges for compliance with social distancing standards. Government responses to the epidemic must acknowledge the disproportionate impact of COVID-19 on women.

Enhancing women's health and nutrition

A multitude of activists has advocated for women's equitable representation in decision-making processes. Engaging women in domestic discussions regarding their health and nutrition is an essential initial measure for instigating change. Essential health messages should be communicated via prevalent media channels, including radio and television, alongside influential figures such as religious leaders and healthcare professionals. Significant initiatives also encompass augmenting the capacities of women's self-help organisations in towns and enlisting adolescent girls with mobile phones to disseminate nutritional information to pregnant mothers. Alongside enhancing women's understanding of maternity and child health concerns, it is imperative to educate and involve men in women's health issues. Incorporating males into Posyandu sessions effectively elucidates the distinct needs of women during and post-pregnancy.

Graphic and visual messaging communication techniques for behaviour modification have demonstrated efficacy in engaging extensive communities, particularly individuals with low literacy levels. Developing these tools for both healthcare staff at CHCs and recipients for home use can facilitate the spread of crucial health messages and key nutritional practices. This is exemplified by Nutrition International's Iron & Folic Acid (IFA) Compliance Card, created to monitor the daily IFA supplementation of pregnant women. It not only aided women in monitoring their IFA supplements but also functioned as a reminder for them and their family to consume them. Furthermore, the card was endorsed by the Ministry of Health for nationwide

implementation in the Maternal and Child Health Handbook, serving as an essential monitoring instrument for both institutional and community health workers ¹⁰⁵.

Pregnancy is a period of joy and susceptibility for every woman. For her health and the well-being of her child, it is imperative that she obtains sufficient nutrition and care. The Indonesian government has undertaken significant initiatives to enhance maternal nutrition and decrease stunting rates; nonetheless, further efforts are necessary. While efforts and resources are focused on alleviating the repercussions of COVID-19, the global community must not overlook the challenges faced by women, who already encounter significant barriers to accessing essential services, further intensified by the pandemic response. Assisting them in surmounting these challenges is essential for guaranteeing that they – and we – emerge from this global epidemic more robust, resilient, and equipped to build a superior future for everybody.

A distinct examination into the socioeconomic and nutritional status of pregnant women in Palu. This study identified a link between economic level and nutritional status among pregnant women living in temporary shelters in Talise, Palu, Central Sulawesi. The Chi-Square test indicated a significant association between socioeconomic position and nutritional status at 0.05, with $p = 0.027$. The family's capacity to get food depends on its income. Families with constrained finances are improbable to meet their nutritional requirements. Accurate data is essential for the successful management and mitigation of the significant risks associated with pregnancy. Undetected issues exacerbate, endangering both the mother and the embryo.

This elevates the rates of morbidity and mortality. Low-income households allocated 60%–80% of their income to food expenditures. Furthermore, 70–80 percent of energy was sourced from carbohydrates (rice and alternatives), whereas merely 20 percent originated from other

energy sources, including fats and proteins. Previous research indicates an association between socioeconomic class and the prevalence of Chronic Energy Deficiency (CED) among pregnant women in the Ngambon subdistrict of Bojonegoro. Conversely, Hamzah (2017) discovered in Aceh that pregnant women earning below the province minimum wage are 3.155 times more susceptible to chronic energy insufficiency compared to those with salaries beyond the provincial minimum wage. A family's income is crucial for fulfilling fundamental needs that affect its health state. Research indicates that expecting women with a low monthly household income face an 8.72 times higher chance of having CED. Furthermore, a strong association exists between monthly family income and the incidence of CED in expectant women.

In a distinct study entitled Relationship Between Socioeconomic Factors and Food Security among Pregnant Women in Iran, researchers found that 112. The individuals' ages ranged from 16 to 48 years (mean 27.6, standard deviation 5.8), their gestational ages varied from 14 to 42 weeks, and their average weight gain was 9.6 kilogrammes. The predominant educational attainment for both individuals and their spouses was high school completion, with 42.9% and 30.5%, respectively. The bulk of participants (45.5%) earned under 400,000 Rials monthly. The majority of participants (62.6%) lived in urban regions, and the remaining 37.5% resided in rural areas. The socioeconomic statistics indicated that a predominant 94.7% of participants were housewives, whilst 66.7% of their spouses were self-employed.

Approximately 30.9% of expecting women experienced food insecurity, while 69.1% had complete food security. The study indicates that food insecurity was more prevalent in households without a child under 18, exhibiting 10.4% moderate hunger, compared to 8% in families with a kid under 18. Food security had a substantial correlation with family socioeconomic status ($\gamma P = 0.000$), house size ($P = 0.000$), husband's employment status

($P = 0.002$), monthly income (gamma $P = 0.000$), and monthly food expenditures ($P = 0.000$), as indicated by statistical analyses¹¹³. The regression analysis results demonstrated that a working spouse elevated the probability of food insecurity by 28% in comparison to a self-employed husband. Families with low socioeconomic position were 53% more likely to experience food insecurity compared to those with high socioeconomic status.

In a separate investigation regarding the determinants of nutritional status, 23.8% of pregnant women were classified as acutely malnourished (MUAC 23 cm), 67.0% experienced moderate gestational weight gain (10 kg), and 12.1% were found to be anaemic (haemoglobin level 11 g/dL). The Chi-square test revealed significant associations between the age, ethnicity, education level, household income, and dietary diversity of expecting women and their MUAC. Likewise, household income, food security, and dietary diversity were substantially associated with the weight gain of pregnant women.

With the exception of dietary diversification, no demographic, social, cultural, or food security characteristics were significantly correlated with the anaemia status of pregnant women. Janajati pregnant women had a 58.9% lower likelihood of acute malnutrition (MUAC 23 cm) compared to Brahmin/Chhetri/Other pregnant women (AOR: 0.411, CI: 0.178 – 0.950, $p=0.037$). Food secure pregnant women exhibited a 60.2% reduced likelihood of experiencing low gestational weight gain compared to their food insecure counterparts (AOR: 0.398, CI: 0.170–0.928, $p=0.033$), while pregnant women with high dietary diversity demonstrated a 63.6% lower likelihood of low gestational weight gain than those with lower dietary diversity (AOR: 0.364, CI: 0.159–0.856, $p=0.016$). Pregnant women with medium dietary diversity were 65.7% less likely to be anaemic compared to those with the least dietary diversity (OR: 0.343, CI: 0.138–0.880, $p=0.021$)¹¹⁵.

2.4 Conceptual Framework

Health Belief Model

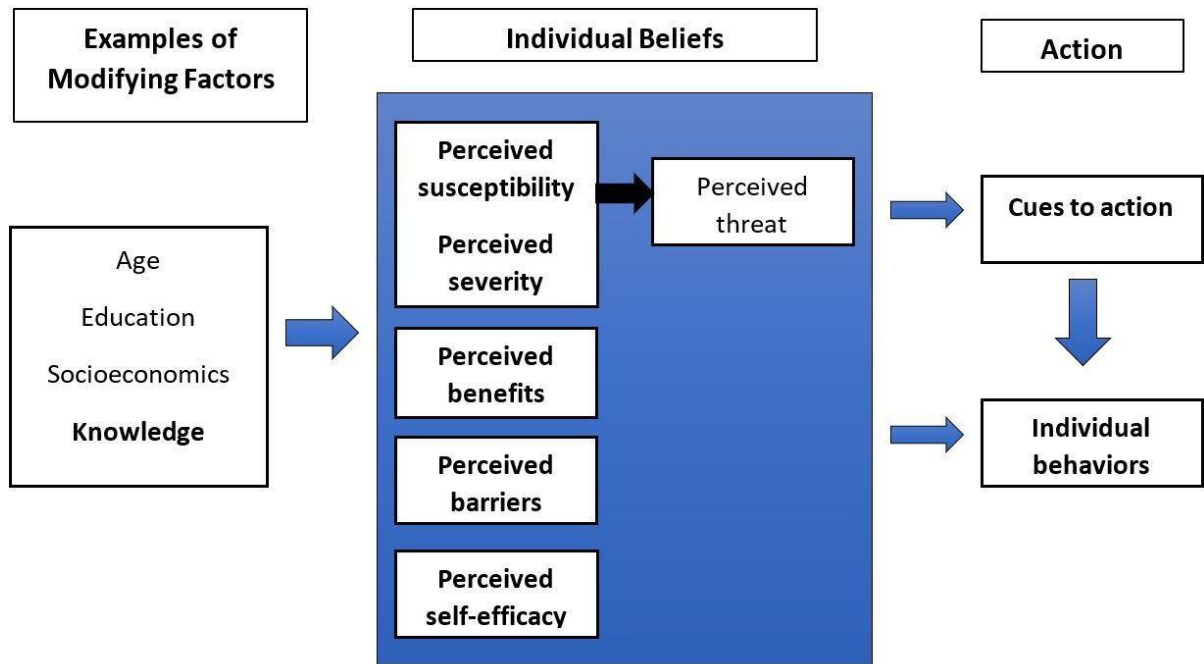


Fig 2.1: Health Belief Model

2.4.1 Application of the Health Belief Model (HBM) to assess Nutritional Status of Pregnant Women Utilizing Traditional Birth Attendants (TBAs)

Core Constructs of the Health Belief Model

Perceived Susceptibility: The conviction among pregnant women over their probability of encountering dietary deficiencies or associated health complications. This may entail evaluating their awareness of the potential dangers associated with inadequate nutrition during pregnancy.

Perceived Severity: The conviction of the gravity of the repercussions of nutritional deficits during gestation. This encompasses comprehending the extent to which women realise the consequences of inadequate nutrition for themselves and their infants.

Perceived Advantages: The conviction in the efficacy of implementing appropriate nutritional practices throughout gestation. This entails evaluating the extent to which women are convinced that proper diet will result in improved health outcomes for themselves and their infants.

Perceived Barriers: The conviction of impediments that hinder the attainment of optimal nutrition. These factors may encompass economic limitations, cultural traditions, insufficient understanding, or restricted availability of nutritional diets.

Cues to Action: Elements that initiate the decision-making process for adopting healthier dietary behaviours. This may be external (guidance from Traditional Birth Attendants, media communications) or internal (individual health issues, experiences of others).

Self-Efficacy: The conviction in one's capacity to effectively implement and sustain optimal eating habits throughout pregnancy. This entails evaluating their confidence in implementing dietary modifications and surmounting obstacles.

Beyond the fundamental elements of the Health Belief Model (HBM), modifying factors can substantially affect the health behaviours of pregnant women employing Traditional Birth Attendants (TBAs). These factors influence perceptions and eventually impact the adoption of health behaviours. Integrating modifying factors into the evaluation yields a more thorough comprehension of the context in which these women make nutritional choices.

Alterations in the Health Belief Model

Demographic Variables

Age: Distinct age cohorts may exhibit disparate levels of health literacy and nutritional understanding.

Educational Attainment: Advanced education is frequently correlated with an enhanced comprehension of nutritional requirements and habits.

Socioeconomic Status: Economic resources influence access to healthful food and healthcare services.

Parity: The quantity of prior pregnancies and deliveries may affect nutritional requirements and experiences.

Sociopsychological Determinants

Traditional ideas around pregnancy and nutrition can influence food selections.

Health Consciousness: The general disposition towards health and wellness might influence the motivation to embrace nutritious dietary habits.

Structural Elements

Understanding and Cognisance: Recognition of nutritional needs and the repercussions of inadequacies.

Access to Healthcare Services: The availability and quality of antenatal care services, particularly those offered by traditional birth attendants (TBAs).

Access to Nutritional Resources: Availability of nutritious foods and supplements, especially in rural or resource-limited areas.

Geographical Location: Closeness to marketplaces, healthcare institutions, and sources of healthful food.

2.5 Summary of Gaps in Literature Reviewed

The literature examined about the nutritional health of pregnant women utilising Traditional Birth Attendants (TBAs) in Ogun State identifies numerous critical deficiencies. Comprehensive data on the nutritional condition of pregnant women utilising the services of traditional birth attendants is scarce. Most research primarily concentrate on women utilising official healthcare services, resulting in a significant knowledge deficit concerning those dependent on traditional care. Moreover, current research frequently lacks thoroughness in comprehending the specific dietary behaviours and nutritional consumption of these women, especially about the cultural and socioeconomic aspects that affect their decisions.

Furthermore, there is insufficient investigation on the knowledge and behaviours of Traditional Birth Attendants about maternal nutrition. Comprehending the nutritional counsel offered by Traditional Birth Attendants (TBAs) and their comprehension of dietary standards is essential for evaluating the comprehensive nutritional support provided to pregnant women in their care. A further gap is the inadequate examination of the obstacles these women have in obtaining healthful foods, encompassing economic limitations, food resource availability, and cultural attitudes that may influence their dietary practices.

Furthermore, there is a significant deficiency of intervention research focused on enhancing the nutritional condition of pregnant women through the use of traditional birth attendants (TBAs). Although certain studies emphasise the necessity for nutritional education and assistance, there are limited recorded initiatives or assessed programs that cater to these requirements within the framework of traditional birth attendants. The influence of regional variations within Ogun State on nutritional status and healthcare access remains inadequately examined, despite its potential importance in determining health outcomes for pregnant women across various regions.

Targeted study addressing these gaps will enhance the understanding of the dietary problems encountered by pregnant women utilising TBAs and guide the formulation of appropriate treatments to improve their health outcomes.

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Chapter Three

Methodology

3.1 Research Design

A cross-sectional design was employed for the study.

3.2 Study Population

The study population consists of pregnant women who are accessing maternal healthcare services from Traditional Birth Attendants (TBAs) in selected Local Government Areas (LGAs) of Ogun State, Nigeria.

3.2.1 Study Area

Ogun State is located between longitude 2°45' and 4°15' east of the Greenwich Meridian and latitude 6°20' and 7°45' north of the equator. It has a population of approximately 4.6 million people, according to the National Population Commission's 2006 Census¹. The state comprises of 20 local government areas (LGAs) and is home to a diverse population, with different cultural and socio-economic backgrounds².

The study was conducted in selected Local Government Areas (LGAs) within Ogun State, Nigeria. Specific communities and healthcare facilities where Traditional Birth Attendants (TBAs) operate were identified as study sites. These sites were chosen based on accessibility, diversity of TBA practices, and representation of the population of pregnant women seeking maternal healthcare from TBAs.

3.2.2 Eligibility Criteria (Inclusion/Exclusion)

Eligibility Criteria

Inclusion Criteria:

Women of reproductive age (15-49 years).

Willingness to participate in the study and provide informed consent.

Exclusion Criteria:

Women with severe health conditions that may impact their ability to participate in the study.

3.3 Sample Size and Sampling Techniques

To determine the sample size for this study, Fisher's formula was utilized. The following variables were considered in calculating the sample size:

- A standard normal deviate (Z) of 1.96, corresponding to a 95% confidence level.
- Acceptable margin of error set at 5%.

Fisher's formula is expressed as:

$$n = \frac{Z^2 p (1 - p)}{d^2}$$

Where:

- n is the minimum sample size required.
- Z is the standard normal deviate.
- p = the estimated proportion of the population with the characteristic of interest (
- d is the margin of error.

Substituting the given values:

$$n = \frac{(1.96)^2 * 0.50(1 - 0.50)}{(0.050)^2}$$

$$n = \frac{3.8416 * 0.50 * 0.50}{0.0025}$$

$$n = 0.960$$

$$0.0025$$

$$n = 384$$

Accounting for a potential non-response rate of 10%, the final sample size calculation is adjusted as follows $384/0.9 = 428$

3.3.1 Sampling Technique

A multistage sampling technique was used to select the study participants. A purposive sampling technique was used to select 4 Local Government Areas (LGAs) in Ogun State that have demonstrated significant reliance on TBAs for maternal and child health services, based on existing health data and community surveys indicating higher rates of TBA utilization.

Once the LGAs are identified, 2 wards was purposively selected from each of the chosen LGAs, ensuring that these wards are known for their active engagement with TBAs. Within each selected ward, 3 TBAs who are actively practicing and recognized within the community was selected. Following this, 18 participants was randomly selected from each TBA, ensuring

that the sample reflects the diverse experiences and backgrounds of the women who utilize TBA services.

3.4 Description of the Research Instrument:

A structured questionnaire was developed to collect data on demographic information (age, marital status, education), socio-economic status (income, occupation), dietary intake (food frequency, diversity), and health behaviors (smoking, alcohol consumption). This provides quantitative data for analyzing associations between these factors and maternal nutritional status.

Knowledge Response by pregnant women utilizing TBAs in Ogun State was measured using a 27 question questionnaire coded 1:Correct and 0: Incorrect. Good knowledge was categorized as 60% of the correct answers.

Dietary intake of calcium, vitamin D, Energy, protein, fat, iron, Zinc, folate and vitamin B12 were assessed by validated 24-hour recalls. Nutritional intake obtained from the 24-hour recalls was analyzed using Food Processor ® (SQL 10.6 ESHA Research, Salem, OR, USA). Calcium, calcium, vitamin D, Energy, protein, fat, iron, Zinc, folate and vitamin B12 intake in the cases and the control were compared to the Dietary reference intakes (DRI) for pregnant women.

Good nutritional status, categorized by meeting the daily recommended intake for energy, protein, fats, calcium, iron, vitamin B12, zinc, folate, vitamin D, maintaining a normal Body Mass Index (BMI) and adequate MUAC.

Anthropometric measurements such as weight, height, and BMI (Body Mass Index) was taken to assess the physical nutritional status of pregnant women. These measurements was conducted using standardized procedures to ensure accuracy and reliability.

Tools for data collection include calibrated weighing scales for measuring weight, height measurement tools (stadiometers), and standardized questionnaires translated into local languages as needed to facilitate participant understanding and response accuracy.

3.5 Data Collection

Data was collected quantitative using pre-validated structured self-administered questionnaire. The instrument was administered both in Yoruba and English. Research assistants were made available for participants who need extra assistance with answering the questionnaire. This include those participants who are unable to read or write. An informed consent form was attached to the questionnaire. It explains the research study and guarantee confidentiality and the required consent from the participant to participate in the research study.

3.6 Data Analysis Plan

All data collected during the study was recorded on paper forms and then transferred onto a secure digital platform for storage and analysis. The digital data stored in a password-protected database and backed up regularly to ensure data security.

All completed copies of the questionnaire was analyzed with the use of Statistical Package for Social Sciences (SPSS) 27.0 version.

Descriptive Analysis: such as frequencies, percentages, means, and standard deviations to summarize the socio-demographic characteristics of the study participants and also for dietary intake variables (e.g., calories, macronutrients, micronutrients).

Chi-square Test: To analyze the association between TBAs' demographic characteristics (e.g., age, education) and their knowledge and practices.

Multiple Regression Analysis: To identify significant predictors of nutritional status, considering socio-economic and cultural factors.

3.7 Ethical Approval

Ethical approval for this study was obtained from Lead City University Ethical Committee and Ogun Ministry of Health Research Ethical Committee. Before acquiring informed verbal consent, each participant received an information statement. The information statement was read to the participants in order to obtain their verbal informed permission. Participants were made aware that their involvement was entirely optional and that they could opt out or withdraw their consent at any moment. Participants were advised that they could exit at any moment or simply decide not to respond to a specific question, and they were not required to answer any questions with which they felt uncomfortable. During data gathering, password-protected laptops were used to store anonymized data. Computers that were password-protected and secure were used to store data.

Endnotes

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Chapter Four

Result and Discussion of Findings

4.1 Demographics Data Analysis

Socio demography of pregnant women utilizing TBAs in Ogun State

Table 4.1 shows the socio-demographic characteristics of pregnant women utilizing Traditional Birth Attendants (TBAs) in Ogun State show that the mean age of the women was 27.13 years with a standard deviation of 5.899. Women aged 18-19 made up 9.4% (40 individuals), while those aged 20-29 were the majority at 58.6% (249). Women aged 30-39 comprised 28.7% (122), and those aged 40-49 were the smallest group at 3.4% (14). Regarding education, 8.5% (36) had no formal education, 40.9% (174) had primary education, 42.1% (179) had secondary education, and 8.5% (36) had tertiary or higher education.

Marital status showed that 29.2% (124) were single, 66.4% (282) were married, and 4.5% (19) were divorced. Ethnically, 88.2% (375) were Yoruba, while 11.8% (50) were non-Yoruba. Religious affiliation was divided between Christians at 54.6% (232) and Muslims at 45.4% (193). In terms of residence, 68.2% (290) lived in urban areas, and 31.8% (135) resided in rural areas. The distribution of gestational age showed 22.1% (94) in the first trimester, 38.1% (162) in the second, and 39.8% (169) in the third trimester. For the number of living children, 51.5% (219) had no children, 19.5% (83) had one, 16.9% (72) had two, 6.6% (28) had three, 2.8% (12) had four, and 2.6% (11) had five or more. Most women, 87.1% (370), were from nuclear families, while 12.9% (55) were from polygamous families. Family size was as follows: 9.6% (41) had one member, 44.2% (188) had two, 21.4% (91) had three, 12.0% (51) had four, and 12.5% (53) had five or more.

Regarding monthly income, 25.2% (107) earned above the minimum wage, while 74.8% (318) earned below it. Employment status showed that 49.6% (211) were gainfully employed, 12.5% (53) worked in unskilled manual jobs, 13.4% (57) were unemployed, and 24.5% (104) were self-employed. The educational level of husbands revealed that 19.8% (84) had primary education, 56.5% (240) had secondary education, 19.3% (82) had tertiary education, and 4.5% (19) had no education. Husbands' occupations were gainfully employed in 52.2% (222) of cases, 12.7% (54) worked in unskilled manual jobs, 8.2% (35) were unemployed, and 26.8% (114) were self-employed.

A history of illness during the current pregnancy was reported by 39.8% (169), while 60.2% (256) had no such history. For those with illness (n=169), 23.1% (98) experienced headaches and blurred vision, 10.6% (45) had lower abdominal pain, and 5.6% (24) had vomiting and epigastric pain. The Body Mass Index (BMI) of the women indicated that 10.1% (43) were underweight, 54.6% (232) had a normal BMI, 17.6% (75) were overweight, and another 17.6% (75) were obese. The Mid-Upper Arm Circumference (MUAC) assessment showed that 86.8% (369) were adequately nourished, while 13.2% (56) were malnourished.

Table 4.1: Socio demography of pregnant women utilizing TBAs in Ogun State

Variable	Frequency	Percentage
Age		
Mean $\pm$ SD	27.1341 $\pm$ 5.899	
18-19	40	9.4
20-29	249	58.6
30-39	122	28.7
40-49	14	3.4
Educational level		
None	36	8.5
Primary level	174	40.9
Secondary level	179	42.1
Tertiary/higher level	36	8.5
Marital status		
Single	124	29.2
Married	282	66.4
Divorced	19	4.5
Ethnicity		
Yoruba	375	88.2
Non -Yoruba	50	11.8
Religion		
Christian	232	54.6
Islam	193	45.4
Place of residence		
Urban	290	68.2
Rural	135	31.8
Gestational age		
1 st trimester	94	22.1
2 nd trimester	162	38.1
3 rd trimester	169	39.8
No of children living		
0	219	51.5
1	83	19.5
2	72	16.9
3	28	6.6
4	12	2.8
5 and above	11	2.6
Family Type		
Nuclear	370	87.1
Polygamous	55	12.9
Family Size		
1	41	9.6
2	188	44.2
3	91	21.4

4	51	12.0
5 and above	53	12.5
Monthly Income		
Above minimum wage	107	25.2
Below minimum wage	318	74.8
Occupation		
Gainfully Employed	53	12.5
Unskilled Manual Job	57	13.4
Unemployed	104	24.5
Self Employed		
Husband Educational Level		
Primary level	84	19.8
Secondary level	240	56.5
Tertiary level	82	19.3
None	19	4.5
Husband Occupation		
Gainfully Employed	222	52.2
Unskilled manual Job	54	12.7
Unemployed	35	8.2
Self Employed	114	26.8
History of illness on current pregnancy		
Yes	169	39.8
No	256	60.2
If yes kind of illness (n=169)		
Headache and blurred vision	98	23.1
Lower abdominal pain	45	10.6
Vomiting and epigastric	24	5.6
BMI		
Underweight (<18.5)	43	10.1
Normal (18.5-24.9)	232	54.6
Overweight (24.9-29.9)	75	17.6
Obesed (>30)	75	17.6
MUAC		
Adequate	369	86.8
Malnourished	56	13.2

Source: Field Survey 2024

Practices and Food Taboos among pregnant women utilizing TBAs in Ogun State

Table 4.2 below shows that among pregnant women utilizing Traditional Birth Attendants (TBAs) in Ogun State, 77.6% reported having no food taboos or cultural beliefs, while 22.4% stated they did have such beliefs. Among those with food taboos, 50.5% avoided okra, 41.1% avoided plantain/banana, 33.7% avoided snails, 28.4% avoided beverages, 8.4% avoided eggs, and 4.2% followed other taboos due to family beliefs. Regarding the frequency of visits to their TBA, the majority of women (68.2%) visited weekly, 22.8% visited twice every three weeks, 7.1% visited monthly, and 1.9% visited occasionally. A large proportion of respondents (86.1%) believed more in TBAs than in health facilities, and among them, 69.9% had a very strong belief in TBAs, while 30.1% had a strong belief.

Additionally, 85.4% of the women believed that attending a TBA would help reduce certain pregnancy or delivery complications, while 14.6% did not hold this belief.

Table 4.2: Practices and Food Taboos among pregnant women utilizing TBAs in Ogun State

Variables	Frequency	Percent (%)
You have food taboos and cultural beliefs.		
No	330	77.6
Yes	95	22.4
If yes		
Snail	32(33.7)	
Plantain/Banana	39(41.1)	
Egg	8(8.4)	
Okro	48(50.5)	
Beverages	27(28.4)	
Others (Family belief)	4(4.2)	
How Often Do you visit your TBA/FBA		
Weekly	290	68.2
Twice in 3 weeks	97	22.8
Monthly	30	7.1
Occasionally	8	1.9
I believe in TBAs/FBAs more than health facilities.		
No	59	13.9
Yes	366	86.1
if yes how strongly do you believe (n=366)		
very Strong	256	69.9
Strong	110	30.1
I believe attending TBA/FBA will help in reducing certain levels of complications during pregnancy/delivery.		
No	62	14.6
Yes	363	85.4

Source: Field Survey 2024

4.2: Presentation of Data

Research Question One: **Dietary intake of pregnant women utilizing TBAs in Ogun**

State Table 4.3 below shows the various practices of dietary intake of pregnant women utilizing Traditional Birth Attendants (TBAs) in Ogun State, 36.2% of respondents reported eating four meals per day, 34.8% ate three meals, 19.5% had five or more meals, and 9.4% ate two meals per day. While 84.0% did not skip meals, 16.0% did, with lunch being the most commonly skipped meal (41.2%), followed by breakfast (36.8%) and dinner (7.4%). A small proportion (14.7%) did not specify which meal they skipped. The main reason for meal skipping was financial constraints (36.8%), followed by time constraints (23.5%), and lack of physical access (5.9%). Other reasons included habitual behavior (4.4%), religious activities (8.8%), pregnancy-related issues (4.4%), and other minor factors (1.5%).

When comparing their food intake during pregnancy to before pregnancy, 59.1% of women ate more, 23.5% consumed the same amount, and 17.4% ate less. A large majority (93.6%) reported receiving nutritional education at the TBA, with 74.6% receiving it during every clinic visit, 13.3% monthly, and 12.1% only occasionally. Outside the TBA, 41.4% of women received nutritional education, mostly from their parents (29.5%), followed by their mother-in-law (24.4%), health workers (17.6%), and their spouse (9.1%). Other sources included friends (5.1%), herbal vendors (6.3%), the internet (4.0%), and other unspecified sources (2.3%).

Table 4.3: Dietary intake Practices among pregnancy women

Variable	Frequency	Percentage
Number of meal per day		
2	40	9.4
3	148	34.8
4	154	36.2
5 and above	83	19.5
Do you skip meal per day		
Yes	68	16.0
No	357	84.0
If yes which meal is are mostly skipped (n=68)	25	36.8
Breakfast	28	41.2
Lunch	5	7.4
Dinner	10	14.7
No response		
Reasons for meal skipping		
Time constrain	16	23.5
Lack of physical access	4	5.9
Financial constrain	25	36.8
Habitual	3	4.4
Religion activities	6	8.8
Pregnant induced	3	4.4
Others	1	1.5
Amount of food intake during pregnancy as compared to before pregnancy		
Less than before	74	17.4
Same as before	100	23.5
More than before	251	59.1
Do you receive nutritional education in this TBA/FBA		
Yes	398	93.6
No	27	6.4
If yes how often (n=398)		
Once in awhile	48	12.1
Once in a month	53	13.3
Every clinic day	297	74.6
Do you receive nutritional education elsewhere?	176	41.4
Yes	249	58.6
No		
If yes where/who (n=176)		
Parents	52	29.5
Mother-in-law	43	24.4

Spouse	16	9.1
Friends	9	5.1
Herbal vendors	11	6.3
Internet	7	4.0
Health workers	31	17.6
Others	4	2.3

Source: Field Survey 2024

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Table 4.3A show the dietary intake of participants. Among the pregnant women utilizing Traditional Birth Attendants (TBAs) in Ogun State, 45.6% had their energy intake within the Dietary Reference Intake (DRI) range of 2000-2500 Kcal per day, while 54.4% did not meet this requirement. In terms of protein intake, 73.6% fell within the recommended range of 60-110 g per day, whereas 26.4% did not.

For fat consumption, 41.4% of women were within the recommended range of 67-91 g per day, while 58.6% exceeded or fell short of this range. Regarding calcium intake, 65.4% met the DRI of 1200-2000 mg per day, but 34.6% did not.

Only 34.4% of the women met the iron DRI of 27 mg per day, with 65.6% falling short. Similarly, only 28.5% consumed the recommended amount of Vitamin B12 (2.4-2.8 µg per day), while a significant 71.5% did not. Zinc intake showed that 34.4% of the women were within the DRI of 11-12 µg per day, while 65.6% were not.

Folate intake was exceptional, with 100% of the women meeting the recommended amount of 400 µg per day plus 0.6 µg for pregnancy. For Vitamin D, 70.8% fell within the recommended intake of 10-20 µg per day, while 29.2% did not.

Table 4.3A: Dietary Intake of Participants

Variables	DRI (Standard for Pregnant women)	Within DRI	Not within DRI
Energy (Kcal/day)	2000-2500	194(45.6)	231(54.4)
Protein (g/day)	60-110	313(73.6)	112(26.4)
Fats (g/day)	67-91	176(41.4)	249(58.6)
Calcium (mg/day)	1200-2000	278(65.4)	147(34.6)
Iron (mg/day)	27	146(34.4)	279(65.6)
Vitamin B12(µg/day)	2.4-2.8	121(28.5)	304(71.5)
Zinc (µg/day)	11-12	146(34.4)	279(65.6)
Folate (µg/day)	400 +0.6	425(100)	0(0)
Vitamin D(µg/day)	10-20	301(70.8)	124(29.2)

Source: Field Survey 2024

Research Question Two: Nutritional status of pregnant women utilizing TBAs in Ogun State

Table 4.4 shows the nutritional status of participants. In examining the nutritional status of pregnant women utilizing Traditional Birth Attendants (TBAs) in Ogun State, it was found that 14.8% of the women had good nutritional status, categorized by meeting the daily recommended intake for energy, protein, fats, calcium, iron, vitamin B12, zinc, folate, vitamin D, maintaining a normal Body Mass Index (BMI) and adequate MUAC. On the other hand, the majority, 85.2%, were classified as having poor nutritional status, indicating they did not meet the necessary dietary requirements, or had an abnormal BMI or malnourished based on MUAC.

Table 4.4: Nutritional status of pregnant women utilizing TBAs in Ogun State

Nutritional Status	Frequency	Percent (%)
Good	63	14.8
Poor	362	85.2

Source: Field Survey 2024

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Research Question Three: Factors influencing the nutritional status of pregnant women who patronize TBAs in Ogun State

Table 4.5 shows the association between demographics and nutritional status of participants at the bivariate level, the analysis reveals several significant and non-significant associations between the variables and the nutritional status of pregnant women utilizing Traditional Birth Attendants (TBAs) in Ogun State.

For BMI, a significant association was observed ($P = 0.001$), showing that 85.7% of participants with normal BMI had good nutritional status, whereas those who were obese, overweight, or underweight had a lower prevalence of good nutritional status. Age did not show a significant association ($P = 0.069$), though participants aged 20-29 had the highest proportion of good nutritional status at 49.2%. Family size was not significantly associated with nutritional status ($P = 0.334$). Those with a family size of two had the highest proportion of good nutritional status at 31.7%. The number of children also showed no significant association ($P = 0.094$), although participants with one child had the highest proportion of good nutritional status at 34.9%.

Educational level of participants did not significantly influence nutritional status ($P = 0.570$), with participants having primary education showing the highest proportion of good nutritional status at 46%. Marital status also did not show a significant association ($P = 0.100$), with married participants having the highest proportion of good nutritional status at 65.1%. Religion ($P = 0.784$), ethnicity ($P = 0.525$), and place of residence ($P = 0.997$) were not significantly associated with nutritional status. Christians and Yoruba participants had slightly higher proportions of good nutritional status at 52.4% and 85.7%, respectively.

Family type ($P = 0.839$) and monthly income ($P = 0.324$) also showed no significant associations. Nuclear families and participants with below minimum wage income had the highest proportions of good nutritional status at 88.9% and 69.8%, respectively. Employment type was not significantly associated ($P = 0.205$), with gainfully employed participants showing the highest proportion of good nutritional status at 39.7%. Husbands' educational level ($P = 0.906$) and occupation ($P = 0.235$) did not significantly affect the participants' nutritional status. However, participants whose husbands had secondary education and were gainfully employed had the highest proportions of good nutritional status at 58.7% and 60.3%, respectively.

A history of illness during the current pregnancy showed no significant association with nutritional status ($P = 0.329$), and the majority of participants without illness had good nutritional status at 54%. Food taboos and cultural beliefs ($P = 0.530$) and the number of meals per day ($P = 0.437$) were not significantly associated. The highest proportion of good nutritional status was observed among those who ate four meals a day at 42.9%. Meal skipping ($P = 0.926$) also did not show a significant association, with 84.1% of those not skipping meals having good nutritional status. The overall analysis revealed that 19% of participants had good nutritional status, whereas 81% had poor nutritional status, showing no significant difference ($P = 0.424$).

Table 4.5 Bivariate Association between Demographics and Nutritional Status of Participants

Variables	Good (%)	Poor (%)	P value
BMI			0.001*
Normal	54(85.7)	178(49.2)	
Obesed	1(1.6)	74(20.4)	
Overweight	2(3.2)	73(20.2)	
Underweight	6(9.5)	37(10.2)	
Age			0.069
18-20	11(17.5)	29(8)	
20-29	31(49.2)	218(60.2)	
30-39	20(31.7)	102(28.2)	
40-49	1(1.6)	13(3.6)	
Family Size			0.334
1	8(12.7)	34(9.1)	
2	20(31.7)	168(46.4)	
3	15(23.8)	76(21)	
4	11(17.5)	40(11)	
5 and above	9(14.3)	44(12.2)	
Number of Children			0.094
0	20(31.7)	153(42.3)	
1	22(34.9)	111(30.7)	
2	12(19)	63(17.4)	
3	4(6.3)	24(6.6)	
4	5(7.9)	7(1.9)	
5 and above	0(0)	4(1.1)	
Educational Level			0.570
None	7(11.1)	29(8)	
Primary	29(46)	146(40.1)	
Secondary	22(34.9)	157(43.4)	
Tertiary	5(7.9)	31(8.6)	
Marital Status			0.100
Single	16(25.4)	108(29.8)	
Married	41(65.1)	241(66.6)	
Divorced	6(9.5)	13(3.6)	
Religion			0.784
Christian	33(52.4)	199(55)	
Islam	30(47.6)	163(45)	
Ethnicity			0.525
Yoruba	54(85.7)	321(88.7)	
Non Yoruba	9(14.3)	41(11.3)	
Place of Residence			0.997
Urban	43(68.3)	247(68.2)	
Rural	20(31.7)	115(31.8)	

Family Type			0.839
Nuclear	56(88.9)	314(86.7)	
Polygamous	7(11.1)	48(13.3)	
Monthly Income			0.324
Above Minimum wage	19(30.2)	88(24.3)	
Below Minimum wage	44(69.8)	274(75.7)	
Occupation			0.205
Gainfully Employed	25(39.7)	186(51.4)	
Unskilled manual job	9(14.3)	44(12.2)	
Unemployed	13(20.6)	44(12.2)	
Self employed	16(25.4)	88(24.3)	
Husband Educational Level			0.906
Primary	13(20.6)	71(19.6)	
Secondary	37(58.7)	203(56.1)	
Tertiary	10(15.9)	72(19.9)	
None	3(4.8)	16(4.4)	
Husband Occupation			0.235
Gainfully Employed	38(60.3)	184(50.8)	
Unskilled manual job	10(15.9)	44(12.2)	
Unemployed	3(4.8)	32(8.8)	
Self employed	12(19)	102(28.2)	
History of Illness on Current Pregnancy			0.329
No	34(54)	222(61.3)	
Yes	29(46)	140(38.7)	
Food Taboo and Cultural Belief			0.530
No	47(74.6)	283(28.2)	
Yes	16(25.4)	79(21.8)	
Number per Day			0.437
2	9(14.3)	31(8.6)	
3	18(28.6)	130(35.9)	
4	27(42.9)	127(35.1)	
5	7(11.1)	52(14.4)	
6	1(1.6)	18(5)	
7	1(1.6)	3(1)	
8	0(0)	1(0.3)	
Skipping Meals			0.926
No	53(84.1)	304(84)	
Yes	10(15.9)	58(16)	
Nutritional Status			0.424
Good	12(19)	87(24)	
Poor	51(81)	275(76)	

Source : Field Survey 2024

Table 4.5A show the regression analysis of demographic characteristics that showed association at bivariate level. The factors influencing the nutritional status of pregnant women who patronize Traditional Birth Attendants (TBAs) in Ogun State were examined using odds ratios (OR) and p-values. For BMI, compared to women with a normal BMI, obese women had 12 times higher odds of having poor nutritional status (OR = 12, 95% CI: 1.383–103.376, $p = 0.024$), and overweight women had 5.9 times higher odds of poor nutritional status (OR = 5.919, 95% CI: 1.138–30.772, $p = 0.035$). Underweight women were not significantly associated with poor nutritional status compared to normal BMI women (OR = 0.535, 95% CI: 0.214–1.334, $p = 0.180$). These results indicate that being obese or overweight significantly increases the odds of poor nutritional status among pregnant women utilizing TBAs.

Table 4.5A: Regression analysis of demographic characteristics that showed association at bivariate level

Variables	OR	P value
BMI		
Normal	0.535(0.214,1.334)	0.180
Obesed	12(1.383,103.376)	0.024
Overweight	5.919(1.138,30.772)	0.035
Underweight	1	

Source: Field Survey 2024

Research Question Four: Level of nutritional knowledge of pregnant women who patronize TBAs in Ogun State

To examine the level of nutritional knowledge of pregnant women who patronize Traditional Birth Attendants (TBAs) in Ogun State, various knowledge questions were assessed as showed in table 4.6 below. The findings indicate that 231 women (54.4%) believe there is no objection to excessive weight gain during pregnancy, while 144 (33.9%) disagreed, and 50 (11.8%) were unsure. Regarding the effect of food on birth weight, 231 (54.4%) agreed, 152 (35.8%) disagreed, and 42 (9.9%) were uncertain. A majority, 222 (52.2%), recognized that appropriate weight gain indicates adequate nutrition, while 157 (36.9%) disagreed, and 46 (10.8%) were unsure.

Most participants (337, 79.3%) acknowledged the benefits of consuming snacks to avoid long periods without food. However, only 197 (46.4%) agreed that the type of oil consumed has health effects, with 154 (36.2%) disagreeing, and 74 (17.4%) uncertain. A significant number of women (279, 65.6%) knew that iron needs to increase during pregnancy, while 100 (23.5%) disagreed, and 46 (10.8%) were unsure. Regarding dairy intake, 225 (52.9%) believed that 3–4 servings should be consumed daily, whereas 133 (31.3%) disagreed, and 67 (15.8%) were uncertain. The belief that excessive tea and coffee consumption negatively affects fetal growth was affirmed by 242 (56.9%), while 117 (27.5%) disagreed, and 66 (15.5%) were uncertain. For optimal brain development, 354 (83.3%) recognized that omega-3 can be best met through fish consumption, while 45 (10.6%) disagreed, and 26 (6.1%) were uncertain.

Most participants (327, 76.9%) agreed that legumes or eggs can replace meat, chicken, or fish in the diet. A strong majority (305, 71.8%) understood the importance of fiber-rich foods

during pregnancy. However, 129 (30.4%) believed there is no need to reduce salt intake, with 237 (55.8%) disagreeing and 59 (13.9%) uncertain. The idea that overconsumption of sweet-sugared foods is acceptable was held by 122 (28.7%), while 236 (55.5%) disagreed, and 67 (15.8%) were unsure. Many women (221, 52%) acknowledged that chickpeas, crackers, and bananas can help prevent nausea. However, 177 (41.6%) thought there was no need for vitamin and mineral supplementation during pregnancy. Regarding street-sold milk, 107 (25.2%) believed it is safe, while 217 (51.1%) disagreed, and 101 (23.8%) were uncertain.

On the risk of food poisoning during pregnancy, 202 (47.5%) agreed, while 133 (31.3%) disagreed, and 90 (21.2%) were unsure. A majority (272, 64%) recognized that vitamin C enhances iron absorption. The belief that adding salt while cooking increases iodine loss was acknowledged by 152 (35.8%), while 160 (37.6%) disagreed, and 113 (26.6%) were uncertain. Only 103 (24.4%) knew that whole wheat bread and bran bread have different nutritional values, while 220 (51.8%) disagreed, and 102 (24%) were unsure. Pre-pregnancy weight affecting pregnancy weight gain was recognized by 175 (41.2%), while 168 (39.5%) disagreed, and 82 (19.3%) were uncertain. The idea that oil is necessary for obtaining vitamin A from carrot salad was accepted by 187 (44%), with 146 (34.4%) disagreeing, and 92 (21.6%) unsure.

Lastly, a significant number of women (271, 63.8%) believed that herbal medicines and teas can be used during pregnancy, while 116 (27.3%) disagreed, and 38 (8.9%) were unsure. The need for folic acid to be taken before pregnancy was recognized by 244 (57.4%), while 137 (32.2%) disagreed, and 44 (10.4%) were uncertain.

Table 4.6: Knowledge Response by pregnant women utilizing TBAs in Ogun State

Knowledge Questions	Yes (%)	No (%)	I don't know (%)
There is no objection to excessive weight gain during pregnancy	231(54.4)	144(33.9)	50(11.8)
Food consumed during pregnancy affects the baby's birth weight	231(54.4)	152(35.8)	42(9.9)
Appropriate weight gain during pregnancy indicates adequate and balanced nutrition	222(52.2)	157(36.9)	46(10.8)
It is beneficial to consume snacks to avoid starving for a long-time during pregnancy	337(79.3)	58(13.6)	30(7.1)
There is no health effect of the consumed oil variety	197(46.4)	154(36.2)	74(17.4)
Iron needs to increase depending on the pregnancy	279(65.6)	100(23.5)	46(10.8)
3–4 servings of dairy products should be consumed daily during pregnancy	225(52.9)	133(31.3)	67(15.8)
To consume too much tea and coffee during pregnancy negatively affects the growth and development of the baby	242(56.9)	117(27.5)	66(15.5)
For baby's brain development, omega-3 is met with the best fish consumption Vitamin D is necessary for the development of baby's skeleton, bone, teeth	354(83.3)	45(10.6)	26(6.1)
When the meat, chicken, or fish is not consumed, the legumes or eggs may replace these foods	327(76.9)	74(17.4)	24(5.8)
Fiber-rich foods should be consumed during pregnancy	305(71.8)	93(21.9)	27(6.4)
There is no need to reduce salt in a healthy pregnancy	129(30.4)	237(55.8)	59(13.9)
There is no objection to overconsumption of sweet-sugared foods in pregnancy	122(28.7)	236(55.5)	67(15.8)
Chickpeas, crackers, bananas, etc. can be consumed to prevent nausea	221(52)	122(28.7)	82(19.3)
There is no need for vitamins and minerals supplementation for a healthy pregnancy	177(41.6)	196(46.1)	52(12.2)
You can consume milk sold on the street in pregnancy	107(25.2)	217(51.1)	101(23.8)
The pregnancies are at greater risk for food poisoning	202(47.5)	133(31.3)	90(21.2)
Vitamin C increases the use of iron in the body	272(64)	86(20.2)	67(15.8)
Adding salt while cooking increases the loss of iodine in the salt	152(35.8)	160(37.6)	113(26.6)
Whole wheat bread and bran bread have the same nutritional value	103(24.4)	220(51.8)	102(24)
Pre-pregnancy weight determines the weight to be taken during pregnancy	175(41.2)	168(39.5)	82(19.3)
In order to benefit from vitamin A found in carrot salad, it is necessary to put oil on salad	187(44)	146(34.4)	92(21.6)
Because herbal medicines and teas are natural, they can be used in pregnancy	271(63.8)	116(27.3)	38(8.9)

Folic acid should be started before being pregnant	244(57.4)	137(32.2)	44(10.4)
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Source: Field Survey 2024

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Level of Knowledge

Table 4.6A shows the level of nutritional knowledge among pregnant women who patronize Traditional Birth Attendants (TBAs) in Ogun State, revealing that 99 women (23.3%) had a good understanding of nutrition, while 326 women (76.7%) had poor nutritional knowledge.

Table 4.6A: level of nutritional knowledge among pregnant women who patronize Traditional Birth Attendants (TBAs) in Ogun State

Nutritional Knowledge	Frequency	Percent (%)
Good	99	23.3
Poor	326	76.7

Source: Field Survey 2024

Bivariate Association between Demographics and Nutritional Knowledge of Participants

In examining the bivariate relationships between various factors and the nutritional status of pregnant women who patronize Traditional Birth Attendants (TBAs) in Ogun State, the following results were analysed as shown in table 4.7. The table summarizes the bivariate association between demographic variables and the nutritional knowledge of participants, represented as percentages of those with good or poor nutritional knowledge, along with their corresponding p-values.

For BMI, the distribution of participants with good nutritional knowledge showed 48.5% were of normal weight, 21.2% were obese, 22.2% were overweight, and 8.1% were underweight, compared to 56.4%, 16.6%, 16.3%, and 10.7% respectively among those with poor nutritional knowledge ($p = 0.276$). Age showed that participants aged 20-29 made up the majority in both good (61.6%) and poor (57.7%) nutritional knowledge groups, with other age groups showing varied distributions. The p-value was 0.385, indicating no significant association.

For Family Size, participants with a family size of 2 made up 44.4% of those with good nutritional knowledge, and those with five or more members constituted 10.1%. In the poor knowledge group, similar distributions were noted ($p = 0.309$). Number of Children was not significantly associated with nutritional knowledge ($p = 0.420$). Most participants with good knowledge had no children (45.5%), while those with poor knowledge had varied distributions, with the highest being 39.3% for no children. Educational Level showed a significant association, with participants who had secondary education being predominant in the good knowledge group (61.6%) compared to 36.2% in the poor knowledge group ($p = 0.001^*$).

Marital Status was also significant, with 77.8% of those with good knowledge being married compared to 62.9% in the poor group ($p = 0.005^*$). Religion showed that participants were predominantly Christian in both groups, with no significant association ($p = 0.066$). Ethnicity revealed that most participants were Yoruba in both good (91.9%) and poor (87.1%) knowledge groups, with a p-value of 0.217.

Place of Residence indicated that 74.7% of participants with good knowledge resided in urban areas compared to 66.3% with poor knowledge ($p = 0.139$). Family Type had no significant association, with 89.9% of those with good knowledge coming from nuclear families ($p = 0.395$). Monthly Income showed 78.8% of those with good nutritional knowledge earned below the minimum wage, similar to 73.6% in the poor group ($p = 0.355$). Occupation had a significant association, with those gainfully employed making up 52.5% of the good knowledge group compared to 48.8% in the poor group ($p = 0.001^*$).

Husband's Educational Level was significant ($p = 0.005^*$), with secondary education being the most common level among participants with good knowledge (51.5%). Husband's Occupation also showed a significant association ($p = 0.046^*$), with 54.5% of those with good knowledge having husbands who were gainfully employed. History of Illness on Current Pregnancy was marginally significant, with 68.7% of participants with good knowledge having no illness history ($p = 0.050^*$). Food Taboo and Cultural Belief showed a significant association, with 87.9% of those with good nutritional knowledge reporting no food taboos ($p = 0.005^*$).

Number of Meals per Day was significant ($p = 0.001^*$), with 34.3% of those with good knowledge consuming 3 meals daily. Skipping Meals had a strong association with nutritional

knowledge ($p = 0.001^*$), as 96% of those with good knowledge did not skip meals. Nutritional Status was not significantly associated with nutritional knowledge ($p = 0.424$).

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Table 4.7: Bivariate Association between Demographics and Nutritional Knowledge of Participants

Variables	Good (%)	Poor (%)	P value
BMI			0.276
Normal	48(48.5)	184(56.4)	
Obesed	21(21.2)	54(16.6)	
Overweight	22(22.2)	53(16.3)	
Underweight	8(8.1)	35(10.7)	
Age			0.385
18-19	6(6.1)	34(10.4)	
20-29	61(61.6)	188(57.7)	
30-39	27(27.3)	95(29.1)	
40-49	5(5.1)	9(2.8)	
Family Size			0.309
1	7(7.1)	35(10.7)	
2	44(44.4)	144(44.2)	
3	20(20.2)	71(21.8)	
4	18(18.2)	33(10.1)	
5 and above	10(10.1)	43(13.2)	
Number of Children			0.420
0	45(45.5)	128(39.3)	
1	28(28.3)	105(32.2)	
2	19(19.2)	56(17.2)	
3	6(6.1)	22(6.7)	
4	0(0)	12(3.7)	
5 and above	1(1)	3(0.9)	
Educational Level			0.001*
None	7(7.1)	29(8.9)	
Primary	23(23.2)	151(46.3)	
Secondary	61(61.6)	118(36.2)	
Tertiary	8(8.1)	28(8.6)	
Marital Status			0.005*
Single	22(22.2)	102(31.3)	
Married	77(77.8)	205(62.9)	
Divorced	0(0)	19(5.8)	
Religion			0.066
Christian	46(46.5)	186(57.1)	
Islam	53(53.3)	140(42.9)	
Ethnicity			0.217
Yoruba	91(91.9)	284(87.1)	
Non-Yoruba	8(8.1)	42(12.9)	
Place of Residence			0.139
Urban	74(74.7)	216(66.3)	

Rural	25(25.3)	110(33.7)	0.395
Family Type			
Nuclear	89(89.9)	281(86.2)	0.355
Polygamous	10(10.1)	45(13.8)	
Monthly Income			0.001*
Above Minimum wage	21(21.2)	86(26.4)	
Below Minimum wage	78(78.8)	240(73.6)	0.005*
Occupation			
Gainfully Employed	52(52.5)	159(48.8)	0.046*
Unskilled Manual Job	5(5.1)	48(14.7)	
Unemployed	4(4)	53(16.3)	0.050*
Self Employed	38(38.4)	66(20.2)	
Husband Educational Level			0.005*
Primary	14(14.1)	70(21.5)	
Secondary	51(51.5)	189(58)	0.046*
Tertiary	31(31.3)	51(15.6)	
None	3(3)	16(4.9)	0.046*
Husband Occupation			
Gainfully Employed	54(54.5)	168(51.5)	0.046*
Unskilled Manual Job	7(7.1)	47(14.4)	
Unemployed	7(7.1)	28(8.6)	0.046*
Self employed	31(31.3)	83(25.5)	
History of Illness on Current Pregnancy			0.050*
No	68(68.7)	188(57.7)	
Yes	31(31.3)	138(42.3)	0.005*
Food Taboo and Cultural Belief			
No	87(87.9)	243(74.5)	0.001*
Yes	12(12.1)	83(25.5)	
Number per Day			0.001*
2	2(2)	38(11.7)	
3	34(34.3)	114(35)	0.001*
4	27(27.3)	127(39)	
5	25(25.3)	34(10.4)	0.001*
6	11(11.1)	8(2.5)	
7	0(0)	4(1.2)	0.001*
8	0(0)	1(0.3)	
Skipping Meals			0.001*
No	95(96)	262(80.4)	
Yes	4(4)	64(19.6)	0.424
Nutritional Status			
Good	12(12.1)	51(15.6)	0.424
Poor	87(87.9)	275(84.4)	

Source: Field Survey 2024

4.3 Discussion of Findings

Findings from this study showed that 77.6% reported having no food taboos or cultural beliefs, while 22.4% stated they did have such beliefs. This finding is consistent with the findings of a study conducted in the Eastern Cape of South Africa, which found that 37% of women followed local cultural practices influenced by food taboos and beliefs, with some of the restricted foods being highly nutritious and potentially influencing prenatal nutrition¹. However, another study found that these taboos and beliefs influence the dietary decisions and practices of expectant women, which may affect their nutritional intake and health during pregnancy². Furthermore, findings also show that among those with food taboos, 50.5% avoided okra, 41.1% avoided plantain/banana, 33.7% avoided snails, 28.4% avoided beverages, 8.4% avoided eggs, and 4.2% followed other taboos due to family beliefs. This pattern of food avoidance during pregnancy has also been observed in other African nations, where complete food groups are sometimes avoided³. However, the specific reasons why various communities avoided these foods varied. In Grand Popo, Benin, for instance, pregnant women are prohibited from ingesting foods rich in carbohydrates, animal proteins, and micronutrients, which contributes to high levels of protein and calorie malnutrition among children and pregnant women in the country⁴.

Findings also show that about 69.9% had a very strong belief in TBAs, while 30.1% had a strong belief. This suggests that the majority of the study population places a high level of confidence and trust in TBAs for their maternal healthcare needs. Such strong beliefs may stem from several factors, including the long-standing presence and embedded role of TBAs in these communities. They are often seen as the primary and, at times, the only accessible maternal

healthcare providers, especially in rural settings where modern healthcare facilities may be limited or too far to reach⁵.

The study also showed that 36.2% of respondents reported eating four meals per day, 34.8% ate three meals, 19.5% had five or more meals, and 9.4% ate two meals per day. While 84.0% did not skip meals. Poor diets deficient in essential minerals such as calcium, zinc, iron, folate, and iodine during pregnancy can res. This is consistent with research done in Northern Nigeria that found that most women (44%) consume three meals a day, with those who eat more than three meals a day coming in second (42%). Just 14% of expectant mothers consume fewer than three meals daily⁶

ult in anemia, pre-eclampsia, hemorrhage, and maternal mortality. Additionally, they may result in wasting, low birthweight, stillbirth, and developmental problems in children.

. Findings from this study showed that most women only 45.6% met the energy intake recommendation, 73.6% met the protein requirement, and 65.4% achieved adequate calcium intake. However, only 34.4% met the iron intake recommendation, and 28.5% consumed sufficient Vitamin B12. All participants met the folate requirement, while 70.8% achieved the recommended Vitamin D intake. This is similar with a study conducted in China that state that most pregnant women had imbalanced macronutrient distribution⁸.

It was also found that 14.8% of the women had good nutritional status, categorized by meeting the daily recommended intake for energy, protein, fats, calcium, iron, vitamin B12, zinc, folate, vitamin D, and maintaining a normal Body Mass Index (BMI). Women's nutritional status is unacceptable in many regions of the world. Too many women, particularly teenagers and those who are nutritionally vulnerable, do not receive the nutrition services they require to be healthy

and provide the best possible chance for their unborn children to live, develop, and thrive⁷. The study finds a statistically significant association between Body Mass Index (BMI) and nutritional status. This finding aligns with existing literature that highlights the importance of maintaining a healthy weight during pregnancy⁹. Being either underweight or overweight/obese can have negative consequences for both the mother and the developing fetus⁹.

Findings from this study also showed that 76.7% had poor nutritional knowledge, The study finds statistically significant associations with education level, marital status, occupation, husband's education level, food taboos, the number of meals consumed per day, and meal skipping. This is corroborated by a study done in Southern Ethiopia that found pregnant women had poor levels of knowledge, attitude, and practice about nutrition in this location. The study also found that women's educational status was related to their knowledge, attitude, and practice. Knowledge was also linked to occupation and parity, and attitude was discovered to be a driver of nutritional practice¹⁰.

Endnotes

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Chapter Five

Conclusion

5.1 Summary of Findings

The study investigates the socio-demographic characteristics and nutritional knowledge of pregnant women utilizing Traditional Birth Attendants (TBAs) in Ogun State. The findings reveal that the mean age of the respondents is 27.13 years, with a significant majority (58.6%) aged between 20-29 years. Educationally, 42.1% have completed secondary school, while 40.9% have primary education. The marital status indicates that most women are married (66.4%), and the predominant ethnic group is Yoruba (88.2%). In terms of religion, 54.6% identify as Christian, and a majority (68.2%) reside in urban areas. The distribution of gestational age shows that 39.8% are in their third trimester. Findings highlight that a significant portion of pregnant women utilizing TBAs in Ogun State do not meet the recommended dietary intake for several essential nutrients, including energy, iron, Vitamin B12, and zinc.

Only 14.8% of pregnant women using TBAs in Ogun State have good nutritional status. Findings reveals that BMI is significantly associated with nutritional status. Pregnant women with a normal BMI tend to have better nutritional status. Other factors, including age, family size, number of children, education level, marital status, religion, ethnicity, place of residence, family type, monthly income, occupation, husband's education, meal skipping, food taboos, and the number of meals per day, did not show statistically significant associations with nutritional status. A large proportion of pregnant women who utilize TBAs in Ogun State have poor nutritional knowledge (76.7%). Factors significantly associated with good nutritional knowledge included secondary education level, being married, specific occupations, husbands

having secondary or tertiary education, holding certain food taboos and cultural beliefs, consuming 3-4 meals daily, and not skipping meals.

5.2 Conclusion

In conclusion, the study highlights the critical role of Traditional Birth Attendants (TBAs) in providing nutritional advice and support to pregnant women in Ogun State. It reveals significant gaps in the nutritional knowledge and dietary intake of these women, which are closely linked to their socio-demographic characteristics and economic constraints. The findings underscore the importance of addressing these gaps through targeted educational interventions, ongoing training for TBAs, and collaborative efforts with healthcare providers.

The study emphasizes that improving the nutritional status of pregnant women is essential for ensuring healthy outcomes for both mothers and their babies. By fostering a better understanding of nutrition and enhancing access to nutritious foods, we can mitigate the risks associated with poor dietary practices during pregnancy.

Ultimately, the recommendations provided aim to create a supportive framework that empowers pregnant women, enhances the capabilities of TBAs, and promotes healthier communities. Continued research and monitoring will be vital in assessing the effectiveness of these interventions and ensuring that the nutritional needs of pregnant women are met, thereby contributing to improved maternal and child health in the region.

5.3 Recommendation

Based on the findings of the study, the following recommendations are proposed:

- 1 Implement targeted nutritional education programs for pregnant women, focusing on the importance of a balanced diet and essential nutrients. These programs should be culturally sensitive and accessible, utilizing community resources to reach women effectively.
- 2 Provide ongoing training and workshops for TBAs to enhance their knowledge of maternal nutrition and dietary guidelines. This will empower them to offer accurate nutritional advice and support to pregnant women in their care.
- 3 **Community Awareness Campaigns:** Launch community awareness campaigns to promote the significance of proper nutrition during pregnancy. These campaigns can utilize local media, community gatherings, and health fairs to disseminate information and encourage healthy eating practices.
- 4 **Collaboration with Healthcare Providers:** Foster collaboration between TBAs and healthcare providers to create a referral system for pregnant women who require more comprehensive nutritional support. This partnership can help bridge the gap between traditional practices and modern healthcare.
- 5 **Nutritional Support Programs:** Establish nutritional support programs that provide food supplements or vouchers for pregnant women, particularly those identified as having poor nutritional status. This can help address immediate dietary deficiencies and improve overall health outcomes.
- 6 Implement strategies to address economic barriers that prevent pregnant women from accessing nutritious foods. This could include subsidies for healthy food options or community gardens to increase the availability of fresh produce.

5.4. Contribution to Knowledge

The study contributes to knowledge in several significant ways:

Understanding Nutritional Knowledge Gaps: It provides valuable insights into the level of nutritional knowledge among pregnant women who utilize Traditional Birth Attendants (TBAs) in Ogun State. By quantifying the percentage of women with good versus poor nutritional knowledge, the study highlights the urgent need for educational interventions.

Role of Traditional Birth Attendants: The research underscores the pivotal role of TBAs in maternal health, particularly in providing nutritional advice. It identifies TBAs as key resources within their communities, capable of influencing dietary practices among pregnant women, thus contributing to the literature on the integration of traditional and modern healthcare practices.

Socio-Demographic Influences: The study explores how socio-demographic factors, such as education level, marital status, and economic conditions, impact nutritional knowledge and dietary intake. This adds to the understanding of how these variables can affect maternal health outcomes and informs future interventions tailored to specific demographic groups.

Link between Nutrition and Health Outcomes: By establishing a connection between poor nutritional knowledge and inadequate dietary intake, the study emphasizes the importance of nutrition in maternal and fetal health. This contributes to the broader discourse on maternal nutrition and its implications for health policy and practice.

5.5 Suggestions for Further Research

Based on the findings and conclusions of the study, the following suggestions for future research are proposed:

Longitudinal Studies on Nutritional Interventions: Conduct longitudinal studies to assess the long-term effects of nutritional education and interventions on the health outcomes of pregnant women and their infants. This could help determine the sustainability and effectiveness of various programs over time.

Comparative Studies across Regions: Investigate the differences in nutritional knowledge and practices among pregnant women utilizing TBAs in different regions or countries. This could provide insights into how cultural, economic, and healthcare system variations influence maternal nutrition.

Role of Family and Community: Examine the influence of family members and community leaders on the nutritional choices of pregnant women. Understanding these dynamics could enhance the effectiveness of educational programs by involving key influencers in the community.

Integration of Traditional and Modern Practices: Research how to effectively integrate traditional nutritional practices with modern dietary guidelines. This could help bridge the gap between TBAs and healthcare providers, ensuring that pregnant women receive comprehensive and culturally appropriate nutritional advice.

Effectiveness of Training Programs for TBAs: Assess the effectiveness of various training programs for TBAs in improving their knowledge and ability to provide nutritional advice.

This could help identify best practices and areas for improvement in TBA training.

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Biography

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- 160.

Study ID: Appendix A

Informed Consent Form

Name and Affiliation of Researcher

This study is being conducted by Halimat Abosede OGUNSANYA, Department of Public Health, Faculty of Basic Medical and Applied Sciences, Lead City University, Ibadan, Oyo State, Nigeria. **Title of Research:**

Nutritional Status and Associated Factors of Pregnant Women Utilizing Traditional Birth Attendants (TBA) IN Ogun State, Nigeria.

Purpose(s) of Research

The purpose of this research is to assess the nutritional status of pregnant women utilizing Traditional Birth Attendants (TBAs) in Ogun State, Nigeria.

Procedure of the research, what shall be required of each participant and approximate total number of participants that would be involved in the research:

A total of 428 pregnant women who patronises Traditional Birth Attendants will be interviewed through questionnaire.⁴ Local governments in Ogun State will be selected based on their high rate of patronage of TBAs shown in the data available with the Alternative Medicine Board in the State.³ TBAs will then be selected from each of the 2wards and 18 TBAs who are well known for their high client flow in each ward.

You will be interviewed using a validated structured questionnaire. You will be asked questions about the food you eat in the last 24 hours; your weight and height will be taken to be able to calculate your Body Mass Index (BMI)

Risk(s)

No disadvantages or harm are expected for you because of your participation in the study. Answering the questions takes like half an hour; if you become tired we do not have to complete the interview or we can re-schedule the interview to another day.

Cost of participating, if any, of joining the research

Your participating in this research will cost you nothing but just a little of your time.

Benefit(s)

The goal of this research is to assess the Nutritional Status of Pregnant Women Patronizing TBAs in Ogun State. The findings of this research would create awareness on the Nutritional Status of the Women and be able to take informed decisions at the Alternative Medicine Board to improve or maintain the Nutritional Status of these Pregnant Women thereby reducing Maternal and Child Mortality in the State.

All information collected in the study would be given code number and no name will be collected. You are however, assured that your response will be treated in utmost confidentiality and for only academic and research purpose.

Voluntariness: Your participation in this research is entirely voluntary.

Consequence of participant's decision to withdraw from research:

You are very free to withdraw at any stage of the research if you so wish as there are no conflict of interest whatsoever.

Statement of person giving consent:

I have read the description of the research. I understand that my participation in this research is voluntary. I know the purpose, methods, risks and benefits of the research study to judge that I want to participate in it. I understand that I may freely stop being part of the study at any time. I have a copy of the consent form.

Name.....

Signature.....

Date.....

Detailed Contact Information

This research has been approved by the Ethics committee of Lead City University, Ibadan and Permission given by the Alternative Medicine Board, Oke-Mosan, Abeokuta, Ogun State. In addition, if you have any question about your participation in this research, you can contact the Principal Investigator,

Name: OGUNSANYA, Halimat Abosede

Department: Public Health, Lead City University Ibadan, Oyo State

Phone number: 08032098585 Email Address: olumibosede2003@gmail.com

If you wish to participate in this study, please sign in the space provided below. Your signature will indicate willingness to participate.

Thanks.

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Lead City University, Ibadan

Assessing the Nutritional Status of Pregnant Women utilizing Traditional Birth Attendants (TBAs) in Selected Local Government Areas (LGAs) in Ogun State, Nigeria

Questionnaire

Dear Respondent

I am a postgraduate student of Lead City University, carrying out research on the above topic

Acceptance to answer the questionnaire will be taken as consent to participate in the study. All information will be treated confidentially and your name is not required on the questionnaire.

Instructions

Please tick ☒ the appropriate box option applicable in question below. You tick on or more boxes as appropriate

SECTION A: DEMOGRAPHIC DATA

Instruction: Kindly tick (☒) or fill in the space which best represent your response(s) to the questions

1. Age as at last birthday : _____
2. Educational level: None ☐ Primary level ☐ Secondary level ☐ Higher / Tertiary level ☐
3. Marital status: Single ☐ Married ☐ Divorced ☐ Widowed ☐ Separated ☐
4. Ethnicity : Yoruba ☐ Ibo ☐ Hausa ☐ Others ☐
5. Religion: Christian ☐ Islam ☐ Traditionalist ☐ Others (specify) _____
6. Place of residence: Urban ☐ Rural ☐
7. Gestational age in weeks: _____
8. Number of children ever born: _____
9. Number of children living: _____
10. Family type : Nuclear family ☐ polygamous family ☐
11. Family size: _____
12. Monthly income _____
13. Occupation: Professional/Managerial () Clerical Job () Sales and Services () Clerical Job () Skills Manual Job () Unskilled Manual Job () Agricultural () Unemployed () Self-employed () Housewife ()
14. Husband's educational Level Primary Level () Secondary Level () Tertiary Level () None ()

15. Husband's occupation: Professional/Managerial () Clerical Job () Sales and Services ()
Clerical Job () Skills Manual Job () Unskilled Manual Job () Agricultural () Unemployed ()
Self-employed ()
16. History of illness on current pregnancy Yes () No ()
17. If yes, Kind of illness Headache and blurred vision () Lower abdominal pain () Vomiting and epigastric pain ()

SECTION B: Anthropometry Measurements (To be measured and filled by the Research Assistant)

18. Weight: _____(kg) Height: _____(m) Body mass index (BMI) _____(kg/m²) Mid-upper arm circumference (MUAC) measurement (in centimeters) _____

SECTION C: CULTURAL FACTORS

19. Do you have any food taboos and Cultural beliefs : Yes [] No []
20. If yes to question 19, tick as appropriate to you;
PREGNANT WOMEN SHOULD NOT EAT;
21. Snails: Yes [] No [] I don't know []
22. Plantain/ Banana: Yes [] No [] I don't know []
23. Eggs: Yes [] No [] I don't know []
24. Okra: Yes [] No [] I don't know []
25. Beverages: Yes [] No [] I don't know []
26. Others (specify) _____
27. Other beliefs about food restrictions during pregnancy (kindly state)
28. Do you attend Traditional Birth Attendants (TBAs)/Faith Birth Attendant (FBAs) during pregnancy Yes [] No []
29. How often do you attend; weekly () twice in 3 weeks () monthly () occasionally ()
30. Do you believe in TBAs/FBAs than health facilities Yes [] No []
31. If yes, How strongly do you believe; very strong () strong () not strong ()
32. Do you believe attending TBAs /FBAs will help in reducing certain level of complication during pregnancy/delivery; Yes [] No []

SECTION D: ASSESSMENT OF DIETARY INTAKE

Please read the under listed statements carefully and indicate by ticking [] as appropriate to you

DIETARY INTAKE OF PREGNANT WOMEN:

33. Number of meal per day _____
34. Do you skip meal per day Yes [] No []
35. If yes ; which meal(s) is /are mostly skipped (choose only one) : Breakfast []
Lunch [] Dinner []
36. Reason(s) for meal skipping: Time constrain [] Lack of physical access []
Financial constrain [] Habitual [] Religion activities [] Pregnant Induced
37. Bowel Irritation [] Fear of macrocosmic baby [] other _____
38. Amount of food intake during pregnancy as compared to before pregnancy;
Less than before [] Same as before [] More than before []
39. Do you receive nutrition education in this TBA/FBA? Yes [] No []
40. If Yes, how often: Once a while [] Once a month [] Every clinic day []
41. Do you receive nutrition education elsewhere? Yes [] No []

42. If yes, where/who? Parents [] Mother-in-law [] Spouse [] Friends []
 Herbal vendors [] Media [] Internet [] Health workers [] Books [] Others
 (specify)_____

FOOD FREQUENCY QUESTIONNAIRE

43. In a typical week how often do you eat/ drink the following food / drink?

FOOD GROUP	DAILY	FREQUENTLY (4-6 times/week)	OCCASIONALLY (1-3 times/ week)	NEVER
GRAINS AND CEREALS				
Maize and maize products (pap, golden morn, corn flakes)				
Rice and rice products (tuwo shinkafa)				
Wheat and wheat products (bread, spaghetti, semovita, noodles etc)				
Sorghum				
Oats				
Guinea corn				
Millet				
Others (specify)				
STARCHY ROOTS AND TUBERS				
Cassava and products (garri, eba, fufu, lafun)				
Yam and products				
Potatoes (Sweet/Irish) and products				
Plantain and products				
Others (specify)				
LEGUMES				
Beans and products (moinmoin, akara, gbegiri, baked beans)				
Locust beans				
Soy beans and products (tofu/wara, soy milk)				
Others(specify)				
NUTS AND SEEDS				
Peanuts/Groundnuts and products (Groundnut soup, peanut butter)				
Cashew nuts				
Coconut				

Melon				
Dika nut/ Bush mango (Ogbono)				
Kola nut				
Tiger nut and dates				
Others (specify)				
VEGETABLES				
Green leafy vegetables (ugwu,soko,ewedu,tete,green etc)				
Okro				
Cabbage				
Cucumber				
Tomatoes, pepper, onions				
Carrots				
Others (specify)				
FRUITS				
Citrus (orange,tangerine)				
Mango				
Pawpaw				
Pineapple				
Apple (local, green, red)				
Banana				
Water melon				
Avocado				
Agbalumo				
Others(specify)				
MEAT, POULTRY AND FISH				
Beef				
Poultry (chicken, turkey, duck)				
Fish				
Pork				
Snail				
Offals (inu eran)				
Eggs and products				
Goat meat				
Bush meat				
Others (specify)				
MILK AND PRODUCTS				
Evaporated milk				
Powdered milk				
Yoghurt				
Fresh milk				
Others (specify)				

FATS AND OIL				
Butter/Margarine/Mayonnaise				
Vegetable oil				
Palm oil				
Groundnut oil				
Others (specify)				
NON-ALCOHOLIC BEVERAGES				
Tea (Lipton, top tea etc)				
Cocoa (milo, bournvita, ovaltine etc)				
Ginger drink				
Soft drinks (cocacola, pepsi etc)				
Others (specify)				
ALCOHOLIC BEVERAGES				
Beer				
Wines and spirit				
Local wines (palm wine, ogogoro etc)				
Others (specify)				
SWEETS AND DESSERTS				
Sugar				
Honey				
Ice cream				
Chocolate				
Jam				
Others (specify)				
SPICES AND CONDIMENTS				
Salt				
Maggi				
Curry, thyme etc				
Ginger, garlic, turmeric etc				
Others (specify)				

Food - intake practice

In this section, I would like to ask you about particular dish you may eat on their own or as part of a dish.

48. Yesterday during the day or the night, did you eat any of the following? *Please tick all the food you ate.* Liver ☐ Kidney ☐ Heart ☐ Beef ☐ Chicken ☐ Goat ☐ Fish ☐ Seafood, prawns, crayfish ☐ Sweet potato ☐ Soyabeans ☐ Fortified breakfast cereals ☐ Whole wheat flour ☐ Others _____

49. Do you usually eat fresh Vitamin C fruits: Orange, Lemon, Pineapple, Watermelon, Mango or juice made from them? Yes ☐ No ☐ Others _____

50. If yes, do you eat them (fresh citrus fruits) every day? Yes ☐ No ☐ Not sure ☐
51. When do you usually eat fresh citrus fruit? Before meals ☐ during meal ☐ after meal ☐ anytime ☐
52. Do you usually drink coffee or tea? Yes ☐ No ☐ Others _____
53. If yes, do you drink coffee/ tea every day? Yes ☐ No ☐ Not Sure ☐
54. When do you usually drink coffee/ tea? 2 hours before meal ☐ during meals ☐ 2 hours or more after meal ☐ Right before meal ☐ Right after meal ☐ Never ☐ Others _____

24-HOUR DIETARY RECALL QUESTIONNAIRE

	Type of Food Consumed	Portion size
... Before breakfast?		
... For breakfast?		
... Between breakfast and lunch?		
... For lunch?		
... Between lunch and dinner?		

... For dinner?		
... After dinner?		
During the last day or night, did you eat any fruit, vegetables or snacks which you did not mention?	If yes, specify:	

SECTION E: NUTRITIONAL KNOWLEDGE

Instructions: Please tick (✓) in the column that reflects your opinion. Yes or No

Items	Yes	No	I don't know
1. There is no objection to excessive weight gain during pregnancy			
2. Food consumed during pregnancy affects the baby's birth weight			
3. Appropriate weight gain during pregnancy indicates adequate and balanced nutrition			
4. It is beneficial to consume snacks to avoid starving for a long-time during pregnancy			
5. There is no health effect of the consumed oil variety			
6. Iron needs to increase depending on the pregnancy			
7. 3–4 servings of dairy products should be consumed daily during pregnancy			
8. To consume too much tea and coffee during pregnancy negatively affects the growth and development of the baby			
9. For baby's brain development, omega-3 is met with the best fish consumption Vitamin D is necessary for the development of baby's skeleton, bone, teeth			

10. When the meat, chicken, or fish is not consumed, the legumes or eggs may replace these foods			
11. Fiber-rich foods should be consumed during pregnancy			
12. There is no need to reduce salt in a healthy pregnancy			
13. There is no objection to overconsumption of sweet-sugared foods in pregnancy			
14. Chickpeas, crackers, bananas, etc. can be consumed to prevent nausea			
15. There is no need for vitamins and minerals supplementation for a healthy pregnancy			
16. You can consume milk sold on the street in pregnancy			
17. The pregnancies are at greater risk for food poisoning			
18. Vitamin C increases the use of iron in the body			
19. Adding salt while cooking increases the loss of iodine in the salt			
20. Whole wheat bread and bran bread have the same nutritional value			
21. Pre-pregnancy weight determines the weight to be taken during pregnancy			
22. In order to benefit from vitamin A found in carrot salad, it is necessary to put oil on salad			
23. Because herbal medicines and teas are natural, they can be used in pregnancy			
24. Folic acid should be started before being pregnant			

Biodata

A. Personal Data

Name : Ogunsanya Halimat Abosedo
Sex: Female
Date of Birth: 20th March, 1977
State of Origin: Ogun State
Local Government: Abeokuta South
Marital Status: Married
Religion: Christianity
Discipline: Public Health
Nationality: Nigerian
Number of Children: 3
Address: 24, kuto Market road, kuto, Abeokuta
Telephone: 08032098585
Email: olumibosedo2003@gmail.com

B. Educational Institutions Attended with Dates

2022	Lead city University, Ibadan	MPH in view
2021 - 2022	Lead city University, Ibadan	PGD Public Health
2003 - 2006	Federal University of Agriculture Abeokuta	B.Sc. Nutrition & Dietetics
1997 - 2000	Moshood Abiola Polytechnic	OND Food Science & Technology

C. Working Experience

Ogun State Primary Health Care Development Board	2010 till date
Ministry of Education, Ogun State	1997 - 2010

D. Professional Membership:

Nutrition Society of Nigeria (NSN)
Institute of Dietetics of Nigeria (IDN)

Association of Public Health &Community Health Worker

E. Publications : Nil

F. Major Conferences Attended with Dates

Training on Maternal and Child Health	2010
Management of Childhood Diarrhea using Zinc and ORS	2012
Bottlenecks in the Health Systems	2013
Communication for Development for Nutrition programs	2013
Nutrition in Emergency	2019
Community Management of Acute Malnutrition	2020
Maternal, Infant and Young Child Nutrition Training of Trainers	2024

G. Referee:

Dr Ogunsola Ayowole Elijah

Executive Secretary,

Primary Health Care Board, Ogun State

07036775698

Dr Seye Onabanjo

Department of Nutrition and Dietetics

Federal University of Agriculture, Abeokuta.

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Signature

Date