

**KNOWLEDGE OF MATERNAL NUTRITION AND FOOD  
CONSUMPTION PATTERN AMONG PREGNANT WOMEN  
ATTENDING ANTENATAL CLINICS IN IBADAN,  
OYO STATE**

**BY**

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## ABSTRACT

Good nutrition is fundamental for any pregnancy. Its importance exceeds beyond helping an expectant mother remain healthy, but also impacts the development of the foetus and ensures that the baby thrives in infancy and beyond. Maternal malnutrition is ranked as one of the major causes of maternal mortality. Knowledge of maternal nutrition is, therefore, an essential component to guarantee positive pregnancy result. The dimension of information about the nourishing needs during pregnancy will influence the food choice and consumption pattern. This study is therefore designed to investigate the knowledge on maternal nutrition and consumption pattern of women attending secondary antenatal clinics in Ibadan, Oyo State.

The study was a descriptive cross-sectional study using validated semi-structured self-administered questionnaire. Three hundred pregnant women consented to participate in the study through a multi-stage sampling technique. A 10-point knowledge scale was used to assess the knowledge of maternal nutrition into three categories:  $\geq 8$  was classified as a good knowledge, a score of  $\geq 5 < 8$  was considered as fair knowledge while  $< 5$  was classified as having poor knowledge. Data collected were analysed using counts, mean, standard deviation, percentages, and Chi-square at  $p < 0.05$  level significance.

Age of respondents was  $29.5 \pm 4.9$  years. The results indicated that about 70% of the respondents were ages 25-34 years. The majority (71.0%) had tertiary education, while 26.7% had secondary education, 35.7% earned income through petty trading, while 27.0% were civil servants. Respondents, (87.0%) had good knowledge, 11.3% had fair knowledge, while 1.7% had poor knowledge on maternal nutrition. Information on maternal nutrition was mostly obtained from the nurses in antenatal clinics. On food intake, 52.0% got their energy source from rice 2-3 times a week, followed by semolina (51.0%) and bread (48.3%). For protein intake, 53.3% consumed *moinmoin* 2-3 times a week, followed by bean cake (45.3%). Orange (55.3%), Apple (39.3%), Water Melon (38.0%), Banana (37.3%) and Green Leafy vegetable (39.3%) accounted for the mostly consumed fruits and vegetables on a daily basis. Food of animal origin, fish (79.7%), meat (63.0%) and eggs (63.3%) were consumed daily, while snail and turkey were consumed occasionally by 37.0% and 37.3%, respectively. Most (90.0%) of the respondents ate pastries, 85.0% ate nuts, and 70.7% ate savory. Few (23.0%) of the respondents consumed pastries twice, while 40.0% of the respondents ate more than three times a day. There were

no significant relationships between the socio-demographic characteristics of respondents, knowledge of maternal nutrition, and the number of times respondents eat per day.

Good knowledge was documented among the study population as well as daily and weekly consumption of protein, vegetables, and fruits. Pregnant women should be exposed to continuous information on healthy eating and guided in making appropriate food choices to consolidate their knowledge.

**Keyword:** Maternal nutrition, Nutrition-related knowledge, Consumption pattern,  
Pregnant women

**Word count:** 448

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## DEDICATION

This work is dedicated to God Almighty

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**Olamide Comfort OYEDOKUN**

## **CERTIFICATION**

This is to certify that this study was conducted by Olamide Comfort OYEDOKUN in the Department of Health Promotion and Education, Faculty of Public Health, College of Medicine, University of Ibadan, Nigeria under my supervision.

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## TABLE OF CONTENTS

Title page	i
Abstract	ii
Dedication	iv
Acknowledgement	v
Certification	vi
Table of contents	vii
List of Tables	ix
List of Figures	x
Glossary of Abbreviations	xi
Definition of terms	xii

### CHAPTER ONE: INTRODUCTION

1.1	Background to the study	1
1.2	Statement of the problem	3
1.3	Justification	4
1.4	Research Questions	5
1.5	General Objectives	5
1.6	Specific Objectives	5
1.7	Hypotheses	6

### CHAPTER TWO: LITERATURE REVIEW

2.1	Concept of Nutrition	7
2.2	Concept of Maternal Nutrition	8
2.3	Concept of Pregnancy	10
2.4	Maternal Nutrition Needs during Pregnancy	11
2.5	Knowledge on Maternal Nutrition	19
2.6	Sources of information on Maternal Nutrition	21
2.7	Food Consumption Pattern of Pregnant Women in Nigeria	22
2.8	Conceptual framework	24

### **CHAPTER THREE: METHODOLOGY**

3.1	Study design	26
3.2	Study area	26
3.3	Study population	26
3.4	Sample size determination	27
3.5	Inclusion criteria	27
3.6	Exclusion criteria	27
3.7	Sampling technique	28
3.8	Instrument for data collection	30
3.9	Validation of instrument	30
3.10	Reliability of instrument	30
3.11	Data collection procedure	31
3.12	Data management and analysis	31
3.13	Ethical consideration	32
3.14	Limitation of the study	33

### **CHAPTER FOUR: RESULTS**

4.1	Socio-demographics	34
4.2	Knowledge on Maternal Nutrition during Pregnancy	38
4.3	Sources of information on Maternal Nutrition	42
4.4	Pattern of Food Consumption	44
4.5	Statistical tests of hypotheses	57

### **CHAPTER FIVE: DISCUSSIONS OF FINDINGS**

5.1.1	Respondents' socio-demographics characteristics	61
5.1.2	Knowledge on Maternal Nutrition during Pregnancy	61
5.1.3	Sources of Information on Maternal Nutrition	62
5.1.4	Consumption Pattern of Pregnancy Women	63
5.2	Implication of study for health promotion and education	66
5.3	Conclusion	67
5.4	Recommendations	68
	References	69
	Appendices	75



## LIST OF TABLES

Table 2.1	Pregnancy weight gain recommendation	13
Table 3.1	Population of registered pregnant women and respondents by secondary health facility in Ibadan	29
Table 4.1	Socio-demographic characteristics of respondents	35
Table 4.2.1	Proportion of response about statement on maternal nutrition during pregnancy	39
Table 4.2.2	Knowledge level of participants on maternal nutrition during pregnancy	41
Table 4.3	Respondents' sources of information on maternal nutrition	43
Table 4.4.1	Pattern of Consumption of Cereals and Grains	45
Table 4.4.2	Pattern of Consumption of Roots and Tubers	46
Table 4.4.3	Pattern of Consumption of Legumes and Pulses and Oil Seed	47
Table 4.4.4	Pattern of Consumption of Vegetables and Fruits	48
Table 4.4.5	Pattern of Consumption of Fish and Meat Products	49
Table 4.4.5	Pattern of Consumption of Beverages	50
Table 4.4.6	Pastries, Nut and Savory Consumption	52
Table 4.5.1	Relationship between respondents' socio-demographics and knowledge of maternal nutrition	58
Table 4.5.2	Number of times respondents eats per day by socio-demographic variables	60

## LIST OF FIGURES

Figure 2.1	Distribution by undernutrition/overnutrition among Nigerian women—2003 versus 2013	9
Figure 2.2	PRECEDE Model	25
Figure 4.1.1	Monthly income of respondents	36
Figure 4.1.2	Respondent's level of Education	37
Figure 4.4.1	Weekly Pastries Consumption Frequency	54
Figure 4.4.2	Dating Eating Frequency	56

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## GLOSSARY OF ABBREVIATIONS

RDA	Recommended daily allowance
GDA	Gestational Diabetes
SGA	Small-for-gestational-age
IOM	Institute of Medicine
ANC	Antenatal clinic
HIV	Human Immunodeficiency Virus
WHO	World Health Organization
IDA	Iron Deficiency Anaemia
DRI	Dietary Reference Intakes

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## DEFINITION OF TERMS

**Knowledge:** This is the awareness and understanding that one has gained about nutrition during pregnancy.

**Maternal nutrition:** This refers to the nutritional needs of women during the antenatal and postnatal period and also may refer to the pre-conceptual period.

**Food consumption Pattern:** refers to the nutritional well-being of women and the meal pattern.

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# CHAPTER ONE

## 1.0. INTRODUCTION

### 1.1 Background to the study

Good nutrition is vital for any pregnancy and not only helps an expectant mother remain healthy but also impacts the development of the fetus and ensures that the baby thrives in infancy and beyond. During the course of pregnancy, at specific times where rapid growth and development of fetal organs and tissue occur, essential nutrients must be available in required amounts to achieve an optimal pregnancy outcome (Brown, 2011).

According to Brown (2011), the nutritional status of the mother is distinct among other factors affecting fetal growth and development that are within our control to modify, which makes healthy eating important during pregnancy. The factors that influence food choices vary, some of which includes, hunger, cost, income, availability, education, cooking skills, time, culture, mood, knowledge, attitude, and beliefs amongst others (European Food Information Council, 2006).

Pregnancy is a lifecycle that requires adjustment to nutrition (Brown, 2011). The physiology changes that occur during pregnancy create a need for an increase in certain nutrients more than for others. The nutritional needs for energy, protein, and micronutrients significantly increase, adequate intake of iron, folate, zinc, calcium, iodine, vitamin A, C, and D are also important for the health of both women and their infants. If these nutritional needs are not met, infants could suffer from development problems and may be at risk of heart disease, diabetes, hypertension, and other health problems during adulthood may be influenced by maternal nutrition during pregnancy (The Borgen Project, 2015). Evidence has shown that maternal nutrition during pregnancy can exert long-lasting effects on the health of the offspring. Studies on Type 2 diabetes and obesity have revealed the vital importance of diet during pregnancy and the mechanism by which it influences the long term health of the offspring (United Nations General Assembly, 2015).

Malnutrition represents a situation of nutritional imbalance consisting of undernutrition – intake of food deficient in macronutrients (calories and protein) and sometimes micronutrients (multivitamins and minerals) – and overnutrition – intake of nutrient poor

diet in spite of excess calorie. Reports have it that undernutrition is responsible for the death of approximately 1.5 million women and children annually worldwide, while over-nutrition contributes immensely to the increasing global morbidity and mortality from diet-related non-communicable diseases (NCDs)(FAO, IFAD, UNICEF, WFP, and WHO, 2017).

Micronutrient deficiency is caused by inadequate stores or intake of vitamins or minerals, which can have adverse effects on the mother, such as anemia, hypertension, complications of labor, and even death. The growing fetus is not spared from the negative consequences, which includes stillbirth, pre-term delivery, intrauterine growth retardation, congenital malformations, reduced immunocompetence, and abnormal organ development(Black, 2001). Anemia is an indicator of both poor nutrition and poor health. Pregnant women are particularly vulnerable to anemia because of the increased need for iron during pregnancy to produce more blood for the supply of oxygen to the growing fetus. Inadequate iron intake can lead to iron deficiency anemia (IDA) which is a contributory factor to poor pregnancy and birth outcomes in developing countries as it predisposes to premature delivery, increased perinatal mortality and increased risk of death during delivery and postpartum (Osungbade and Oladunjoye, 2012). WHO Global Health Observatory, 2017, indicated that 35% of women of reproductive age (15–49 years old) in Africa are anemic, ranking the continent one of the highest in the prevalence of anemia (FAO, IFAD, UNICEF, WFP, and WHO, 2017).

The occurrence of nutritional deficiency as a result of dietary habits and patterns is higher during pregnancy compared to other stages of life because of the increase in demands for the nutrient to support the process (Adikari, Sivakanesan, Wijesinghe, and Liyanage, 2016). Several studies have shown a significant positive relation between socio-demographic variables and nutritional knowledge among pregnant women (Factors, Woreda, Zone, Daba, and Beyene, 2013). In addition, a study conducted by (Oluleke, Ogunwale, Arulogun, and Adelekan, 2016), it was discovered that older women had a better knowledge of dietary intake during pregnancy compared with younger women. This was attributed to the fact that they have gained experience and knowledge over time. Therefore, nutritional education is important, particularly for pregnant women concerning nutrition during pregnancy.

Dietary factors such as presence or absence of food restrictions, overall quality of the diet, feeding habits, dietary indiscretions and inadequate knowledge of nutrition have been documented as independent variables associated with pregnancy outcome and maternal weight gain in pregnancy (Campbell and Campbell, 2008). Maternal diets during pregnancy cannot be over-emphasized as it has a long-lasting impact on the health status of the mother and growing fetus. Studies have shown that inadequate dietary intake in pregnancy can lead to poor pregnancy outcomes.

Studies assessing the consumption pattern and dietary habits of pregnant women have been carried out in Nigeria. A study among pregnant women in Odeda Local Government Area of Ogun State documented that 52% got their energy source from rice on a daily basis, followed by pap (38%) and Eko (34%). For protein intake, 36% consumed bean cake on a daily basis, while 66% consumed Moi-Moi 2-3 times a week. Orange (48%) and green leafy vegetable (40%) were the most consumed fruit and vegetable on a daily basis. Fish (76%), meat (58%) and eggs (30%) were the food of animal origin consumed daily while chicken and snail were consumed occasionally by 54% and 42% respectively (Ademuyiwa and Sanni, 2013).

A study on dietary habits of pregnant women in Ogun East documented the top four snacks most often consumed by pregnant women in descending order, which include: meat pie, sausage rolls, biscuits, and egg rolls. The choice of food items consumed are flour-based products, which are often energy-dense, but of sub-optimal nutritive value (Sholeye, Badejo, and Jeminusi, 2014).

## **1.2 Statement of the problem**

Malnutrition is ranked as one of the major causes of maternal mortality, and it is a major determinant of a successful pregnancy and a healthy well-nourished baby (Sholeye et al., 2014). A woman's chance of dying from pregnancy and childbirth in Nigeria is 1 in 13, and the neonatal death rate represents a quarter of the total number of deaths of children under-five (UNICEF, 2016). A fetus in the womb of a malnourished woman is deprived of adequate nutrient for optimal growth and development and susceptible to infection, cognitive impairment, retarded growth, poor vision and adult-related predisposition of disease (The Borgen Project, 2015).

The national nutrition and health survey reported a total of 6.9 percent of Nigerian women of reproductive age as acutely malnourished and 3.8 percent as severely malnourished (NBS, 2018). In the developing world, including Nigeria, the maternal mortality rate is estimated as 450/100000 live births and 30/100000 live births in the developed world. The increase in the rate of pregnant mothers suffering from malnutrition and a high maternal mortality rate creates an urgency for maternal nutrition interventions. Some pregnant women have difficulty in making appropriate food choices and have inadequate knowledge of the nutritional benefit of the food that they consume daily. It is important for women to have the proper nutrients in their diets, such as foods with folic acid, iron, calcium, protein, vitamin B12, vitamin C, vitamin D, and vitamin A, to maintain their body and support the growth of their baby (Cox and Phelan, 2008).

Evidence-based interventions are needed to address maternal nutritional needs during pregnancy, which is one of the targets of sustainable development goals in reducing the global maternal mortality ratio, neonatal mortality, and end preventable deaths of newborns. Even though research has been conducted on nutritional knowledge among pregnant women, but the majority have focused on accessing the knowledge of sources of key nutrient. There is a gap in knowledge on the nutritional requirement and consequences of malnutrition on pregnancy outcome.

It is, however, pertinent to lay emphasis on information that helps pregnant women get enough nutrients to fuel the baby's growth and maintaining a healthy weight for better pregnancy outcomes. This study aims at assessing their knowledge of maternal nutrition and consumption pattern during pregnancy.

### **1.3 Justification of the study**

The physiology changes that occur during pregnancy create a need for an increase in certain nutrients and avoid certain foods that can harm the growth and development of the fetus. It is therefore important that the pregnant woman be knowledgeable in nutrition in relation to her health and fetus so as to make informed choices that will have a positive impact on the pregnancy.

Women play a major role in determining the nutritional status of a household. Most often than not, they are responsible for the choice and preparation of foods. This implies that the nutritional status and health of members of the household is dependent on the level of knowledge of the mother. The nutritional status of a mother during pregnancy affects the



health of the child when it is born up until adulthood. Therefore, it is expedient to address malnutrition among women, most especially pregnant mothers. This is important because, at the pregnancy stage, the nutritional status of a mother can be modified to prevent maternal-child morbidity and mortality.

Good maternal nutrition is necessary to achieve the sustainable goal especially to meet the target of reduction of global maternal mortality ratio to less than 70 per 100,000 live births and reduce neonatal mortality to at least as low as 12 per 1,000 live births and under-5 mortality to at least as low as 25 per 1,000 live births(United Nations General Assembly, 2015).

The anticipated results of this study will be useful to health professionals, especially health workers in antenatal clinics, to pass across appropriate nutritional messages during antenatal clinics to help pregnant women make a better food choice. It will help the government and policymakers to make informed decisions while planning evidence-based health programs targeted at pregnant women to make healthy dietary choices.

#### **1.4 Research Questions**

This study provided answers to the following questions:

1. What is the level of knowledge of pregnant women on maternal nutrition?
2. What are the sources of information on maternal nutrition among pregnant women?
3. What is the pattern of food consumption of pregnant women?

#### **1.5 General Objective**

The broad objective of this study was to investigate the knowledge of maternal nutrition and consumption pattern of pregnant women attending antenatal clinics in Ibadan, Oyo State.

#### **1.6 Specific objectives**

The specific objectives were to:

1. assess the level of knowledge of pregnant women on maternal nutrition.
2. determine the sources of information on maternal nutrition among pregnant women.
3. determine the pattern of food consumption of pregnant women.

## 1.7 Hypotheses

The null hypotheses formulated for this study were

**Hypothesis 1:** There is no significant association between socio-demographic characteristics of respondents and knowledge on maternal nutrition.

**Hypothesis 2:** There is no significant association between socio-demographic characteristics of respondents and the number of times respondents eat per day.

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## CHAPTER TWO

### 2.0 LITERATURE REVIEW

#### 2.1 Concept of Nutrition

Nutrition, according to Brown (2011), is an interdisciplinary science focused on the study of foods, nutrients, and other food constituents and health. World Health Organization (“WHO | Nutrition,” 2014) defined nutrition as the intake of food, considered in relation to the body’s dietary needs. Good nutrition is characterized by an adequate, well-balanced diet combined with regular physical activity, which is a cornerstone of good health. Whereas poor nutrition can lead to reduced immunity, increased susceptibility to disease, impaired physical and mental development, and reduced productivity (WHO 2014).

Zimmerman and Snow (2012) also defined nutrition as the sum of all processes involved in how organisms obtain nutrients, metabolize them, and use them to support all of life’s processes. Food is a basic need which has to be taken inadequately and in the right proportion for optimal health. Nutrients are gotten from food that we eat and are required for body function and maintenance of overall health. An adequate diet is one that contains nutrient-dense foods. Examples of nutrient-dense foods are fruits and vegetables, lean meats, poultry, fish, low-fat dairy products, and whole grains as oppose to eating “empty calorie foods” like sugary carbonated beverages.

A balanced diet ensures that one nutrient is not consumed at the expense of others. For example, Vitamin A is essential during pregnancy, but excess intake has been linked to birth defects. Cox and Phelan, emphasized that finding a balance between getting enough nutrients to fuel the fetus growth and maintain a healthy weight, which is important for the health of the baby and mother. Calorie control involves monitoring food portions to ensure that energy consumed from foods meets the energy expenditures required for body functions and activity to maintain optimal weight during pregnancy. Moderation refers to not eating to the extreme; neither too much nor too little. Variety involves eating different foods from all the food groups. This helps to ensure that all the nutrients necessary for a healthy diet are consumed (Zimmerman and Snow, 2012).

## 2.2 Concept of Maternal Nutrition

Maternal nutrition refers to the nutritional needs of women during the antenatal and postnatal period (i.e., when they are pregnant and breastfeeding) and to the time period before conception. (DiGirolamo, 2013). It focuses on the periods before, during, between, and after pregnancy, including the period of lactation.

Malnutrition refers to nutritional imbalance consisting of under-nutrition—intake of food deficient in macronutrients (calories and protein) and sometimes micronutrients (multivitamins and minerals)—and over-nutrition—intake of nutrient poor diet in spite of excess calorie (Adinma et al., 2017). The prevalence of maternal under-nutrition during pregnancy has been associated with poor pregnancy outcomes in developing countries. The National Demographic Health Survey (NDHS) 2013 report indicates that under-nutrition among women aged 15–49 years in Nigeria showed only minimal improvement over a 10-year period, with a 4% decrease from 2003 to 2013. Whereas, the trends in over-nutrition grew worse, with the 2003 value of 21% increasing to 25% in 2013, as shown in Figure 2.1.

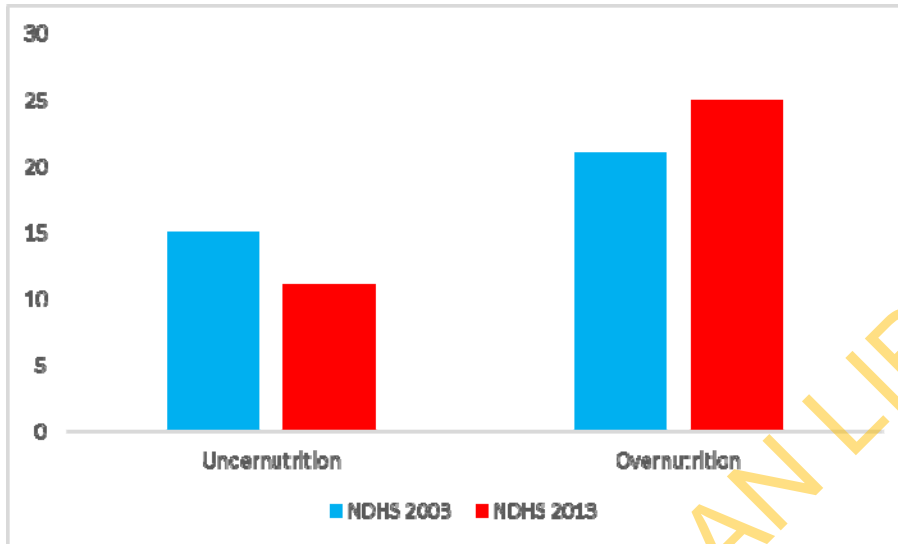


Figure 2.1: Distribution by undernutrition/overnutrition among Nigerian women—2003 versus 2013

The overall nutritional status of a woman before and after conception have an influence on pregnancy outcomes. Maternal under-nutrition is characterized by a body-mass index of less than 18.5 kg/m<sup>2</sup>. Maternal under-nutrition is evident in most countries in sub-Saharan Africa, south-central and south-eastern Asia, and in Nigeria, where 11% of women of reproductive age have a body-mass index of less than 18.5 kg/m<sup>2</sup>. A woman with short stature is at risk of poor birth outcomes and obstetric complications. Short stature has been associated with small pelvic size, which increases the likelihood of difficulty during delivery and the risk of bearing low birth weight babies. A woman is considered to be at risk if her height is below 145 cm (NPC/ICF, 2014). Obesity is a public health problem among Nigerian women, as evident in the increasing trend of over-nutrition. The National Demographic Health Survey (NDHS) 2013 report indicates that seventeen percent of women are overweight (BMI of 25-29 kg/m<sup>2</sup>), and 8 percent are obese (BMI of 30 kg/m<sup>2</sup> or above).

According to Morrison and Regnault (2016), poor maternal nutritional intake after the periconceptional period during pregnancy can negatively impact fetal genetic growth trajectory and can result in fetal growth restriction. Inadequate nutrition can also cause insufficient nutrition to reach the fetus, intrauterine growth retardation, preterm labors, growth retardation, some inherited malformations, and pregnancy complication (Widiastuti, Mutyara, and Siddiq, 2015).

### **2.3 Concept of Pregnancy**

Zimmerman and Snow (2012) described pregnancy as a developmental marathon that lasts for about forty weeks. It begins with the first trimester (weeks one to week twelve), extends into the second trimester (weeks thirteen to week twenty-seven), and ends with the third trimester (week twenty-eight to birth). According to Cetin and Laoreti (2015), pregnancy represents a unique époque in life with considerable potential to influence not only maternal health but also the health of the next generation.

The process of conception begins when the sperm cell fertilizes an egg cell, creating a zygote. After fertilization, the fertilized ovum and early blastocyst appear to detect and respond to the nutritional quality of the fallopian tube environment, even before implantation. During this time, and throughout the first 10 weeks of gestation, nourishment of the developing fetus seems to be provided solely by the fluid produced by

the glands of the endometrium. This is significant as all organ differentiation takes place by 11 weeks of gestation. (Gurský, Perejda, and Varga, 2018).

The nine (9) months of pregnancy represent the most intense period of growth and development humans ever experience (Brown, 2011). Although the outcome of this process is dependent on many factors, most of which are modifiable. However, maternal nutritional status stands out of the factors affecting fetal growth and development that are within our control to change. The risk for the developing fetus of developing the adult-onset disease is determined, at least in part, by maternal nutritional status at conception, during pregnancy, and in early infancy.

The fetal strategy of limiting growth in the absence of adequate nutrition creates an infant with higher insulin response to food and less growth of muscle (including the heart), nephrons, and bone. If the diet improves in infancy or childhood, this infant will gain weight at a higher-than-normal rate and will be at higher risk of type 2 diabetes and the metabolic syndrome (Barker, 2008). When the infant grows into adulthood, the lower number of nephrons and cardiac cells will set the stage for hypertension and cardiac failure, which is evident in the alarming increase in non-communicable diseases. Therefore, maternal nutrition must be optimized before conception, so that the preimplantation and early differentiation environment is ready to support early fetal and initial placental development.

#### **2.4. Maternal Nutritional Needs during Pregnancy**

The nutritional needs of women differ at every stage. The period of pregnancy is the most critical, as it places a lot of psychological, metabolic, and nutritional demands on the woman (Adinma, Umeonih, and Umeh, 2017). Nutrient requirements during pregnancy are not static. They vary during the course of pregnancy depending on prepregnancy nutrient stores, body size and composition, physical activity levels, stage of pregnancy, and health status. For the most part, nutrient needs can be and are optimally met by consuming well balanced, adequate, and healthful diets consisting of basic foods. Healthful diets established during pregnancy can last well beyond pregnancy and benefit health for life (Brown, 2011).

Therefore, women of child-bearing ages should maintain good nutritional status through a lifestyle that optimizes maternal health and reduces the risk of birth defects, suboptimal fetal growth and development, and chronic health problems in their children. The key

components of a health-promoting lifestyle during pregnancy include appropriate weight gain, appropriate physical activity, and consumption of a variety of foods in accordance with the dietary guidelines for pregnancy, appropriate and timely vitamin and mineral supplementation, avoidance of alcohol, tobacco, and other harmful substances, and safe food handling(Kaiser and Allen, 2008).

#### **2.4.1. Weight Gain Recommendation during pregnancy**

Pre-pregnancy weight status influences the relationship between weight gain and birth weight. The higher the weight before pregnancy, the lower the weight gain needed to produce healthy-sized infants. Underweight women tend to retain some of the weight gained in pregnancy for their own needs. Hence, they need to gain more weight in pregnancy than do other women to reduce their risk of delivering low-birth-weight babies. Overweight and obese women, on the other hand, are able to use a portion of their energy stores to support fetal growth, so they need to gain less (Brown, 2011).

Recommended weight gains for women of entering pregnancy underweight, normal-weight, overweight, and obese are displayed in Table 4.1



<b>Pre-pregnancy Weight Status Body Mass Index</b>	<b>Recommended Weight Gain</b>
Underweight, <18.5 kg/m <sup>2</sup>	12.7–18.2 kg
Normal weight, 18.5–24.9 kg/m <sup>2</sup>	11.4–15.9 kg
Overweight, 25–29.9 kg/m <sup>2</sup>	6.8–11.4 kg
Obese, 30 kg/m <sup>2</sup> or higher	5.0–9.1 kg
Twin pregnancy	11.4–24.5 kg

**Table 4.1: Pregnancy weight gain recommendations**

*Adapted from the Institute of Medicine's Nutrition during Pregnancy*

While deficiencies in nutrition during pregnancy can result in adverse offspring outcomes, once pregnant, maternal weight gain during and after pregnancy are critical issues for maternal and fetal health as well. Poor weight gain, particularly in the third trimester, may result not only in low birth weight but also infant mortality and intellectual disabilities. Hence, it is fundamental for a pregnant woman to maintain a healthy weight, and her weight prior to pregnancy has plays a vital role (Zimmerman and Snow, 2012). However, it is suggested that factors that may impede adequate weight gain should be screened for among pregnant women, along with monitoring of weight gain over the course of pregnancy (National Academy of Sciences, 1992).

#### **2.4.2. Energy**

Energy requirements increase during pregnancy, mainly due to increased maternal body mass and fetal growth. The additional energy increment needed to support appropriate weight gain during pregnancy is 90 to 125 kcal/d in the first trimester, 286 to 350 kcal/d in the second trimester, and 466 to 500 kcal/d in the third trimester (Butte and King, 2005). This translates to 10% to 25% increase in caloric intake actually needed to support a healthy pregnancy which invalidates the old adage “eating for two.” In order to meet with the increased demands during pregnancy, more effort should be geared towards a shift from low-nutritional calories into more nutrient-dense calories compared to increased caloric intake.

Physical activity levels are also a determinant of the additional calorie needs during pregnancy. The calorie intake needs of women who perform little exercise are lower compared to those with a higher level of physical activity. Low levels of energy expenditure from physical activity are common in the first trimester of pregnancy, and the energy savings may produce a positive caloric balance even though there are no significant changes in a woman’s caloric intake (Brown, 2011).

Higher energy intake is associated with increased maternal weight gain, increased risk of hypertension, gestational diabetes, cesarean deliveries, macrosomia (birth weight >4500 g) and childhood obesity in the offspring. Conversely, inadequate energy intake is associated with small-for-gestational-age (SGA or low birth weight (LBW; <2500 g). SGA is associated with an increased risk of adult metabolic diseases, including type 2 diabetes.

### **2.4.3. Protein**

During pregnancy, extra protein is needed for the synthesis of new maternal and fetal tissues. Protein builds muscle and other tissues, enzymes, antibodies, and hormones in both the mother and the unborn baby. Additional protein also supports increased blood volume and the production of amniotic fluid. The RDA of protein during pregnancy is 71 grams per day, which is 25 grams above the normal recommendation. High protein supplementation or balanced protein supplementation is not helpful and may be harmful to the pregnancy (Kramer and Kakuma, 2003) whereas balanced energy/protein supplementation appears to lead to a lower risk of small-for-gestational-age (SGA) births, as well as a small increase in mean birth weight and maternal weight gain (Kramer, 2000; Kramer, 2005; Ota, Tobe-Gai, Mori, and Farrar, 2012). Meats, poultry, seafood, eggs, milk and dairy products, beans, lentils, nuts, and seeds are rich sources of dietary protein. Protein, in smaller amounts, is also found in vegetables and grains.

### **2.4.4 Carbohydrate**

Pregnant women need the energy provided by carbohydrates to grow a healthy baby, as glucose, derived from carbohydrate, is the main fuel used for intrauterine growth (Clapp III, 2002). The recommended daily allowance, or RDA, of carbohydrates during pregnancy is about 175 to 265 grams per day to fuel fetal brain development. The best food sources for pregnant women include whole-grain bread and cereals, brown rice, root vegetables, legumes, and fruits. These and other unrefined carbohydrates provide nutrients, phytochemicals, antioxidants, and fiber. These foods also help to build the placenta and supply energy for the growth of the unborn baby.

According to Brown, (2011) citing Eskes (1998), sources of carbohydrates that do not contain added sugars and fat tend to be less energy-dense than foods that do and may help women manage pregnancy weight gain. All women, including pregnant women, should limit their intake of these sugars, as well as foods that have high amounts of added sugar such as candy, desserts, and sugar-sweetened beverages (soda, juice, lemonade, sweetened teas, and other fruit-flavored drinks).

### **2.4.5. Fat**

Fats are part of a healthy diet during pregnancy. Fat is primarily used as an energy source by the body but is also used to transport the fat-soluble vitamins A, D, E, and K and to

provide essential fatty acids that cannot be synthesized by the body. Although there is no DRI for fat specific to pregnancy, however, pregnant women are advised to follow the normal nutritional guidelines which suggest keeping total dietary fat intake to between 25% and 35% of total calories, and those calories should come from healthy fats, such as avocados. Foods with unhealthy fats, including French fries and other fast food, should be avoided. Also, it is not recommended for pregnant women to be on a very low-fat diet since it would be hard to meet the needs of essential fatty acids and fat-soluble vitamins. Fatty acids are important during pregnancy because they support the baby's brain and eye development. In particular, the brain depends on omega-3 and omega-6 fatty acids, such as the kind found in salmon and sunflower or safflower oil, for function, structure, and growth. Fats can also help the placenta grow and may help to prevent premature birth and low birth weight (Zimmerman and Snow, 2012).

#### **2.4.6. Water**

The large increase in water need during pregnancy necessitates the importance of monitoring fluid intake. According to the IOM, pregnant women should drink 2.3 liters (about 10 cups) of liquids per day to provide enough fluid for blood production. Women who engage in physical activity in hot and humid climates should drink enough to replace fluid lost to perspiration. Water, diluted fruit juice, iced tea, and other unsweetened beverages are good choices for staying hydrated (Zimmerman and Snow, 2012).

#### **2.4.7. Iron**

Maternal iron stores at conception are a strong predictor of maternal iron status and risk of iron deficiency and anemia in later pregnancy. The World Health Organisation (WHO) estimated that 44.6% of all pregnant women in Africa within ages 15 – 49 years are anaemic. It was estimated that about 58% of pregnant women in Nigeria have a blood haemoglobin concentration of less than 110 g/L. A severe situation that calls for public health intervention (WHO, 2015).

There is an increasing need for iron during pregnancy to produce more blood for the supply of oxygen to the growing fetus. Inadequate iron intake can lead to iron deficiency anemia (IDA), which is a contributory factor to poor pregnancy and birth outcomes in developing countries (Osungbade and Oladunjoye, 2012). Pregnant women are advised to

take 1.9 mg of iron per 1,000 kcal of dietary energy in the second trimester and 2.7 mg/1,000 kcal in the third trimester.

Sources of dietary iron include meat, fish, and poultry; other sources, though in less quantity, are cereals, dairy products, fruits and vegetables. About 40% of the iron content of meat, fish, and poultry is in the haem form, out of which about 25% is absorbed (ACC/SCN, 2001) whereas only about 2 - 5% of total iron is absorbed from cereals and legumes. However, there is a low intake of these foods, especially meat, fish, and poultry among people of low socioeconomic status. In addition, some of the foods are avoided or are seen as taboos for religious or cultural reasons in certain communities.

#### **2.4.8. Folate**

Folate, derived from food, and folic acid, the synthetic form of folate found in vitamin supplements, is a water-soluble B vitamin. Folate/folic acid is required for neural tube development occurring within 28 days of conception. (Lowensohn, Stadler, and Naze, 2016). Folate requirements increase dramatically during pregnancy due to the extensive organ and tissue growth that takes place (Brown, 2011). Folate is needed for the formation of the brain and spinal cord. At the 28th day of gestation, the neural tube closes by day 28 of gestation when there a pregnant woman is deficient in folate, this might not take place and an opening at the lower end of the spine causes spina bifida, whereas a larger defect can lead to anencephaly (complete failure of the brain to develop).

However, there is a need for supplementation, as it is hard to achieve the recommended dietary allowance from food only (Cox and Phelan, 2008). They, however, mentioned that supplements are advised to be able to achieve the daily recommendation of 600micrograms of folic acid. Foods rich in folate include beans, peas, orange juice, and green leafy vegetables.

#### **2.4.9. Iodine**

Iodine requirements during pregnancy are increased because of a 50% increase in maternal thyroid (T4) hormone production. Fetal thyroid-stimulating hormone is not synthesized until the 10th to 12th week of gestation, about the same time that the fetal thyroid is capable of concentrating iodine and synthesizing iodothyronine. There is also an increased loss of iodine in the urine during pregnancy. Iodine is required by the mother and fetus for

thyroid function and energy production, and for fetal brain development. When maternal iodine intake is low, maternal thyroid hormone production is low. Poor neuronal development in the fetus, due to iodine deficiency during critical time points, causes irreversible brain damage, is the leading cause of preventable mental retardation worldwide, and can result in up to a 20-point drop in IQ. Iodine deficiency during fetal development is also associated with fetal goiter (causing a tendency of obstruction at delivery), hypothyroidism, and cretinism. Major sources of iodine include iodized salt, seafood, and dairy products (Lowensohn et al., 2016).

#### **2.4.10. Vitamin A**

Vitamin A is a key nutrient in pregnancy because it plays important roles in the reactions involved in cell differentiation. Deficiency in Vitamin A may produce malformations of the fetal lungs, urinary tract, and heart and night blindness whereas excessive intake in the form of retinol or retinoic acid (but not beta-carotene) increases the risk of cleft lip or palate, hydrocephalus, and heart defects.  $\beta$ -Carotene, found in food, does not pose a risk.

#### **2.4.11. Vitamins B6, B12, and C**

Low levels of B12 have been associated with high levels of homocysteine, which has been associated with preeclampsia (Vollset et al., 2000) and LBW (Ahmed, Akhter, Sharmin, Ara, and Hoque, 2011). There was an earlier recommendation by the FAO (Food and Agricultural Organization)/WHO of a 40% increase in the vitamin B-12 dietary allowance to meet fetal demands and increased metabolic needs (Ladipo, 2000). Vitamin B6 supplementation has been shown in 3 small studies to give a modest gain in birth weight (Dror and Allen, 2012). Vitamin C, also commonly called ascorbic acid, is a water-soluble micronutrient essential in the diet for humans, although most other mammals can readily synthesize it. Citrus fruits are great sources of vitamin C, and so are many vegetables. Vitamin C supplementation has not been shown to be of value in improving pregnancy outcomes (Dror and Allen, 2012), but has shown value for prevention of wheezing and asthma in the children of smokers (McEvoy et al., 2014).

#### **2.4.12. Vitamin E**

As pregnancy does not require additional vitamin E, and it is common in most diets, additional vitamin E is unlikely to be required (Ladipo, 2000). Deficiency during

pregnancy may cause miscarriage, preterm birth, preeclampsia, and intrauterine growth retardation (Gagne, Wei, Fraser, and Julien, 2009).

#### **2.4.13. Vitamin D**

Vitamin D supports fetal growth, the addition of calcium to bone, and tooth and enamel formation. Lack of a sufficient supply of vitamin D during pregnancy compromises fetal as well as childhood bone development. Vitamin D is also needed to help the body utilize calcium effectively and important for healthy skin and eyesight. Vitamin D can be gotten from fortified milk and breakfast cereal, salmon, and egg yolks.

#### **2.4.14. Calcium**

Calcium is needed to build the fetus bone and teeth. Calcium and/or vitamin D deficiency leads to porous, weak bones and rickets. A Cochrane Review has concluded that there is sufficient evidence to show that calcium supplementation lowers the risk of preeclampsia and other hypertensive diseases of pregnancy, especially in the face of a low-calcium diet (Hofmeyr, Lawrie, Atallah, Duley, and Torloni, 2014). Food sources of calcium are milk, yogurt, cheese, fortified juices, tofu, cereals, Chinese cabbage, kale, broccoli, and fish with bones.

### **2.5 Knowledge of Maternal Nutrition**

Nutrition during pregnancy majorly affected the outcome of the pregnancy and accredited as an essential determinant for a sound and fruitful pregnancy, including the long-lasting strength of future age (Bawadi et al., 2010). Maternal dietary intake during pregnancy can be influenced by a few elements, including monetary and economic wellbeing, culture, and the instructive dimension of the mother and her family. Malnutrition can result from obliviousness of pregnant women to their wholesome needs. The dimension of information about the nourishing needs during pregnancy will influence the food choice and consumption pattern.

Knowledge of nutrition is an essential component to guarantee positive pregnancy result and is the basic to accomplish healthy dietary behaviors and in this way enhances their eating regimen quality (Zalilah et al., 2008). Mitra et al. (2012) feature the significance that antenatal mothers could profit through dietary information; nourishing learning during

pregnancy is important to guarantee ideal gestational weight gain and decreases entanglements, the two of which are connected to positive birth results and add to the general wellbeing of pregnant women. In any case, proof uncovered that antenatal women during pregnancy do not generally embrace these suggestions, and the explanations behind this are inadequately comprehended (*Malaysian Dietary Guidelines*, 2017).

The preparation of food in any household is usually the responsibility of women. The implication of this is that their knowledge or lack of knowledge of nutrition will, to a large extent, affect the health and nutritional status of the entire family. It is important, therefore, that malnutrition is addressed in women to ensure optimal health that will enable them to fulfil the multiplicity of roles expected of them— income generation, having healthy children, care of the family, and ultimately advancing societal development.

Nutritional knowledge has been proven to play a very vital role in adopting optimal nutrition practices in the health of every expectant mother. As a matter of fact, the health and nutritional status of the population of a nation is an important indicator of the development of the country. A nutrition survey carried out in India observed that the nutritional status of pregnant and lactating and infants is not satisfactory. This is probably due to a lack of basic knowledge regarding proper nutrition and wrong customs prevalent in the community besides nonavailability and low intake of food.

In Nigeria, there are some adverse socio-cultural and economic factors such as educational level, monthly income, and occupation that produced negative consequences and reduce women's access to effective ante-natal services needed to reduce maternal morbidity and mortality. The most important of these are the low socioeconomic status of women that deny them access to appreciable decision-making with regard to their reproductive functions, high level of female illiteracy which is a leading cause of poor health-seeking behaviour for maternity services among Nigerian women and high rate of poverty that predominantly affects women leading to inadequate dietary intakes, high rate of pregnancy complications and women's reduced access to evidence-based maternity services (Kever et al., 2015). However, in a study conducted by Lim *et al.*, (2018), higher nutritional knowledge did not reveal an association with the educational level of the respondents. This was attributed to the continuous efforts of antenatal health care providers in



delivering nutritional information to antenatal mothers regardless of their education level, which impacted their nutritional knowledge.

## **2.6. Sources of Information on Maternal Nutrition**

Understanding women's experiences in gaining information and their perceived needs for this information are important aspects in identifying gaps in knowledge and provision of suitable support to meet their needs. The World Health Organization identified that involving women in decision-making and considering them as active participants in optimizing their own health are essential components of high-quality antenatal services. Thus, in the first instance, it is important to find out from the women themselves their specific needs with regard to nutrition communication and their ideas on how to develop effective strategies and care that promote healthy diet-related behaviours. There is limited published research on the experiences of women gaining nutrition-related information during pregnancy.

Szwajcer, Hiddink, Koelen, and van Woerkum (2007), reported that midwives made an effort to build rapport with pregnant women by being friendly, complimentary, confirmative, and supportive; however, providing non-individualised information deterred women from using it. In many cases, women reported navigating between different sources to seek information. Several articles have reported receipt of advice from family members, primarily mothers/mothers-in-law, or friends to women on recommended foods for consumption during pregnancy, as well as foods to avoid (Aubel et al., 2004; Choudhury & Ahmed, 2011; Choudhury et al., 2012; de Sa et al., 2013). Advice received by pregnant women varies based on traditions that are passed from generation to generation such as eating less food to avoid becoming ill, sitting over or near a fire to dry. Mothers often reported adhering to the advice given out of respect for these trusted sources (Choudhury & Ahmed, 2011; Hartini et al., 2005; Khadduri et al., 2008; Oni & Tukur, 2012).

Using nonreliable sources of information, such as online resources, has been found to significantly increase women's confidence levels regarding making decisions about their pregnancy; however, confidence does not necessarily equate with having accurate or relevant information or making an appropriate decision. Instead, women may feel uncertain and may adopt non-rational decision-making in dietary management.

In findings from a qualitative study carried out in Nigeria, health promoters and local government area key informants discussed that counselling on adequate weight gain during pregnancy, advice on food preparation and consumption, and a balanced diet are part of routine ANC (Girard and Olude, 2012). Kavle, J. A., & Landry (2018) revealed in a literature review that limited evidence is available on the type and quality of information and counselling received on maternal nutrition and weight gain during pregnancy at the health facility and/or community levels. They reported a lack of information regarding the content and/or quality of counselling on the diet that was provided during ANC visits, indicative that targeted, quality counselling is needed during ANC visits, addressing the local context, cultural beliefs, and misperceptions regarding food consumption.

### **2.7. Food Consumption Pattern of Pregnant Women in Nigeria**

Food restrictions resulting from food taboos are common in Africa, in which Nigeria is not an exception, and pregnant women are often been targeted. This result in the inadequacy of nutrient intake by pregnant women in such communities. Several factors have been associated with adherence to food taboos such as teenage pregnancy, lack of formal education, low household income, primigravida, low socioeconomic status and a low body mass index(Oni and Tukur, 2012). It is therefore important to focus on the consumption pattern among pregnant women during pregnancy given their implications for both maternal and fetal health.

Oluleke et al., (2016) reported that cultural taboos had a greater influence on a diet during pregnancy, while other reasons for food restriction includes preventing big fetus or difficult labour, belief of negative effect of foods, dislike of taste during pregnancy, and food is forbidden on religious ground. Some of the foods avoided based on cultural belief includes pumpkin, banana, plantain, walnut, dog, okra, pork, dog, and snail. Bournvita, Milo, Coke, and Fanta were avoided to prevent having a big fetus. The food taboos documented by Sholeye et al. (2014) are mainly proteins and vegetables—beans, egg, fish, okra, and plantain

A literature review on maternal nutrition in Nigeria, Adinma,*et.al.* (2017) reported that studies from different parts of Nigeria showed that most pregnant women consumed leafy green vegetables, albeit variety of species. Women of Akwa Ibom state in south Nigeria were reported to widely consume Ikong Ubong (*Telfavia Occidentalis*) and Afang while *Amaranthus sp.*, okra, garden egg, and lettuce are consumed by Berom pregnant women of

northern Nigeria. Studies have shown that the mineral and vitamin contents of the commonly consumed vegetables in Nigeria are usually adequate for pregnancy. Some food preparation practices in Nigeria and similar countries such as parboiling of rice and blanching of vegetable are known to compromise the nutritive values of foods.

Snacking is common among pregnant women because they require additional energy during pregnancy and for most women, the extra energy needs are easily met by adding in between-meal snacks. However, healthy snacking habit is not commonly practiced as reported by Oluleke et al.,(2018) that pregnant women generally had a preference for taking pastries as snacks in place of fruit which is a healthier alternative.

In a study conducted on consumption pattern of pregnant women in Ogun, Calabar and Plateau (Sholeye et al., 2014; Williams et al., 2009; Badi et al., 2012), it was revealed that respondents showed a preference for dark-green leafy vegetables. In terms of frequency of meal during pregnancy, (Ademuyiwa and Sanni, 2013; Oluleke et al., 2018) reported that most pregnant women ate more than three times a day. This was attributed to the awareness of pregnant women on the importance of adequate diet during pregnancy as a reflection of the health education activities carried out by the health workers during the antenatal clinic.

Eating small amounts of food more frequently (in the appropriate combinations and containing the needed nutrients) contributes to the well-being of pregnant women and development of their children as well as, has the benefits of helping with some of the uncomfortable side effects of pregnancy including nausea and heartburn. Emphasis should be placed on increasing the consumption of nutrient-dense foods and minimizing empty-calorie foods that may provide the extra energy needed but do not provide micronutrients that are needed in much higher amount compared with the increased calorie needs. Pregnant women with serious nutritional problems should be referred to dieticians for appropriate nutritional interventions (Oluleke et al., 2018).

## 2.8. Conceptual Framework

PRECEDE model have been selected to guide this study. The PRECEDE framework is used as a model which is useful in the diagnosis of behavioural antecedents of the student. According to the model, behavioural antecedents could be categorized into three, which are **predisposing** factors, **enabling** factors and **reinforcing** factors.

### **Application of Precede Model to Knowledge on Maternal Nutrition and Consumption Pattern of Pregnant Women Attending Antenatal Clinics In Ibadan**

The acronym **PRECEDE** stands for Predisposing, Reinforcing, and Enabling Causes in Educational Diagnosis and Evaluation. The model was developed by Green, Kreuter, and others. It has served as a conceptual framework in health education planning aimed at diagnosing the health problems of a community, understanding the factors that influence the people's behaviour and developing an intervention to promote healthy behaviour (Green and Kreuter, 1999). The model consists of three groups of factors, namely predisposing, enabling, and reinforcing factors which can influence behaviour. These factors are often called behavioural antecedent factors:

- *Predisposing factors*, which motivate or provide a reason for behavior; they include age, knowledge about good nutrition, educational status of the woman, food preference, occupation, educational level of significant others, age and parity.
- *Enabling factors*, which enable persons to act on their predispositions; these factors include available resources to purchase healthy food, food availability, preparation time, and cooking skills.
- *Reinforcing factors*, which come into play after a behavior has been initiated; they encourage repetition or persistence of behaviors by providing continuing rewards or incentives. Influence of media advertisements on nutrition during pregnancy, health talks given by health workers during antenatal clinics, reassurance by family and friends might all be considered reinforcing factors.

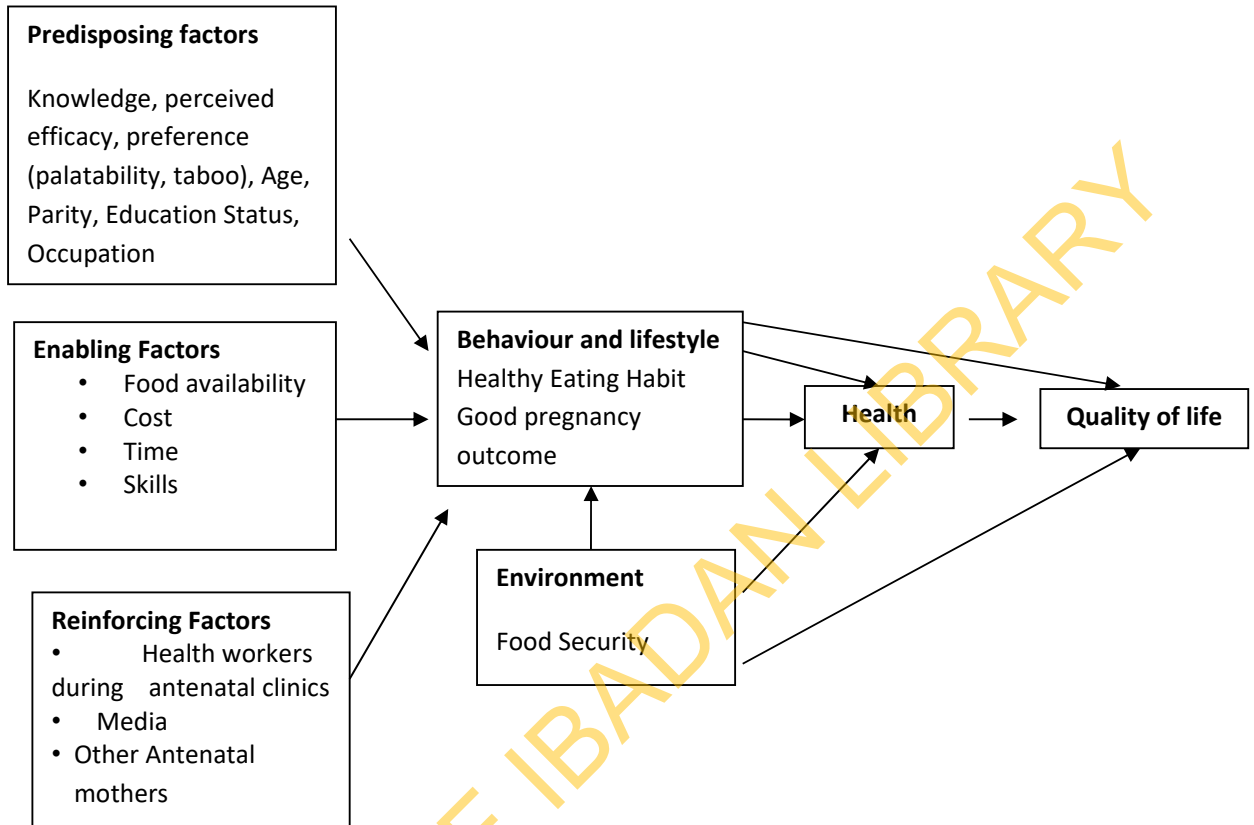


Figure 2.2: PRECEDE model

## CHAPTER THREE

### 3.0 METHODOLOGY

#### 3.1 Study Design

This study utilized a descriptive cross-sectional design to assess the knowledge of maternal nutrition and consumption pattern of pregnant women attending antenatal clinics in Ibadan.

#### 3.2 The study area

Ibadan is the capital of Oyo State, the third-largest city in Nigeria by population (after Lagos and Kano) and the largest in a geographical area. It has a population of 2,550,593. Ibadan is located in southwestern Nigeria, in the southeastern part of Oyo State about 120 km east of the border with the Republic of Benin in the forest zone close to the boundary between the forest and the savanna. The city ranges in elevation from 150 m in the valley area to 275 m above sea level on the major north-south ridge which crosses the central part of the city. The city's total area is 1,190 sq meters (3,080km<sup>2</sup>). The city is naturally drained by four rivers with many tributaries: Ona River in the North and West; Ogbere River towards the East; Ogunpa River flowing through the city and Kudeti River in the Central part of the metropolis, Ogunpa River a third-order stream, with a channel length of 12.76 km and a catchment area of 54.92 km<sup>2</sup>.

Ibadan is made up of 11 Local government areas. The local government areas are categorized into urban and semi-urban. The study area was carried out in two urban local government of Ibadan, and three public secondary antenatal clinics were randomly selected. Jericho Specialist Hospital and Ring Road Hospital located in Ibadan south west local government area while Jericho Nursing Home situated in Ibadan North West Local Government Area.

Ibadan has a large expanse of land which is very fertile for agriculture. Some of the food crops mostly produce in the study area includes cassava, yam, maize, cocoyam, mellon, soybeans, cocoa, and sorghum. (Oyo State Portal <http://oyostate.gov.ng>)

#### 3.3 Study population

The target population for this study was pregnant women attending selected secondary antenatal clinics in Ibadan, Oyo State. Three secondary health facilities were Ring Road

State Hospital, Jericho Nursing Home, and Jericho Specialist Hospital. These health facilities offer antenatal care services and also ensure the health of mother and child before, during, and after the delivery.

### 3.4 Sample Size Determination

The sample size for this study was determined using the formula for the single population proportion.

$$N = \frac{Z^2 pq}{d^2}$$

Where n = Sample size

Z = z value corresponding to a 95% level of significance = 1.96

p = proportion of pregnant women with poor maternal nutrition = 74.0% = 0.74 (Factors et al., 2013)

q = (1-p) = (1-0.74) = 0.26

d = absolute precision (5%)

Therefore, from the above sample size is

$$n = \frac{1.96^2 \times 0.74 \times 0.26}{0.05^2} = 300$$

Therefore, three hundred (300) study participants were proposed for recruitment.

### 3.5 Inclusion criteria

Pregnant women who consented to participate in the study and attended antenatal clinics in the selected secondary hospitals for antenatal care regardless of their age, number of visits or their marital status, were recruited into the study.

### 3.6 Exclusion criteria

1. The staff of the unit
2. Women with a gynecological problem
3. Women too ill to respond

### 3.7 Sampling Technique

A three-stage sampling technique was used to obtain a representative sample of respondents

#### **Stage 1: Sampling the secondary antenatal clinics in an urban setting by simple random sampling**

A sampling frame of secondary antenatal clinics within the urban setting of Ibadan was drawn.

Three secondary antenatal clinics were selected by simple. These includes:

- Ring Road State Hospital
- Jericho Specialist Hospital, Jericho, Ibadan
- Jericho Nursing Home, Jericho, Ibadan.

#### **Stage 2: Selection of the number of respondents in each secondary antenatal clinic**

A proportionate sampling technique was adopted to calculate the number of respondents per secondary antenatal clinics using the formulae below:

$$\frac{\text{Number of women registered in each antenatal clinic} \times \text{Sample Size (N)}}{\text{Total number of antenatal mothers registered in the secondary antenatal clinic (three ANC)}}$$



**Table 3.1.** The population of registered pregnant women and respondents by secondary health facility in Ibadan.

<b>Names of secondary health facility</b>	<b>Total number of a pregnant woman registered</b>	<b>Total number of respondents to be selected</b>	<b>% selected</b>
Ring Road State Hospital, Adeoyo, Ibadan	145	123	41.0
Jericho Nursing Home, Ibadan	90	76	25.3
Jericho Specialist Hospital Jericho, Ibadan	120	101	33.7
Total	355	300	100.0

Source: **Registers for pregnant women at the Health facilities; accessed November 2018**

### **Stage 3: Selection of respondents**

Simple random sampling was used to select participants in each health facility in the study. Every pregnant woman present will have an equal chance of being selected. Respondents who consented to be interviewed after the necessary information had been given were recruited for the study.

### **3.8 Instrument for data collection**

A semi-structured interviewer questionnaire was designed to collect quantitative data (see Appendix 1). The questionnaire was developed based on the research objectives and review of literature on the topic. The questionnaire was structured and divided into sections based on the objectives of the study as follows:

**Section A:** Socio-demographic characteristics

**Section B:** Knowledge of maternal nutrition during pregnancy

**Section C:** Sources of information on maternal nutrition

**Section D:** Pattern of Food Consumption of antenatal mothers

The food frequency questionnaire was adapted from Ademuyiwa and Sanni (2013)

The instrument was designed in English Language and translated to the Yoruba Language, which is the main language of communication in Ibadan, the study location. The Yoruba version was then given to another expert to translate it back to English. This was done to ensure the accuracy of the translation. The English and Yoruba versions of the questionnaire are contained in Appendix 1 and 2, respectively.

### **3.9 Validation of the instrument**

The validity of the instrument was ensured by reviewing relevant literature on the variables in the study objectives after which the project supervisor reviewed and made a suggestion for improvement on the instrument. It was also scrutinized by experts in the field of human nutrition and dietetics to ensure face and content validity, who made relevant corrections and suggestions before the draft was tested for reliability.

### **3.10 Reliability of the instrument**

In establishing the reliability of the instrument, the researcher used the pre-test technique. The instrument was pre-tested among 30 antenatal mothers (10% of the total sample size) in State Hospital Oyo town, a representative study population. After the pre-test, each

questionnaire was numbered, and a coding guide was prepared to facilitate entry of the data into the computer software. The reliability co-efficient measure obtained from the pre-test is 0.83.

Following the pretest, the instrument was revised, and ambiguous questions were either removed or reconstructed while some were added.

### **3.11 Data collection procedure**

Data were collected by the researcher with the assistance of three research assistants who helped in the administration of the questionnaire. The research assistants were trained by the researcher on the ethical conduct of research, administration of questionnaire, and the content of the instrument. Each respondent was courteously approached, and the necessary information about the study was given to them in the language they understand best. The questionnaire was administered by the interviewer by asking each question, explaining when clarification is needed and recording the response of each respondent. For some respondent who insisted on filling the questionnaire, the interviewer explained each section of the questionnaire and was advised to ask for further clarification if there be any need.

### **3.12 Data Management and Analysis**

The questionnaire was reviewed to ensure consistency and completeness before leaving the field. The questionnaire was sorted and coded serially for easy entry and recall. Thereafter, a coding guide was developed along with the data collection tool in order to facilitate its analysis. Cleaning, recording, and coding of data for analysis were done. Using the coding guide, the data collected were entered into the computer using IBM Statistical Package for Social Sciences (SPSS).

Descriptive statistics such as counts, mean, standard deviation, percentages, and inferential statistics such as Chi-square were done. The data were presented in tables and charts. Respondents' knowledge of maternal nutrition was measured on a 10-point knowledge scale:  $\geq 8$  was classified as a good knowledge, a score of  $\geq 5 < 8$  was considered as fair knowledge while  $< 5$  was classified as having poor knowledge.

To identify major sources of information on maternal nutrition, a 12-item of statement questions was used and reported in percentage to identify the major source of information available to pregnant women. To determine the consumption pattern of pregnant women,

various food types were grouped into five categories with five frequency option, which includes; Daily, 2-3 times a week, Monthly, Occasionally or Never. The response was reported in percentage to identify the frequency of consumption of each food.

Chi-square test statistic was conducted to investigate the relationship between socio-demographic characteristics and knowledge on maternal nutrition, socio-demographic characteristics, and number of times respondents' eats per day.

### **3.13 Ethical Considerations**

Ethical consideration and approval were sought and obtained from Oyo State Ethical Review Board/Committee prior to the commencement of the study (see Appendix 3) to ensure the proposed study meets all the principles and National guidelines in research involving human participants. Permission was also sought from hospital management before conducting the study.

**Informed Consent/Confidentiality:** A valid informed consent was obtained from the study participants through appended signature on the informed consent form after the adequate provision of information. All identifiers were removed from the questionnaire, and confidentiality was ensured through the protection of data collected from participants.

**Voluntariness:** Participants were accorded the right to or not to participate in the study without any consequence. It was also made clear to participants that they are under no obligation to participate in the study.

**Beneficence:** There was no direct benefit from this study, but the findings would be of great value in the design of interventions at promoting the nutritional knowledge and consumption pattern of pregnant women.

**Non-maleficence:** The study did not involve any risk as it does not involve the utilization of any invasive material. No harm would come to respondents who chose to participate in the study. Only the time needed to respond to the questionnaire was required of the participants.

**Dissemination of findings:** To ensure study, participants are informed about the information gathered, the antenatal clinics will be briefed on the result of the finding and considered for publication in journals.

**Translation of protocol to the local language:** Participants' level of education vary, therefore the questionnaire was translated to the Yoruba language by a linguistic expert that is vast in both languages for easy communication with respondents who are illiterates

and semi-illiterates. The Yoruba version of the instrument was back-translated into English by another language expert to ascertain the accuracy of the translation.

#### **3.14 Limitation of the study**

The study relied solely on the responses from respondents; at such, the frequency of consumption of each food items cannot be verified as to whether their claims are true or not. Also, the data cannot be generalized for all pregnant women in Ibadan metropolis. The researcher, however, informed the respondents to give absolutely true information as there is no right or wrong answer.

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## CHAPTER FOUR

### 4.0

### RESULTS

#### 4.1 Socio-demographic Characteristics of Respondents

This section deals with the socio-demographic characteristics of the respondents which are presented in Table 4.1. This includes age, level of education, religion, ethnic group, family structure, occupation, monthly income, and number of children. The respondents' ages range from 17-44 years, with a mean of  $29.5 \pm 4.9$  years. Majority of the respondents were within the age range of 25 – 34 years. The respondents were grouped into three religious groups. The distribution of respondents by religious affiliation shows that majority (69.0%) practiced Christianity, 30.7% practiced Islam, while 0.3% practiced Traditional religion.

A larger proportion of 255(85.0%) of the respondents practice monogamy (Table 4.1). The majority (69.3%) of the respondents had parity less than two, while 30.7% had parity two and above. A total of 213(71.0%) of the respondents had tertiary education, while 80 (26.7%) had secondary education. A minority 4 (1.3%) and 3(1.0%) of the respondent had no formal education and primary education, respectively. Majority 270 (90.0%) of the respondents' were from Yoruba ethnic group while Igbo 20 (6.7%), Hausa 2(0.7%) and some other (2.7%) tribes were also represented. Figure 4.1.2 shows that more of the respondents (38.7%) earned less than ₦21, 000, while 33.3% earned between ₦21,000 – ₦40,000. 12% of the respondents' had no income, 8.7% earned between ₦41,000 – ₦60,000, and only 7.3% earned above ₦60,000.

Table 4.1: Socio-demographic Characteristics of respondents

(N=300)

<b>Variable</b>	<b>Frequency</b>	<b>Percentage</b>
<b>Age</b>		
17-24	43	14.3
25-34	210	70.0
≥35	47	15.7
<b>Parity</b>		
0-1	208	69.3
≥2	92	30.7
<b>Religion</b>		
Christianity	207	69.0
Islam	92	30.7
Traditional Religion	1	0.3
<b>Ethnic Group</b>		
Yoruba	270	90.0
Igbo	20	6.7
Hausa	2	0.7
Others	8	2.7
<b>Family Structure</b>		
Monogamy	255	85.0
Polygyny	45	15.0
<b>Occupation</b>		
Civil Servant	81	27.0
Petty Trader	107	35.7
Artisans	38	12.7
Housewife	11	3.7
Students	18	6.0
Unemployed	18	6.0
Others	27	9.0

N=300

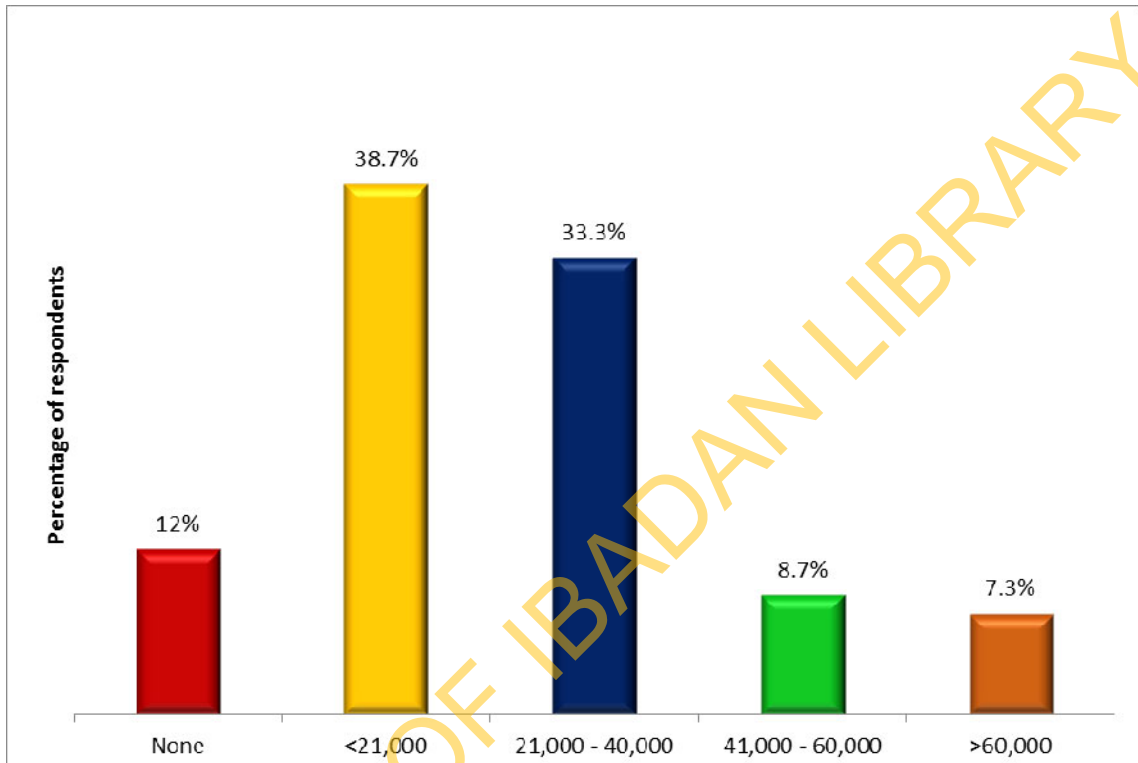


Figure 4.1.1: Respondents' monthly income in Naira



N=300

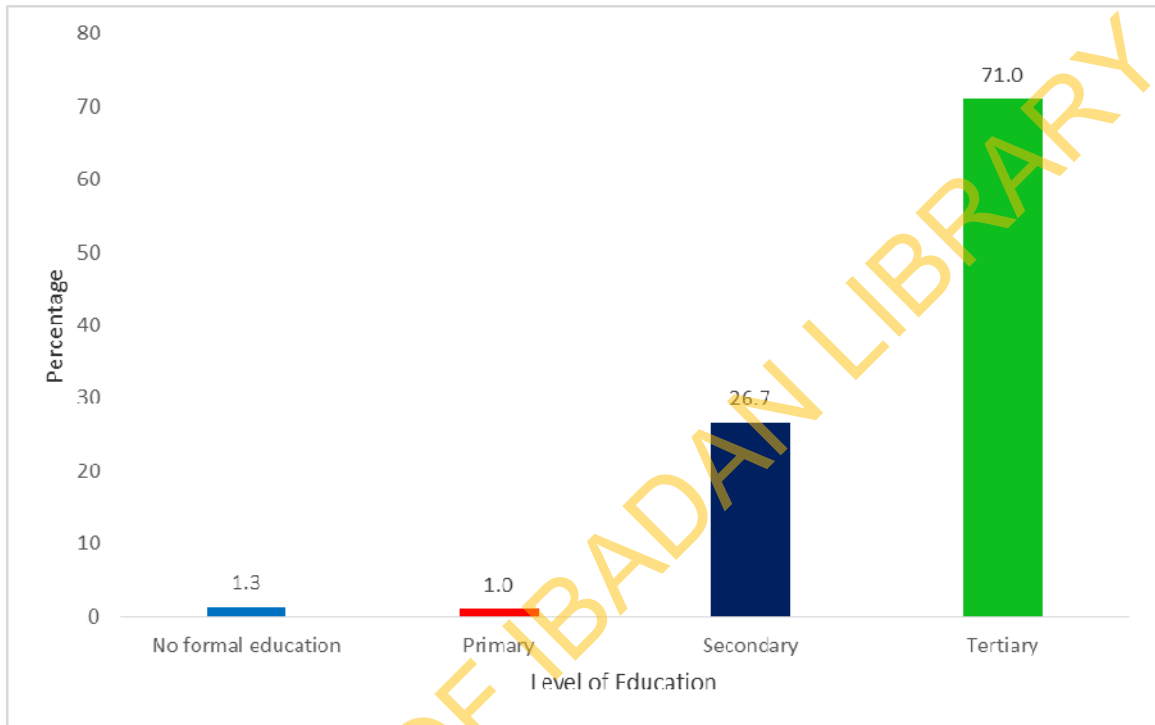


Figure 4.1.2 Respondent's level of education

#### 4.2. Knowledge of Maternal Nutrition during Pregnancy

Table 4.2.1 presents information on the knowledge of respondents' on maternal nutrition during pregnancy. The answers to all questions were a dichotomous answer of 'Yes' or 'No.' Nearly all (97.7%) respondents were knowledgeable that a balanced diet is important during pregnancy. Many (84%) of the respondents understood that women's nutrition during pregnancy is different. Only 15.7% of respondents had the knowledge that iron is not a source of vitamin. The majority (96.7%) of the respondents were knowledgeable about the fact that a pregnant woman needs more folic acid and iron than a non-pregnant woman. A large proportion of the respondents (89.7%) had a good understanding that nutrients deficiency during pregnancy could affect the health status of mothers and baby. Almost three-quarter (69.0%) respondents mentioned specifically that nutrients deficiency during pregnancy could affect the health status of mothers and baby. A large proportion (81.3%) of respondents correctly indicated that been an underweight mother could affect fetal well-being and growth. Slightly above three-quarter (77.3%) of the respondents correctly mentioned that obese women are at an increased risk of several pregnancy problems. A large proportion (88.0%) of the respondent had the knowledge of snacking on fruits and nuts in between meals during pregnancy. The majority (97.0%) are knowledgeable that meat, egg, poultry, fish, and dairy are high-quality sources of protein.

**Table 4.2.1:** Proportion of response about the statement on maternal nutrition during pregnancy.

N=300

<b>Statement</b>	<b>True (%)</b>	<b>False (%)</b>
A balance diet is important during pregnancy?	293(97.7)*	7(2.3)
Women nutrition during pregnancy is different from others	252(84.0)*	48(16.0)
Iron is a source of vitamin	253(84.3)	47(15.7)*
During pregnancy, a woman needs more folic acid and iron than a woman who is not pregnant	290(96.7)*	10(3.3)
Nutrients deficiency during pregnancy could affect the health status of mothers and baby	269(89.7)*	21(10.3)
Additional energy needs should be tailored based on the woman's weight before pregnancy	207(69.0)*	93(31.0)
Underweight mother can affect fetal well-being and growth	244(81.3)*	56(18.7)
Obese women are at an increased risk of several pregnancy problems	232(77.3)*	68(22.7)
Eating snacks like fruit and nuts in between meals is important during pregnancy	264(88.0)*	36(12.0)
High quality sources of protein includes meat, egg, poultry, fish, and dairy	291(97.0)*	9(3.0)

\*Correct responses

Table 4.2.2 shows that a large proportion of the respondents' 261 (87.0%) had good knowledge of maternal nutrition during pregnancy with a mean knowledge score of  $8.0 \pm 1.33$ . Respondents with fair and poor knowledge of maternal nutrition were 11.3% and 1.7%, respectively.

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**Table 4.2.2:** Knowledge level of participants on maternal nutrition during pregnancy

(N=300)

<b>Knowledge Level</b>	<b>Frequency (%)</b>
Good( $\geq 7$ )	261(87.0%)
Fair(5-6)	34(11.3%)
Poor( $< 5$ )	5 (1.7%)

$\bar{x} = 8.0 \pm 1.33$

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### **4.3. Sources of Information on maternal nutrition**

The respondents' source of information on maternal nutrition is presented in Table 4.3 As expected, all 300 (100%) respondents' heard about maternal nutrition from antenatal clinics. Majority of the respondents' 290 (96.7%) mentioned nurses as their sources of information on maternal nutrition. Of all the mass media, television is reported more 204 (68%) as a source of information and newspapers 97 (32%) as the least source of information to the respondents. Older women and female relatives were reported by 207 (69%) of the respondents while friends are the least 172 (57.3%) source of information on maternal nutrition. The church was mentioned as other sources of information on maternal nutrition.

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**Table 4.3:** Respondents' sources of information on maternal nutrition

**N=300**

Statement	Frequency	%
Physician	216	72
Friends	172	57.3
Antenatal clinics	300	100
Books	184	61.3
Nurse	290	96.7
Newspapers	97	32.0
Older women	207	69
Pregnancy manual/pamphlets	185	61.7
Female relatives	207	69
Television	204	68
Radio	199	66.3
Internet	187	62.3
Church	4	1.3

**\*Multiple responses present**

#### 4.4. Pattern of Food Consumption

Pattern of Consumption of Cereals and Grains, Roots and Tubers, Legumes, Pulses and Oil Seeds, Vegetables and Fruits, Beverages and Foods of Animal Origin by the pregnant women is presented in Table 4.4.1 – 4.4.5.

Table 4.4.1 shows the pattern of consumption of cereals and grains. More than half (53%) of the respondent's reported consuming rice 2-3 times a week, whereas almost half (47.7%) of the respondents consume *Eko* occasionally while a few (4.7%) consumed wheat on a daily basis. (see table 4.4.1 for details)

The pattern of consumption of roots and tuber is presented in Table 4.4.2. More than half (58.3%) and (48%) of women reported consuming yam and *Amala* 2-3 times a week while a few (3.0%) consumed cocoyam daily. (see table 4.4.2 for details)

Table 4.4.3 presents the pattern of consumption of Legumes, pulses and oilseeds, Majority of the respondents consumed *Moi-Moi* (53.3%) and Bean cake (45.3%) 2-3 times a week. A few percentages (6.7%), (3.7%) and (4.7%) reported consuming *gbegiri*, *Apon*, and walnut daily. (see table 4.4.3 for details)

Table 4.4.4 presents the pattern of vegetable and fruits consumption. All pregnant women reported consuming at least one type of vegetable and fruit daily. The green leafy vegetable was mostly consumed by (53.4%) of the respondents' 2-3 times a week. Orange (55.3%), Pineapple (30.3%), Water Melon (38.0%) and Apple (39.3%) were some of the fruit reported to be consumed daily by the respondents. (see table 4.4.4 for details)

Table 4.4.5 shows the pattern of Fish and Meat products consumption. Fish (79.9%), Meat (63.0%), Meat organs (34.3%) and Egg (63.3%) were reported to be consumed on a daily basis by the respondents. (see table 4.4.5 for details)

Table 4.4.6 shows the pattern of beverage consumption. However, a larger percentage never ate snail (48%) and prawn (48.7%) during pregnancy. Majority of the respondents (45.3%) consume milk on a daily basis while a larger percentage (40.3%) never consumed teabags in this category. (0.3%) of the respondents mentioned coffee as other types of beverage consumed. (see table 4.4.6 for details)



**Table 4.4.1** Pattern of consumption of cereals and grains

N=300

Variable	Daily	2-3 times a week	Monthly	Occasionally	Never
Cereals and Grains					
Rice	132(44.0)	159(53.0)	2(0.7)	3(1.0)	4(1.3)
Wheat	14(4.7)	89(29.7)	27(9.0)	97(32.3)	73(24.3)
Bread	30(10.0)	145(48.3)	23(7.7)	91(30.3)	11(3.7)
Maize	19(6.3)	56(18.7)	27(9.0)	143(47.7)	55(18.3)
Eko	51(17.0)	77(25.6)	23(7.7)	110(36.7)	39(13.0)
Semolina	47(15.7)	153(51.0)	16(5.3)	63(21.0)	21(7.0)
Pap	78(26.0)	102(34.0)	14(4.7)	81(27.0)	25(8.3)

**Table 4.4.2** Pattern of consumption of roots and tubers

N=300

Variable	Daily	2-3 times a week	Monthly	Occasionally	Never
<b>Roots and Tubers</b>					
Yam	26(8.7)	175(58.3)	22(7.3)	65(21.7)	12(4.0)
Cocoyam	9(3.0)	24(8.0)	14(3.0)	93(31.0)	160(53.3)
Sweet Potatoe	27(9.0)	87(29.0)	32(10.7)	100(33.3)	54(18.0)
Fufu	21(7.0)	49(16.3)	21(7.0)	126(42.0)	83(27.7)
Amala	84(28.0)	144(48.0)	14(4.7)	31(10.3)	27(9.0)
Lafun	24(8.0)	48(16.0)	9(3.0)	76(25.3)	143(47.7)
Eba	27(9.0)	102(34.0)	22(7.3)	96(32.0)	53(17.7)
Garri	18(6.0)	69(23.0)	28(9.0)	123(41.0)	62(20.7)

**Table 4.4.3** Pattern of consumption of legumes and pulses and oilseeds

N=300

<b>Variable</b>	<b>Daily</b>	<b>2-3 times a week</b>	<b>Monthly</b>	<b>Occasionally</b>	<b>Never</b>
<b>Legumes, Pulse and Oil Seeds</b>					
Beans	26(8.7)	82(27.3)	94(31.3)	64(21.3)	34(11.3)
Bean cake	37(12.3)	136(45.3)	28(9.3)	81(27.0)	18(6.0)
Moi-moi	45(15.0)	160(53.3)	26(8.7)	65(21.7)	4(1.3)
Gbegiri	20(6.7)	54(18.0)	39(13.0)	106(35.3)	81(27.0)
Melon (Egusi)	28(9.3)	143(47.7)	34(11.3)	78(26.0)	17(5.7)
Apon	11(3.7)	44(14.7)	23(7.7)	96(32.0)	126(42.0)
Walnut	14(4.7)	38(12.7)	14(4.7)	85(28.3)	149(49.7)
Groundnut	78(26.0)	120(40.0)	9(3.0)	65(21.7)	28 (9.3)

**Table 4.4.4:** Pattern of consumption of vegetable and fruits

N=300

Variable	Daily	2-3 times a week	Monthly	Occasionally	Never
<b>Vegetables and Fruits</b>					
Green leafy vegetable	118(39.3)	160(53.4)	5(1.7)	14(4.7)	3(1.0)
Okra	27 (9.0)	115(38.3)	18(6.0)	74(24.7)	66(22.0)
Orange	166(55.3)	104(34.7)	6(2.0)	18(6.0)	6(2.0)
Banana	112(37.3)	114(38.0)	17(5.7)	46(15.3)	11(3.7)
Pineapple	91(30.3)	86(28.6)	26(8.7)	69(23.0)	28(9.3)
Water Melon	114(38.0)	118(39.3)	10(3.3)	43(14.3)	15(5.0)
Cashew	6(2.0)	8(2.7)	7(2.3)	88(29.3)	191(63.7)
Cherry	9(3.0)	9(2.0)	11(3.7)	114(38.0)	157(52.3)
Pawpaw	80(26.7)	89(29.7)	22(7.3)	83(27.7)	26(8.7)
Apple	118(39.3)	87(29.0)	24(8.0)	51(17.0)	20(6.7)
Cucumber	54(18.0)	83(17.6)	27(9.0)	63(21.0)	73(24.3)
Garden Egg	60(20.0)	67(22.3)	28(9.3)	81(27.0)	64(21.3)
Carrot	47(15.7)	66(26.0)	31(10.3)	120(40.0)	36(12.0)

**Table 4.4.5** Pattern of Consumption of Fish and Meat Products

N=300

<b>Variable</b>	<b>Daily</b>	<b>2-3 times a week</b>	<b>Monthly</b>	<b>Occasionally</b>	<b>Never</b>
<b>Fish and Meat Products</b>					
Fish	239(79.7)	46(15.3)	8(2.7)	2(0.7)	5(1.7)
Meat	189(63.0)	89(29.7)	2(0.7)	17(5.7)	3(1.0)
Meat Organs	103(34.3)	106(35.3)	20(6.7)	52(17.3)	19(6.3)
Chicken	42(14.0)	98(32.7)	48(16.0)	98(32.7)	14(4.7)
Turkey	37(12.3)	83(27.7)	35(11.7)	112(37.3)	33(11.0)
Egg	190(63.3)	83(27.7)	5(1.7)	16(5.3)	6(2.0)
Snail	15(5.0)	18(6.0)	12(4.0)	111(37.0)	144(48.0)
Prawn	26(8.7)	36(12.0)	18(6.0)	74(24.7)	146(48.7)

**Table 4.4.6** Pattern of Consumption of Beverage

N=300

<b>Variable</b>	<b>Daily</b>	<b>2-3 times a week</b>	<b>Monthly</b>	<b>Occasionally</b>	<b>Never</b>
<b>Beverage</b>					
Milk	136(45.3)	113(37.7)	9(3.0)	37(12.3)	5(1.7)
Milo	87(29.0)	109(36.3)	15(5.0)	59(19.7)	30(10.0)
Bournivta	40(13.3)	85(28.4)	15(5.0)	91(30.3)	69(23.0)
Teabags	18(6.0)	54(18.0)	15(5.0)	92(30.7)	121(40.3)
Coffee	-	1(100.0)	-	-	-

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Table 4.4.7 shows the pattern of pastries, nuts, and savory consumption. A large percentage (90%) of pregnant women consume pastries. 85% and 70.7% of the respondents' consume nuts and savory, respectively.

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**Table 4.4.7:** Pastries, Nut and Savory Consumption

N=300

<b>Food Items</b>	<b>Frequency</b>	<b>Percentage</b>
Pastries	270	90
Nut	255	85
Savory	212	70.7

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The weekly pastries consumption frequency of respondents' is shown in Figure 4.4.1. About a quarter (23.3%) of the respondents consume pastries twice a week, 20% reported once a week, and 19.3% reported eating pastries every day. 10% of pregnant women never eat pastries. Whereas, 18.7% and 8.7% of the respondents' mentioned eating pastries three times and four or more times weekly.

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N=300

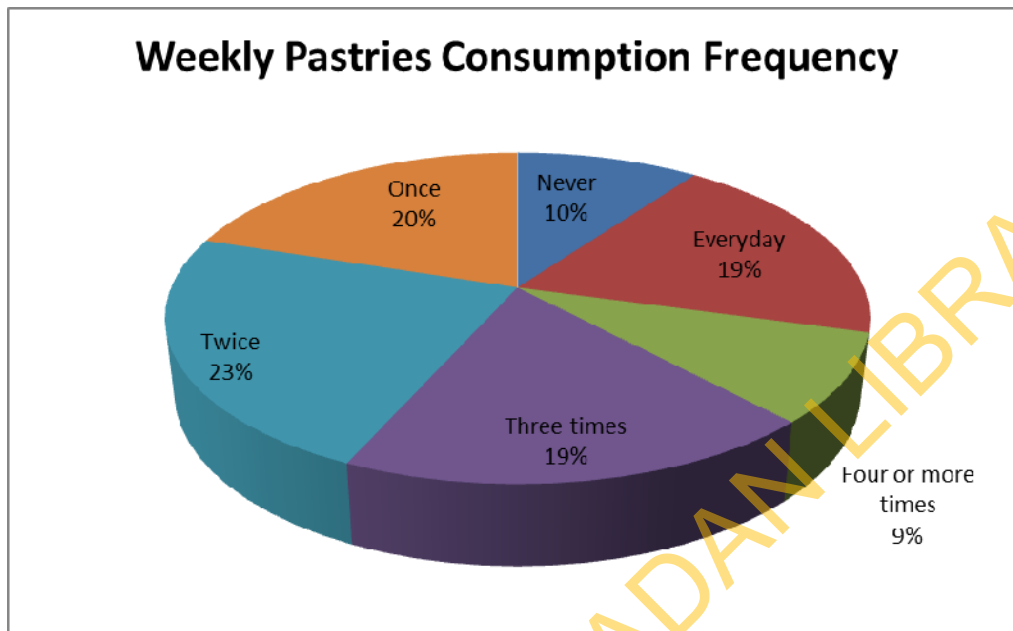


Figure 4.4.1: Weekly Pastries Consumption Frequency

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**Figure 4.4.2** shows the daily Eating Frequency of respondents. An equal percentage of respondents' (40%) who eats three times and four or more times daily was recorded, while the rest eats once or twice daily.

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N=300

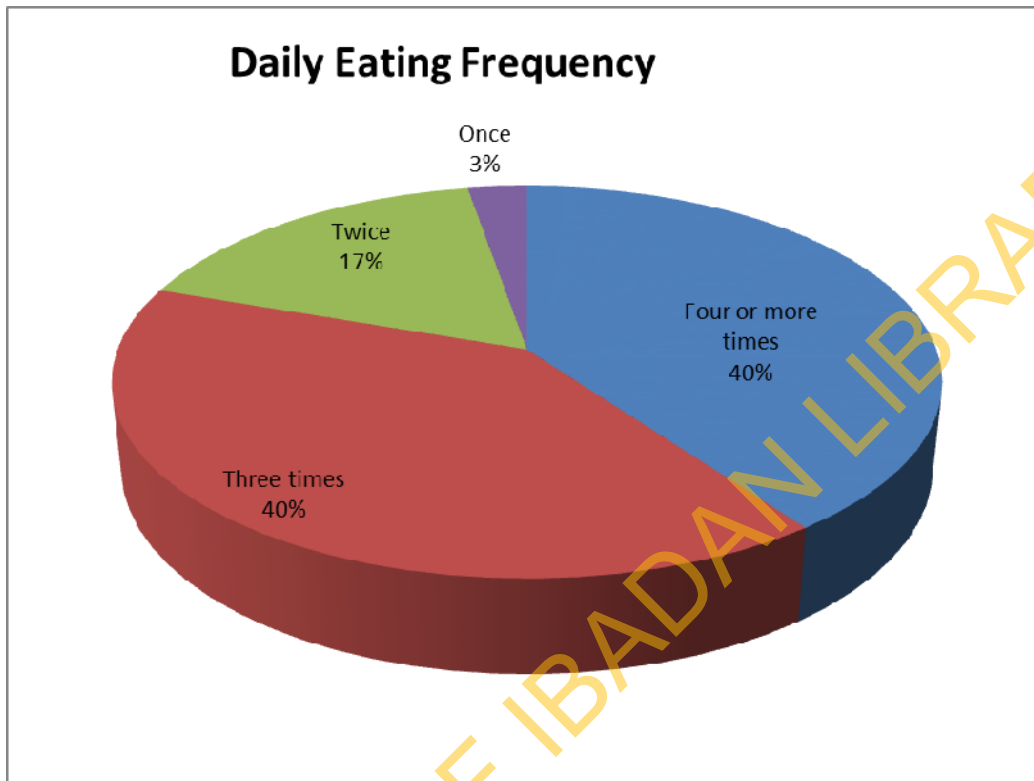


Figure 4.4.2: Daily Eating Frequency

#### **4.5: Statistical Tests of Hypothesis**

**Hypothesis 1:** There is no significant association between socio-demographic characteristics of respondents and knowledge on maternal nutrition

##### **4.5:1: Relationship between respondents' socio-demographic and knowledge on maternal nutrition**

The table 4.5.1 presents the result of the cross-tabulations between respondents' socio-demographic and knowledge on maternal nutrition. Fisher's exact test revealed that there was no significant association between level of education, religion, ethnic group, occupation, monthly income, and parity with a p-value  $> 0.05$ . Thus, the null hypothesis that there is no significant association in respondents' socio-demographic and knowledge of maternal nutrition was not rejected.

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**4.5:1: Relationship between respondents' socio-demographic and knowledge on maternal nutrition**

	Knowledge			X <sup>2</sup>	Df	P-value
	Poor (%)	Fair (%)	Good (%)			
<b>Level of Education</b>						
No formal education	0 (0.0)	0 (0.0)	4(100.0)			
Primary	0 (0.0)	0 (0.0)	3(100.0)	4.002	2	0.801
Secondary	0 (0.0)	9(11.3)	71(88.8)			
Tertiary	5(2.3)	25(11.7)	183(85.9)			
<b>Parity</b>						
0-1	5(2.4)	22(10.6)	181(87.0)			
≥2	0(1.6)	12(8.8)	80(89.6)	2.185	2	0.330
<b>Occupation</b>						
Self employed	3(1.9)	17(11.0)	135(87.1)			
Civil Servant	2(2.0)	12(12.2)	84(85.7)	0.775	2	0.991
Unemployed	0(0.0)	5(10.6)	42(89.4)			
<b>Religion</b>						
Christianity	5(2.4)	27(13.0)	175(84.5)			
Islam	0(0.0)	7(7.6)	85(92.4)	6.826	2	0.229
Traditional	0(0.0)	0(0.0)	1(100.0)			
<b>Monthly Income</b>						
None	0(0.0)	4(11.4)	31(88.6)			
<21,000	3(2.6)	13(11.1)	101(86.3)			
21,000 – 40,000	2(2.0)	12(12.0)	86(86.0)			
41,000 – 60,000	0(0.0)	3(11.5)	23(88.5)	1.225	2	1.000
>60,000	0(0.0)	4(11.4)	31(88.6)			
<b>Ethnic Group</b>						
Yoruba	4(1.5)	28(10.4)	238(88.1)			
Hausa	0(0.0)	0(0.0)	2(100.0)			
Igbo	1(5.0)	3(15.0)	16(80.0)	16.132	2	0.053
Idoma	0(0.0)	1(16.7)	5(83.3)			
Ibibo	0(0.0)	2(100.0)	0(0.0)			

**Hypothesis 2:** There is no significant association between socio-demographic characteristics of respondents and the number of times respondents eat per day.

#### **4.5:2: Relationship between respondents' socio-demographic and number of times respondents eats per day**

The table 4.5.2 presents the result of the cross-tabulations between respondents' socio-demographic and the number of times respondents eat per day. Chi-square analysis and Fisher's exact test was used in testing the relationship between respondents socio-demographics and number of times respondents eat per day which revealed that there was no significant association between level of education, age group, occupation, monthly income, and parity with a p-value  $> 0.05$ . Thus, the null hypothesis that there is no significant association in respondents' socio-demographic and knowledge of maternal nutrition was therefore not rejected.

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**4.5:2: Number of times respondents eats per day by socio-demographic variables**

	Number of times respondents eat per day		X <sup>2</sup>	Df	P-value
	<3 times (%)	≥3 times (%)			
<b>Level of Education</b>					
No formal education	2 (50.0)	2 (50.0)			
Primary	0 (0.0)	3 (100.0)	4.864*	2	0.127
Secondary	11 (13.8)	69(86.3)			
Tertiary	46(21.6)	167(78.4)			
<b>Age group</b>					
15-24	3(7.0)	40(93.0)			
25-34	47(22.4)	163(77.6)	5.370	2	0.069
≥35	9(19.1)	38(80.9)			
<b>Parity</b>					
0-1	40(19.2)	168(80.8)			
≥2	19(20.7)	73(79.3)	0.082	2	0.875
<b>Occupation</b>					
Self employed	31(20.0)	124(80.0)			
Civil Servant	19(19.4)	79(80.6)	0.024	2	1.000
Unemployed	9(19.1)	38(80.9)			
<b>Monthly Income</b>					
None	5(14.3)	30(85.7)			
<21,000	22(18.8)	95(81.2)			
21,000 – 40,000	21(21.0)	79(79.0)	3.113*	2	0.536
41,000 – 60,000	8(30.8)	18(69.2)			
>60,000	3(13.6)	19(86.4)			

\*Fishers exact test



## CHAPTER FIVE

### DISCUSSION, CONCLUSION AND RECOMMENDATION

#### 5.1. DISCUSSION

##### 5.1.1 Socio-demographic characteristics

Data collected showed that majority of the respondents were between the age ranges of 25 to 34 years. This could be because it is the peak of their reproductive years and this is consistent with the findings of (Oluleke et al., 2018) where a majority(62.8%) of the respondents falls within this age range. Due to the location of the study, most of the respondents are of the Yoruba ethnic. Majority of the pregnant women were in a monogamous marriage. Most of the respondents were Christians, possessed a degree from tertiary institutions. Majority of the respondents either had no previous deliveries or one delivery. This might be as a result of an increase in awareness about family planning and consequence of having too many pregnancies.

This result also shows that many of the respondents were working as petty traders and civil servants. This is similar to the findings of (Oluleke et al., 2018) in Ile-Ife, a similar city to Ibadan within the south-western region of Nigeria. This trend was believed to be a result of governments been the highest employers of labour in Nigeria, and people preference for white-collar jobs. Also, he believed the reason many of the respondents were into petty trading might be as a result of the fact that petty trading could be established with a little capital and resources.

Slightly above one-third of the respondents earn less than 21,000 nairas while another one-third earns between 21,000 to 40,000 naira. This is expected based on the occupation of the majority of the respondents; civil servants and petty trader, where the minimum wage of a civil servant in Nigeria is N18, 000. Low income can lead to household food insecurity causing inadequate dietary intake, which might result in maternal and child under-nutrition.

##### 5.1.2. Knowledge of Maternal Nutrition during pregnancy

The study revealed the respondents level of knowledge on maternal nutrition during pregnancy. Majority of the respondents had good knowledge while only a few had fair and poor knowledge. However, a few women lacked the knowledge that additional energy

needs should be tailored based on the woman's weight before pregnancy and the increased risk of an obese woman of having several pregnancy problems. Similar studies have indicated a similar trend among pregnant women (Lim *et al.*, 2018; Oluleke *et al.*, 2016).

Previous studies have associated educational level of pregnant women with higher nutritional knowledge (Matthew O Oluleke *et al.*, 2016). However, this study did not reveal any association between the level of educational level and knowledge on maternal nutrition. This is also similar to the findings of Lim *et al.* (2018). This was attributed to the ongoing efforts of antenatal health care providers in delivering nutritional information to antenatal mothers regardless of their education level, which greatly improved their nutritional knowledge. This could also be a likely explanation for the finding in this study. Almost all the respondents had either secondary or tertiary education. This probably explains that pregnant women were educated in the study, and possessed the ability to gain adequate knowledge and comprehension of maternal nutrition.

The present study revealed that there was no association between monthly income, occupation, and knowledge on maternal nutrition. This was contrary to the findings of other studies (Factors *et al.*, 2013; Lim *et al.*, 2018; Oluleke *et al.*, 2016) which showed an association between monthly income, occupation, and knowledge on maternal nutrition. This finding may explain by the supposition they have a common source of information i.e. antenatal clinics, nurses and physicians, irrespective of their income level or occupation status.

It was also revealed that there was no association between age and knowledge of maternal nutrition. This was similar to the findings of Lim *et al.*, (2018) that older maternal age did not increase the nutritional knowledge during pregnancy. They suggest that the finding was due to various resources available to harness nutritional information.

### **5.1.3 Sources of Information**

All pregnant women chose antenatal clinics as their source of information. This is expected as the respondents were recruited from the antenatal clinics. The findings also revealed that information on maternal nutrition was mostly obtained from the nurses compared to doctors. This can also be explained based on the nurses having more contacts with pregnant women and responsible for nutritional education during every antenatal clinic.

The newspaper was the lowest source of information. This can also be attributed to the income level and occupation status of pregnant women. Since the majority were either civil servants or petty traders, they might not have the resources to purchase a newspaper, and their level of exposure might limit the access to this form of print media. It is interesting to know that older women and female relatives also play a huge role in disseminating information on maternal nutrition as they were mentioned by the majority of the respondents as their source of information.

There is also a possibility of religious institutions as a potential source for information on maternal nutrition. It is not surprising that a few pregnant women mentioned religious institution as their other sources of information based on health talks and interventions organized by these institutions.

#### **5.1.4. Consumption Pattern of Pregnant Women**

The pattern of food consumption was observed in five categories. The pattern of consumption of cereals and grains; roots and tubers; legumes, pulses and oilseeds; vegetables and fruits; beverages and foods of animal origin.

For the category of foods under cereals and grains, majority of the respondents ate rice 2-3 times a week and daily. This is consistent with the findings of Ademuyiwa and Sanni (2013). This could be because rice is a major staple food in Nigeria. Also, in this food category, part of the daily consumed food is *Eko* – solid pap, semolina, and pap. Wheat had the highest percentage of never consumed food in this category. The reason for this could be attributed to the lack of awareness on the nutritional benefits of wheat consumption to pregnant women (Ademuyiwa and Sanni, 2013).

In the category of foods under the root and tubers, the majority of the foods; Yam, *Amala* – Yam flour and Eba, were mostly consumed 2-3times a week. Cocoyam was the highest food never consumed in this category. It might be as a result of inadequate knowledge about the benefit of cocoyam consumption to pregnant women. It may also be due to cocoyam inferior food status, that cocoyam is produced and consumed by low- income rural dwellers (Agbelemoge, 2013). Cocoyam is an excellent source of carbohydrate. It also contains dietary fibre and higher protein contents than the majority of the tropical root crops. Dietary fiber helps the pregnant woman maintain a healthier digestive process and helps in the easy passage of stool. It also contains thiamine, calcium, niacin, manganese, vitamin B, vitamin C, vitamin E, magnesium, copper, and riboflavin. Consuming nutrient-

packed food like cocoyam is vital for maintaining a healthy immune system, which helps the body to make use of protein, carbohydrates, and other nutrients in food.

*Moinmoin* is food in the legumes, pulse, and oilseeds category, that is largely consumed by pregnant women 2-3 times a week. Bean cake is another food in this category consumed in the same frequency. This is similar to the findings of Ademuyiwa and Sanni, (2013), who explain their preference over bean cake because it can be stored in the refrigerator after production and eaten a few days after. But this cannot be done with bean cake as it has to be consumed the same day of preparation. This finding shows that *Gbegiri* – a soup prepared from beans was mostly consumed occasionally despite been a native soup in the study area. This could probably be attributed to the preparation process. However, walnut has the highest percentage of number of pregnant woman who never consumed the nut in this category. It might be as a result of lack of awareness of the health benefit of the nut during pregnancy. Walnut is an excellent source of fatty acid required for the baby's development. It is also a rich source of Omega fatty acids, which are necessary for the baby's brain activity. It has a significant amount of vitamins, fibre, magnesium, copper, manganese, calcium, iron, zinc, and selenium essential for the health of the mother and child. According to Oluleke et al., (2016), walnut was listed among foods avoided based on the cultural belief of reducing contraction strength during labour.

The findings in the category of vegetables and fruits show that Green leafy vegetable was mostly consumed 2-3 times a week, a significant percentage of pregnant women consumed them daily also. Orange, Apple, Water Melon, and Banana are some fruit mostly consumed daily by the respondents. According to the study of Santiago, Park, and Huffman, (2013) on consumption habit in California, orange was revealed as the second most commonly consumed fruit, which is in accordance with the findings of this work. These findings are also consistent with the study of Ademuyiwa and Sanni, (2013), where they attributed the daily consumption of orange because of its high vitamin C content, availability almost all year round and affordability. The least consumed fruits are African cherry and cashew. According to Ademuyiwa and Sanni (2013), the reason given by some of the pregnant women was that cherry consumption gives them severe nausea and vomiting. In this study, during the interviewer's administration of the questionnaire, the respondents' mentioned that both fruits are seasonal; hence, they are not readily available for consumption.

The pattern of beverage consumption in this study shows that milk has the highest percentage of consumption. This is similar to the finding of Ademuyiwa and Sanni (2013). However, this study differs in the pattern for milo and bournivta consumption as a large percentage of women consumed both beverages daily and 2-3 times a week. This negates the proposition that the avoidance of beverages was due for fear of big size fetus, which could result in difficult labour at childbirth. Teabags have a larger percentage of women who never consumed it. This could be due to the concern regarding caffeine during pregnancy. Coffee was listed among the other beverage consumed during pregnancy.

Of the foods of animal origin, a higher percent of the respondents consumed fish, meat, and egg on a daily basis. Ademuyiwa and Sanni, (2013) explained that these choices were because they are both good sources of protein and some other vital nutrients required for a healthy pregnancy and successful suckle of an infant. Oluleke et al. (2018) also revealed the consumption of these protein-rich in their study. It was commended as a good practice that needs to be reinforced and practiced regularly by pregnant women and intending pregnant women. In this category, snail had a large percentage of respondents' who never consumed it. This could be as a result of the cultural belief that it causes the fetus to salivate excessively.

The pattern for snacks consumption shows that a larger percentage of women consume pastries and savory. This finding which is similar to the study of Oluleke et al., (2018), noted that respondents generally had a greater preference for taking pastries as snacks in place of fruit and nuts which is a healthier alternative. Based on this study, pastries were mostly consumed twice a week. According to the study of Santana, Alves de Oliveira Queiroz, Monteiro Brito, Barbosa Dos Santos, and Marluca Oliveira Assis, (2015), processed and industrialized foods containing high caloric density and low nutritional value, which are represented especially by foods with a high concentration saturated fat and sodium such as pastries, confers risk to maternal health, and consequently to their fetus.

An equal proportion of respondents eats three times and above which corresponds with Oluleke et al., (2018) findings which suggest they were aware of the importance of adequate diet during pregnancy and this could be a reflection of the health education activities carried out by the health workers during the antenatal clinic. However, there was

no significant association between the number of times respondents eat per day and their socio-demographic variables. Oluleke et al., (2018) quoting Ogunjobi et al., (2008) mentioned that eating small amounts of food more frequently (in the appropriate combinations and containing the needed nutrients) contributes to the well-being of pregnant women and development of their children.

## **5.2. Implications of findings for Health Promotion and Education**

The finding of this study has several implications for planning, development, and implementation of health promotion and education on maternal nutrition. To reduce to the negative consequence of malnutrition on maternal and child health, the following should be put in place:

### **Nutrition Education Intervention:**

Evidence-based and effective strategies should be employed to educate pregnant women on maternal nutrition to provide adequate knowledge that would lead to positive dietary practices/behaviours. Training and re-training of nurses/midwives on the application of active methods/approaches to disseminate information to pregnant women during antenatal clinics. Utilizing technology platforms and mass media to increase awareness about maternal nutrition.

### **Policy Formulation:**

Guideline on Maternal Nutrition based on Nigeria context should be developed to improve better understanding of pregnant women on maternal nutrition. The poor dietary practices observed in other studies on maternal nutrition underscores the importance of developing these guidelines and translation to different languages to enhance comprehension and acceptability. Policies to encourage food security within the country should also be formulated and implemented to ensure all year availability of seasonal foods and improve the food choices of a pregnant woman.

### **Advocacy:**

Advocacy to create urgency and seeking the collaboration of government, non-governmental organizations, food industries, all sectors of the economy, health workers, teachers, religious bodies, the general community, the family, and the individuals for improved maternal nutrition.

### 5.3 Conclusion

Good knowledge was documented among the respondents' though few women lack knowledge on some specific knowledge statements on weight gain and implications of obesity on pregnancy. Information on maternal nutrition was mostly obtained from nurses in antenatal clinics. It was also discovered that older women and female relatives also play a huge role in disseminating information on maternal nutrition. Religious institutions tend to be a potential source for information on maternal nutrition.

The pattern of pregnant women food consumption was observed in five categories; cereals and grains; roots and tubers; legumes, pulses and oilseeds; vegetables and fruits; beverages and foods of animal origin. *Eko*, semolina, pap, fish, meat, and egg are foods mostly consumed on a daily basis. Yam, *Amala*, Eba, *Moinmoin*, bean cake, and Green leafy vegetable were mostly consumed 2-3times a week. Fruits mostly consumed on a daily basis are Orange, Pineapple, Water Melon, and Apple. Majority of the respondents never consumed Wheat, cocoyam, walnut despite their health benefits during pregnancy. A large percentage of pregnant women consumed Milo and bournivta 2-3 times a week despite the cultural belief of causing big fetus.

This study, therefore, indicates that there is a need for continuous nutrition education interventions for pregnant women. During health talks in antenatal clinics, nutrition education should be intensified, and emphasis should be placed on healthy eating patterns, healthy food choices, and importance of fruits and vegetable consumption for supply of nutrients, healthy snacking habit and consequences of poor maternal nutritional status. Pregnant women should also to be enlightened on the health benefits of food mostly avoided during pregnancy and reinforcement of healthy lifestyles.

#### **5.4. Recommendations**

Based on the findings from this study, the following recommendations are made:

1. Continuous in-service training, mentorship, and support should be given to nurses and midwives to promote effective nutrition education during the antenatal clinic.
2. Targeted and quality counseling on maternal nutrition should be provided during ANC visits. Information should be tailored to address the local context, cultural beliefs, and misperceptions regarding food consumption
3. Encourage women to practice home gardening by providing them with the necessary skills and resources to increase their consumption of fresh vegetables and fruits.
4. Design of intervention programs such as complimentary food processing and sales, household animal & horticulture production, conditional cash transfer, and food pricing program which are evidenced-based to improve maternal diets.
5. Maternal nutrition interventions can also be integrated into community-level activities by involving older women, grandmothers, support groups, and other identified significant others with up-to-date information about maternal nutrition. This will equip them with the capacity to act as reinforcement for healthy food practices among pregnant women.



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8. Monthly Income: 1. < 21,000 [ ] 2. 21,000 – 40,000 [ ] 3. 41,000 – 60,000 [ ]  
4. >60,000 [ ]

9. Number of Children \_\_\_\_\_

**SECTION B: Knowledge on maternal nutrition during pregnancy (Please tick *one* appropriate box)**

S/N	Items (Please tick one box)	True	False
11.	A balance diet is important during pregnancy?		
12.	Women nutrition during pregnancy is different from others		
13.	Iron is a source of vitamin		
14.	During pregnancy, a woman needs more folic acid and iron than a woman who is not pregnant		
15.	Nutrients deficiency during pregnancy could affect health status of mothers and baby		
16.	Additional energy needs should be tailored based on the woman's weight before pregnancy		
17.	Underweight mother can affect fetal well-being and growth		
18.	Obese women are at an increased risk of several pregnancy problems		
19.	Eating snacks like fruit and nuts in between meals is important during pregnancy		
20.	High quality sources of protein includes meat, egg, poultry, fish and diary		

**SECTION C: Sources of Information on maternal nutrition**

**Instruction:** Please read and tick [√] as appropriate.

What are your sources of information on maternal nutrition during pregnancy?

S/N	Sources of Information	Yes	No
21.	Physician		
22.	Friends		
23.	Antenatal clinics		
24.	Books		
25.	Nurse		
26.	Newspapers		
27.	Older women		
28.	Pregnancy manual/pamphlets		
29.	Female relatives		
30.	Television		
31.	Radio		
32.	Internet		
33.	Others (Please specify)		



**SECTION D: Pattern of Food Consumption**

**34. How often did you eat each of the listed food groups? Tick [√] one box in each row.**

S/N	FOOD GROUPS	Daily	2 times a week	3 times a week	Monthly	Occasionally	Never
	<b>Coding score</b>	<b>6</b>	<b>5</b>	<b>4</b>	<b>3</b>	<b>2</b>	<b>1</b>
	<b>Cereals and Grains</b>						
1.	Rice						
2.	Wheat						
3.	Bread						
4.	Maize						
5.	Eko						
6.	Semolina						
7.	Pap						
8.	Others						
	<b>Root and Tubers</b>						
9.	Yam						
10.	Cocoyam						
11.	Sweet Potatoe						
12.	Fufu						
13.	Amala						
14.	Lafun						
15.	Eba						
16.	Garri						
17.	Others						
	<b>Legumes, Pulses and Oil Seeds</b>						
18.	Adalu						
19.	Bean cake						
20.	Moi-moi						
21.	Gbegiri						
22.	Melon (Egusi)						
23.	Apon						
24.	Walnut						
25.	Groundnut						
26.	Others						

S/N	FOOD GROUPS	Daily	2 times a week	3 times a week	Monthly	Occasionally	Never
	<b>Coding score</b>	<b>6</b>	<b>5</b>	<b>4</b>	<b>3</b>	<b>2</b>	<b>1</b>
	<b>Vegetables and Fruits</b>						
27.	Green leafy vegetable						
28.	Okra						
29.	Orange						
30.	Banana						
31.	Pineapple						
32.	Water melon						
33.	Cashew						
34.	Cherry						
35.	Pawpaw						
36.	Apple						
37.	Cucumber						
38.	Garden Egg						
39.	Carrot						
40.	Others						
	<b>Animal, Milk and Dairy Product</b>						
41.	Fish						
42.	Meat						
43.	Meat Organs						
44.	Chicken						
45.	Turkey						
46.	Egg						
47.	Snail						
48.	Prawn						
49.	Others						
	<b>Beverages</b>						
50.	Milk						
51.	Milo						
52.	Bournvita						
53.	Teabags						
54.	Others						

35. What type of snacks do you take often? Tick [] one box in each row.

S/N	Food Items	Yes	No
1.	<b>Pastries</b> (Meat Pie, Fish pie/roll, Puffpuff, Donught, Egg roll, Sausage Roll, e.t.c)		
2.	<b>Nut</b> (Groudnut, Cashew nut, Coconut e.t.c)		
3.	<b>Savory</b> (Biscuit and Pop-corn)		
4.	<b>Fruits</b> (Apple, Banna, Orange e.t.c)		

36. How often do you take pastries weekly? (Please tick *one appropriate box*)

Once	Twice	Three times	Four or more times	Everyday	Never
6	5	4	3	2	1

37. How many times do you eat in a day (Please tick *one appropriate box*)

Once	Twice	Three times	Four or more times
4	3	2	1

*Thanks for your time*

APPENDIX 2

**ÀKÓLÉ: ÌMÓ ÌJÌNLÈ OHUN A MÚNI DÀGBÀ ÀTI ỌNÀ ÌJE, ÌMU ÀWỌN OBÌNRIN TÍ WỌN N LỌ FÚN ÌWÒSÀN ÌSÁÁJÚ-ÌBÍ NÍ ILÉ-ÌWÒSÀN ILÚ ÌBÀDÀN, ÌPÍNLE ỌYỌ**

**Ifaàrà:** Mo jẹ akékòọ èka igbélèkè ilera àti ètò èkò, ní èka èkò ilera ará ilú, kólèji ti ìwòsàn, Ifáfìtì ti ilú Ìbàdàn. Èróngbà isé yìi ni láti se iwádíí lórii “**ÌMÓ ÌJÌNLÈ OHUN A MÚNI DÀGBÀ ÀTI ỌNÀ ÌJE, ÌMU ÀWỌN OBÌNRIN TÍ WỌN N LỌ FÚN ÌWÒSÀN ÌSÁÁJÚ-ÌBÍ NÍ ILÉ-ÌWÒSÀN ILÚ ÌBÀDÀN, ÌPÍNLE ỌYỌ**”. Isé iwádíí yìi yòò se afisun tí ó se é se láti mú idàgbàsókè bá iránwọ fún ilera paápáá jùlọ awọn tí ó fara pé ohun a mú ni dàgbà àti iwà ónjẹ jíjẹ tí ó dárá. Kòsì idáhùn tí ó tònà tàbí tí kò tònà fún awọn ibèrèrè tí mo bèrè tàbí afọ tí mo fọ, ohun tí o pọn dandan fún yín ni sise otító pẹ̀lú òdodo nínú awọn idáhùn yin. ewè, mo rò yín láti mò wí pé didáhùn àtòjọ ibèrèrè kii se kànpá rára. Gbogbo abájade èsì iwádíí isé yìi látàrí ikopa yin ní a ó se ni bókélẹ́ tí a o sí lóò fún isé iwádíí nìkan.

È se.

Mo ti ka fòòmù ifowósi, tí ó sì ti yémi yékéyéké. Mo sì finú-findò faramó/ nkò faramó láti kopa nínú iwádíí ní pa fí falà sí inú akámọ tí ó bá èromi lọ ní isàlè yìi.

1. Faramó [ ]

2. Nkò Faramó [ ]

Ìbuwólù: -----

ojó: -----

**Abala A: ibèrèrè àbùdá eni ajẹmọ awùjọ**

**Ìkilò:** *Dákun falà sí inú akámọ tí a pèsè (gégé bí ó ti yẹ)*

1 Kíni ojò-orí yín ní ayeye ojò ibí tí e se kojá? \_\_\_\_\_ (ní odún)

2 Ipò idílé: 1. alókoláya [ ] 2. Àpọn [ ] 3. Opó [ ] akọkọkaya [ ]

3 Ipele ti Eko: 1. O kò ka iwé [ ] 2. Ní èkò iwé mífà [ ] 3. Ní èkò ilé iwé sẹ̀kòndírì [ ] 4. Lọ sí ilé iwé gíga [ ]

4 èsìn : 1. Kristeni [ ] 2. Musulumi [ ] 3. élésin ibílẹ [ ] 4. èsìn òmíràn (tọka rẹ) \_\_\_\_\_

5 èyà: 1. Yoruba [ ] 2. Hausa [ ] 3. Igbo [ ] 4. èyà òmíràn (tọka rẹ) \_\_\_\_\_

6 irú ebí tí e ti jáde : 1. Oníyàwó kan [ ] 2. Oníyàwó púpò [ ]

7 isé 1. Òsìsẹ̀ ijọba [ ] 2. onisowo [ ] 3. Onísẹ̀ owo [ ] 4. Abiléko [ ] 5. akékòọ [ ] 6. Alánísẹ̀ lówọ [ ] 7. òmíràn (tọka rẹ) \_\_\_\_\_

8 Iye owó osù : 1. < 21,000 [ ] 2. 21,000 – 40,000 [ ] 3. 41,000 – 60,000 [ ] 4. >60,000 [ ]

9 Iye omọ \_\_\_\_\_

10 Ipele ti èkò báalé ilé : 1. kò ka iwé [ ] 2. èkò iwé mífà [ ]

3. èkò ilé iwé sẹ̀kòndírì [ ] 4. èkò ilé iwé gíga [ ]

**Abala B:** Imò nípa ounje ninu oyun (Dákún falà sínú àkámó tí ó tònà)

S/N	Áláyé òrò kòòkan (Dákún falà sínú àkámó kan soṣo)	Bẹ̀ni	Bẹ̀kó
11.	Iwontunwonsi onje se koko ninu oyun?		
12.	Ounje alaboyun yaato si ounje awon iyoku		
13.	Ayoonu je orisin awon ajira		
14.	Ninu oyun, alaboyun nilo folik-asidi ati ayoonu ju obirin ti ko loyun		
15.	Aipe ounje ninu oyun le se ijamba fun ilera iya ati omo		
16.	Afikun ounje agbara ninu oyun da lori iwon obinrin naa ko to loyun.		
17.	Iya ti o gbe won le se akoba fun ilera ati idagbasoke oyun inu		
18.	Obinrin to sanra ju ni ewu pupo lati ni opolopo isoro ninu oyun		
19.	Jije were bii eso, ati epa laarin ounje se Pataki nigba iloyun		
20.	Orisun puroteeni ti o gbegede julo ni eran, eyin, adiyé, ati eja		

**Abala D: Ibo ni o ti gbo nipa ounje ninu oyun**

**Ikilò:** Jowo mu eyi t'ò tona nibi ti o ye

S/N	Ibi ti o ti gbo nipa re	Bẹ̀ni	Bẹ̀kó
21.	Odo onisekun oyinbo		
22.	Aarin ore		
23.	Ile Iwosan Agbegbi		
24.	Inu iwe		
25.	Noosi		
26.	Inui we iroyin		
27.	Obinrin agbalagba		
28.	Iwe apejuwe nipa oyun		
29.	Aana mi lobirin		
30.	Ori ero amo-hun-ma-wo-ran		
31.	Titeti si ero redio		
32.	Ero ayara-bii-asa		
33.	Awon miiran		

**Abala E: Batani ona ijeun**

34. Emeloo ni o n je awon onje ti o wa ni iwopo wonyi? Fala si [√] akamo kan ni ibu kookan.

S/N	IWOPO ONJE	Ojoojumọ	Ẹemeji ni oṣe	Ẹmeṣa ni oṣe	Oṣoṣu	Ẹkọṣkan	O ti
<b>Coding score</b>		6	5	4	3	2	1
<b>Oka oniyangan ati horo</b>							
1.	Iresi						
2.	Alikama						
3.	Bureḍi						
4.	Agbado						
5.	Eko						
6.	Semolina						
7.	Ogi						
8.	Awon miiran						
<b>Apeka ati gbongbo</b>							
9.	Iṣu						
10.	Iṣu koko						
11.	Anamọ						
12.	Fufu						
13.	Amala						
14.	Lafun						
15.	Eba						
16.	Garri						
17.	Awon miiran						
<b>Ewa , Poosi ati ororo eso</b>							
18.	Adalu						
19.	Akara						
20.	Moi-moi						
21.	Gbegiri						
22.	Egusi						
23.	Apon						
24.	Asala						
25.	Epa						
26.	Awon miiran						

S/N	IWOPO ONJE	Ojoojumọ	Eḡemeji ni oṣe	Eḡemeṭa ni oṣe	Oṣooṣu	Eḡeḡọkan	O ti
	<b>Coding score</b>	<b>6</b>	<b>5</b>	<b>4</b>	<b>3</b>	<b>2</b>	<b>1</b>
	<b>Eḡo ati Eso loriṣiiriṣi</b>						
27.	eḡo						
28.	Ila						
29.	oṣan						
30.	oḡeḡe						
34.	Eso oyinbo						
35.	Ibeḡe						
36.	Apu						
37.	Kukumba						
38.	Igba						
39.	Karọṭi						
40.	Ohun miiran						
	<b>eran, wara maluu ati ohun osin eḡeran</b>						
41.	eja						
42.	eran						
43.	Tinu eran						
44.	Adiye						
45.	Tolotolo						
46.	eyin						
47.	Ibin						
48.	Akan						
49.	Ohun miiran						
	<b>Ohun mimu</b>						
50.	Wara maluu						
51.	Milo						
52.	Bonfita						
53.	Tii-olokun						
54.	Ohun miiran						

35. Iru awon ipapanuwo ni o ma n je loore-koore? Fala si [√] akamo kan ni ibu kookan

S/N	Alakale onje	Beni	Beko
1.	<b>ipapanu</b> (ipapanu eleran, ipapanu eleja, Fish pie/roll, pofupofu, donoti, ipapanu elayin, wewe soséji,, ati be lo)		
2.	<b>Epa</b> (epa, omọ kasu, agbon ati be lo)		
3.	<b>Kenu- ma- dile</b> ( bisiki ati guguru)		
4.	<b>Eso</b> (eso apu, ogede, osan ati be lo)		

36. Emeloo ni o n je ipapanu ni ose? (dakun fala si akamo ti o ye)

ekan	emeji	emeta	emerin tabi ju be lo	Ojoojumo	O ti
6	5	4	3	2	1

37. Emeloo ni o n jeun lojumo? (dakun fala si akamo ti o ye)

ekan	emeji	emeta	emerin tabi ju be lo
4	3	2	1

*E se fun akoko yin.*



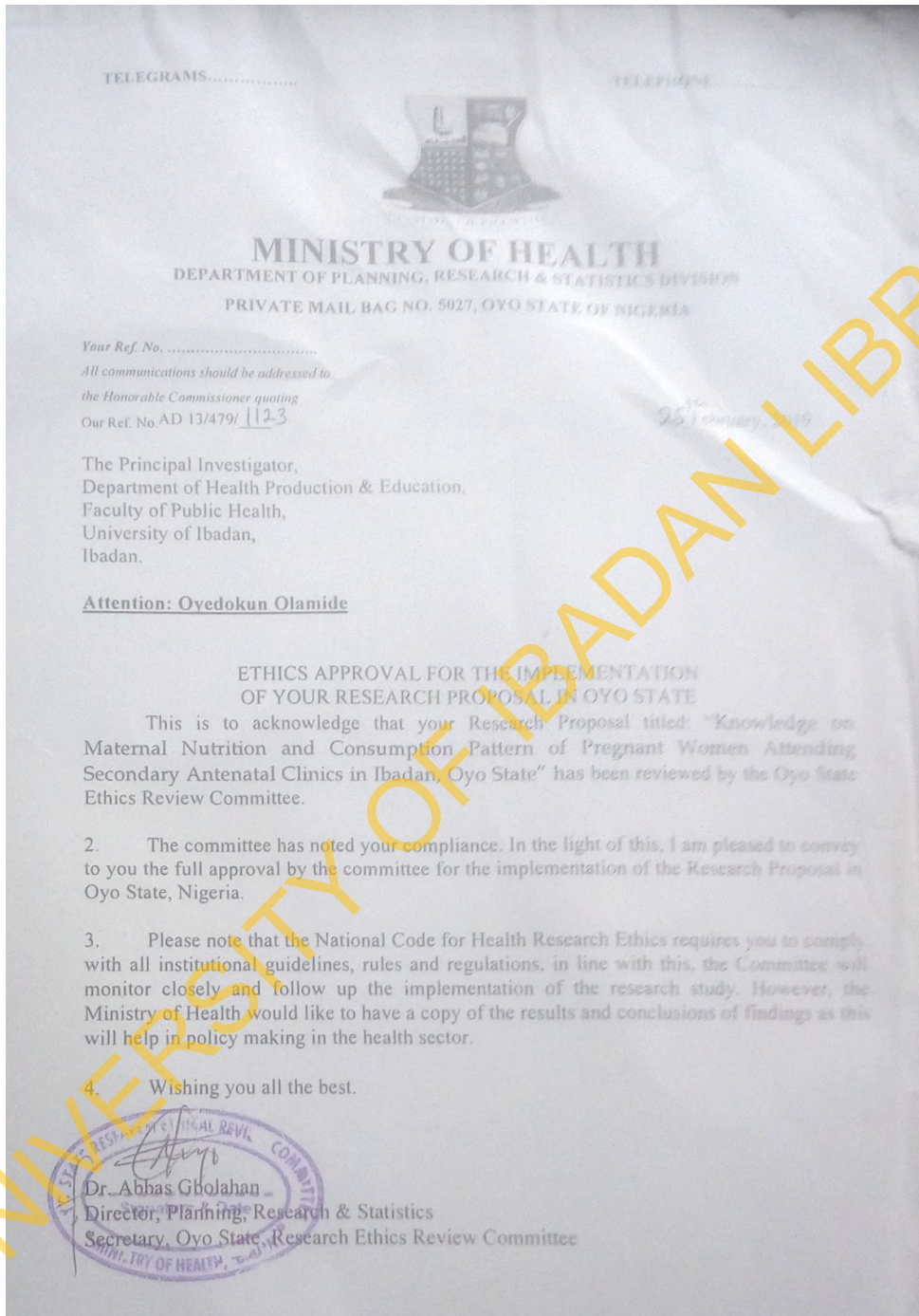
APPENDIX 3  
ALOTTED POINTS

**SECTION B: Knowledge on maternal nutrition during pregnancy (Please tick *one appropriate box*)**

S/N	Items <i>(Please tick one box)</i>	True	False	Score
11.	A balance diet is important during pregnancy?	True		1
12.	Women nutrition during pregnancy is different from others	True		1
13.	Iron is a source of vitamin		False	1
14.	During pregnancy, a woman needs more folic acid and iron than a woman who is not pregnant	True		1
15.	Nutrients deficiency during pregnancy could affect health status of mothers and baby	True		1
16.	Additional energy needs should be tailored based on the woman's weight before pregnancy	True		1
17.	Underweight mother can affect fetal well-being and growth	True		1
18.	Obese women are at an increased risk of several pregnancy problems	True		1
19.	Eating snacks like fruit and nuts in between meals is important during pregnancy	True		1
20.	High quality sources of protein includes meat, egg, poultry, fish and diary	True		1
	<b>Total obtainable score</b>			<b>10 points</b>
	<b>Code</b>	<b>Code 1: Score 0-4 = Poor</b> <b>Code 2: Score 5-6= Fair</b> <b>Code 3: Score 7-10= Good</b>		

APPENDIX 4

ETHICAL APPROVAL



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