

UNIVERSITY OF EDUCATION, WINNEBA

**INVESTIGATING THE FOOD HABITS OF PREGNANT WOMEN IN THE
NEW JUABEN MUNICIPALITY, KOFORIDUA – EASTERN REGION,
GHANA**

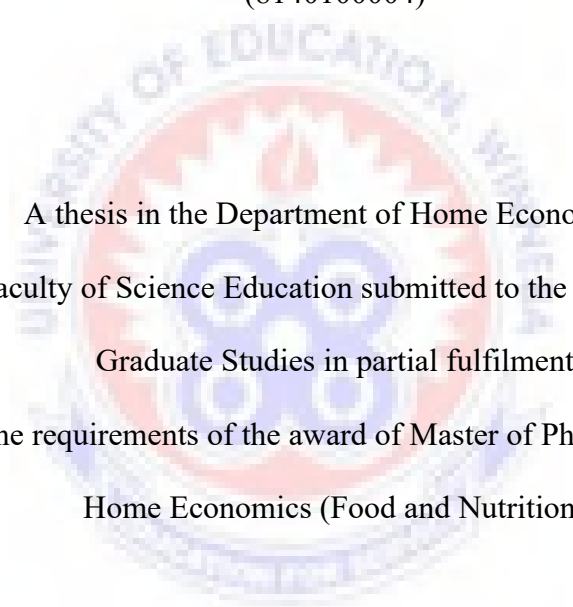


JUNE, 2019

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INVESTIGATING THE FOOD HABITS OF PREGNANT WOMEN IN THE
NEW JUABEN MUNICIPALITY, KOFORIDUA – EASTERN REGION, GHANA

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A thesis in the Department of Home Economics,
Faculty of Science Education submitted to the school of
Graduate Studies in partial fulfilment
of the requirements of the award of Master of Philosophy of
Home Economics (Food and Nutrition)

June, 2019

DECLARATION

I, **Stella Appiah**, declare that this thesis with the exception of quotations and references contained in published works which have all been identified and acknowledged, this thesis is entirely my own original work, and that it has not been published or submitted in part or whole for another degree elsewhere'

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SUPERVISOR'S DECLARATION

I hereby certify that the preparation and presentation of the thesis was supervised in accordance with the guidelines on supervision of thesis laid down by the University of Education, Winneba.

Name of Supervisor: Madam Comfort Katum Madah

Signature:

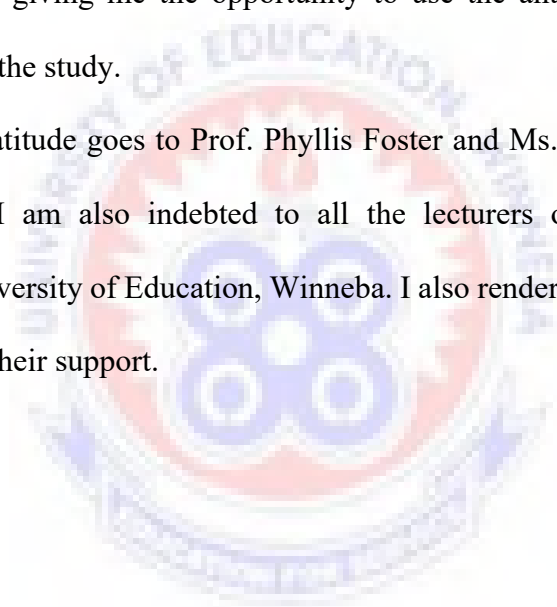
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DEDICATION

I dedicate this thesis to the Almighty God for His Grace and Mercies. Also, to my children and family.



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ABSTRACT

Maternal mortality reduction has been a global health priority to prevent women and babies who die due to complications from pregnancy and childbirth especially, in developing country. There have been several interventions to curb maternal and neonatal deaths in Ghana. To achieve good maternal health the food habits of pregnant women in the New Juaben municipality, Koforidua in the Eastern Region of Ghana was investigated. Descriptive survey was used to find out the nutritional knowledge of the pregnant women, identify their food intake, health challenges during pregnancy and also how to improve the food habits of pregnant women attending ante-natal clinic at the Eastern Regional Government Hospital, in the New Juaben Municipality in Koforidua. Purposive and convenience, both non-probability sampling techniques were used on 100 respondents aged 15-41 years and above using questionnaire and interview guide. Analysis was done using S.P.S.S version 23 and the result was analysed using descriptive statistics. It was deduced from the findings that ignorance, socio-cultural and economic factors inhibit respondents intake of nutrients because sometimes the food is available, but culturally unacceptable norms forbid them to eat while others cannot afford to buy and eat nutritious food. Inferential statistic was also performed using the one sample t-test, it was concluded that there was statistically significant difference in the nutritional knowledge of protein, $t(99) = -3.282$, $p\text{-value} = 0.001$) and iodine ($t(99) = -2.650$, $p\text{-value} = 0.009$). However, there was no statistical significance in the nutritional knowledge of vitamin B ($p\text{-value} = 0.079$), vitamin C ($p\text{-value} = 0.314$), vitamin D ($p\text{-value} = 0.282$), folic acid ($p\text{-value} = 0.451$), calcium ($p\text{-value} = 0.499$) and omega 3 fatty-acids ($p\text{-value} = 0.770$) among pregnant women. This means that the pregnant women who attended ante-natal clinic at Koforidua regional hospital had nutritional knowledge of protein and iodine, but lacked nutritional knowledge of some vitamin including folic acid, calcium and omega 3 fatty-acids, which serves as some essential nutrients needed in pregnancy. Pregnant women should report health challenges such as nausea, oedema and other health challenges to their health care providers to be addressed promptly to prevent complications. To improve on the food habits of respondents' variety of foods should be eaten. It is recommended that provision of comprehensive nutritional education should be given to all women in the reproductive years. Cultural barriers associated with food should be discouraged and consumption of locally produced nutritious food should be encouraged before and during pregnancy to prevent maternal malnutrition and its related effects. Pregnant women should eat balanced diet to help achieve the Sustainable Development Goal 3 of good maternal health by the year 2030.

CHAPTER ONE

INTRODUCTION

1.1 Overview

This chapter consists of background of the study, problem statement, objectives, research questions, hypothesis, significance and organisation of the study. It also contains operational definition of terms and abbreviations.

1.1 Background of the Study

Healthy pregnancy outcomes for both mother and foetus can result from good nutrition and healthy lifestyle choices. Nutrition during pregnancy can affect not only the foetal development, but also the risk of chronic diseases for the infant in adulthood (Koletzko, 2012). It is commonly accepted that the foetus is nourished adequately at the expense of maternal stores therefore, if certain essential nutrients are not available during particular sensitive windows of development at conception, foetal development can be less than optimal (Zeisel, 2009). To have good pregnancy outcome it is important for pregnant women to have good food habits by eating varied diet to meet their nutritional requirements. However, women's dietary behaviours and intake during pregnancy are strongly influenced by different cultural practices, myths, taboos and ignorance formed from food habits. Food habit is the way in which people select, cook, serve and eat foods that are available to them. It differs from one ethnic group to another and from one country to another. Some people use their fingers, others use cutlery and still others use chop sticks. All these describe the food habits of people (Keletzko, 2012).

On the other hand food habits can also be described as the typical behaviour of a particular group of people in relation to food. It determines one's food choices, number of times meals are served per day, size or portion of food shared at meals, methods of

food preparation and who takes part in the meal. It can also, be describe as the product of the environmental influences on culture and sometimes resistant to change (Barasi, 2003; Fieldhouse, 1993). According to Whitney and Rolfes (2007), the acquisition of food habits is mostly unconscious, since food habits are acquired at a younger age from parents and incidentally ensure transmission between generations. Therefore it is important to develop healthy eating habits, especially, during pregnancy because it is one of the most critical developmental periods of life (Whitney *et.al*, 2007). According to Fieldhouse (1993), food habits to a large extent can be used to measure the nutritional level and health of the individual depending upon the kind, quantity and quality of foods eaten. According to Bennet and Brown (1996), food production is theoretically sufficient to feed the world's population but about one billion people are undernourished while approximately two billion suffer from micronutrient deficiencies. If people do not have enough to eat, they would be hungry and poorly nourished. However, Fieldhouse (1993) asserted that the abundance of food itself does not guarantee that an individual will be well nourished. He explains that even if there is abundance of food, people may suffer from a sort of hunger or nutrient deficiency if they choose wrong kinds of food or eat more or less than the body requirements. Therefore, though food may be abundant in Ghana, availability of food is not a good basis from which to predict good food habits. Keletko, (2012) were also of the views that whether food supplies are limited or abundant, people tend to develop patterns of eating while these patterns settle to form fixed food habits.

According to Webb (2003), pregnant women require varied diet to meet their nutritional requirements to improve the nutritional status because pregnancy is a critical period for meeting the body's demand for macro and micronutrients (Ali, 2013). It is opined that pregnancy increases energy needs by 13%, protein by 54% and vitamin and mineral by

0.50 per cent but in developing countries, poor nutritional status in pregnancy accounts for 18.5% of maternal stunting (Administration Committee on Coordination/Sub-committee on Nutrition (ACC/SCN, 2000). It has also been noted that a sub-optimal diet that comprises of inadequate intake of calories and essential micronutrients, combined with a heavy workload, impacts adversely on the health of the mother, the developing foetus or the new-born baby (Mpontshane *et al.*, 2008). In Ethiopia, 50 per cent of the population cannot meet their daily minimum energy requirement of 2200 calories (MOPED, 1999), 871 and 673 maternal deaths per 100,000 live births were recorded in 2000 and 2005, respectively. Rural women are more likely to suffer from Chronic Energy Deficiency (CED) than women in urban areas (Teller & Yimar, 2000). The effects of low birth weight, prematurity for perinatal mortality, morbidity in developing countries and its association with under-nutrition and malnutrition in the mothers have motivated various attempts to improve pregnancy outcome through food supplementation (Ceesay, Prentice, Cole, Foord, Weaver & Poskitt, 2003). Although nutritional supplements can provide large quantities of particular micronutrients but a healthy balanced diet should form the basis of a woman's nutritional intake. Maintaining a healthy diet before and during pregnancy helps to protect both the pregnant mother and her developing baby from immediate and long-term health risks. This is because a woman's nutritional status during pregnancy depends upon availability of nutritional reserves of particular micronutrients which have been built up in her body from prior consumption such as calcium and iron among the lot. As these reserves build up before a woman becomes pregnant, maintaining good nutrition prior to conception ensures adequate nutritional status during pregnancy. Furthermore, women who are underweight or overweight, or who have deficiencies in particular micronutrients rarely "catch-up" by improving their diet once they are pregnant, as at

this stage their body already faces additional nutritional demands because of the growing baby. In Ghana, the attributes to maternal death includes postpartum haemorrhage, hypertension, abortion and sepsis. Ghana was estimated 358 per 100,000 live births in 2015 which was higher than 190 maternal deaths per 100,000 live births projected under the Millennium Development Goal (MDG), (Ghana MDG report, 2015 www.undp.org.>Doc>Incigro, Ghanaian Times Newspaper, 2019). However there has been lot of interventions to meet the set target but further progress need to be made in the full unmet MDG 5. To ensure healthy lives and to reduce maternal mortality rate the Sustainable Development Goal (SDG) 3 has been the present universal health coverage. This is to challenge countries to provide equitable access to good health irrespective of location, economic status, age and sex. Thus improving maternal health is critical in saving the lives of women who die due to complications from pregnancy and childbirth yearly. It is estimated that over 90% of these deaths could be prevented if women in developing countries' including Ghana have access to sufficient diets, basic literacy, health services, portable water and sanitation facilities during pregnancy and child birth. Therefore, there is more to be done in terms of good food habit practices during pregnancy in order to revive the Millennium Development Goals 4 and 5 and proceed to achieve maternal health of the Sustainable Development Goal (SDG) 3 by the year 2030.

1.2 Problem statement

Maternal health is an important issue that has large economic implications because the transition of food habits during pregnancy is most critical since good food habits result in good pregnancy outcome. However, food preferences are established in the early stage of life, while people make independent food habits decisions as they move in the stages of life. But it has been observed that due to ignorance, cultural beliefs and socio-economic factors stemmed from food habits most women enter pregnancy with poor nutritional status and may suffer macro and micro-nutrient deficiencies. The nutritional status of a woman before and during pregnancy is important as a sub-optimal diet impacts negatively on the health of the mother and the foetus. Food habits in pregnancy are critical issue that cannot be overlooked when considering the health of a country, especially a developing country like Ghana. It is estimated that over 90% of maternal and neonatal deaths could be prevented if women in developing countries have access to sufficient diets, basic literacy, health services, safe water and sanitation facilities during pregnancy (<http://www.mdgmonitor.org/dg-progress-report-africa/>).

To achieve good maternal health, the food habits of pregnant women should be investigated and addressed. Though, there has been a lot of interventions like Millennium Development Goal (MDG) 5 which was instituted to address maternal health and thus reduce maternal mortality by three-quarters and the fourth goal aims at reducing infant mortality are considered under the Ghana Health and Insurance Scheme. Despite considerable investment in health care, Ghana has not made adequate progress in reducing maternal mortality. Previous targets to curb maternal mortality were aimed at 190 deaths per 100,000 births in 2015 but Ghana recorded 384 deaths in maternal mortality. In 2016, 128 deaths per 100,000 births were recorded while in 2017, 144 deaths per 100,000 births were recorded. In 2019, 210 deaths per 100,000 births

were recorded (Ghana MDG report, 2015 www.undp.org.>Doc>Incigro, Ghanaian Times Newspaper, 2019). The new global target on maternal mortality set by the WHO is 70 deaths per 100,000 live births by 2030 (SDG 3). However, a remark made by WHO representative indicated that the current pace of Ghana's reduction in mortality is slow making the Global target unattainable (Ghanaian Times Newspaper, 2019). Therefore, it may be difficult to achieve this goal without considering maternal food habits which contribute a great deal to maternal and infant good health.

It is upon this backdrop that the study aimed at determining the nutritional knowledge, food choices, intake and attitude towards food among the pregnant women in New Juaben Municipality. This may assist to improve the practice of good food habits through nutrition education and also create the awareness of good nutrition especially, before, during and after pregnancy in order to achieve maternal health of SDG 3 by the year 2030.

1.3 Purpose of the Study

The purpose of the study was to investigate the food habits of pregnant women attending ante-natal clinic at Eastern Regional Government Hospital, Koforidua.

1.4 Objectives of the Study

The study objective is to:

1. find out the nutritional knowledge of the pregnant women attending antenatal clinic at the Eastern Regional Government Hospital, Koforidua.
2. identify the food eaten by the pregnant women attending antenatal clinic at the Eastern Regional Hospital Government, Koforidua.
3. ascertain the disease/health challenges of pregnant women attending antenatal clinic at the Eastern Regional Hospital Government, Koforidua.

4. find out how to improve the food habits of pregnant women attending antenatal clinic at the Eastern Regional Government Hospital, Koforidua.

1.5 Research Questions

The study was guided by the following research questions:

1. What is the nutritional knowledge of the pregnant women attending antenatal clinic at the Eastern Regional Government Hospital, Koforidua?
2. What foods are eaten by the pregnant women attending antenatal clinic at the Eastern Regional Government Hospital, Koforidua?
3. What are the diseases/health challenges of pregnant women attending antenatal clinic at the Eastern Regional Government Hospital, Koforidua.
4. How do we improve the food habits of the pregnant women attending antenatal clinic at the Eastern Regional Government Hospital, Koforidua?

1.6 Hypothesis

H₀₁: There was no significant difference between the nutritional value knowledge and the food habits of pregnant women attending ante natal clinic at Koforidua Regional hospital.

1.7 Significance of the Study

The findings of the study will encourage women to modify their food habits by eating variety of foods. It may also be used by Ministry of Public Health and other organizations working in the promotion of maternal health to implement programmes aimed at improving food habits among pregnant women as a way to improve maternal nutritional status. It will inform policy makers to find ways to curb poor food habits of women during pregnancy to prevent maternal and foetal mortality. Opinion leaders may find ways to discourage some cultural practices associated with food especially among

pregnant women. The study will also contribute to knowledge on food habits of pregnant women and factors related to it.

1.8 Delimitation

The study was carried out in the Eastern Region Government Hospital, Koforidua. It is the only regional hospital in the Eastern part of Ghana, and receives referrals from other parts of the region. It would also have been carried out in all health centres and maternity homes in the New Juaben Municipality but due to time and financial constraints, it was limited to the Eastern Regional Government Hospital, Koforidua alone.

1.9 Limitations

The number of respondents used was hundred and twenty (120) during the administration of the instruments but due to discomfort associated with pregnancy twenty (20) respondents were not able to give responses as required for the study. In all hundred (100) questionnaires were used as primary data for the study.

1.10 Organization of the study

The study is presented in six chapters. Chapter one is the introduction which consists of background of the study, problem statement, objectives, research questions, hypothesis, significance, limitation, delimitation and organisation of the study. Chapter two involves comprehensive review of literature related to the study. The purpose of chapter 2 is to acquaint the reader with existing studies relating to the issues covered in the study. It also provided the theoretical framework for the study and established the need and relevance of the empirical data for the study. Chapter three deals with the methods used to collect data for the study under the following headings: research design, study area, population, sample and sampling procedure, research instruments,

validity and reliability, pretesting, data collection procedure, method of data analysis and ethical considerations. Chapter four presents results of the research findings. Chapter five discussed the results of the research findings, and finally, chapter six comprised the summary, conclusion and recommendations of the study.

1.11 Operational definition of terms and abbreviations

- **Food aversion:** the avoidance of food in pregnancy due to excessive vomiting
- **Hyper emesis gravidarium:** pregnant women who experience extreme nausea and vomiting which can adversely affect the mother and the foetus. It can result in dehydration, electrolyte imbalance and malnutrition
- **Insomnia:** Medical condition in which you have difficulty sleeping.
- **Gestation:** the period of intra uterine development of offspring from conception to birth in humans. Gestation lasts for 40 weeks after the woman's menstrual period (range of 37 to 41 week)
- **Low Birth Weight:** This refers to any weight less than 5.5 lb or 2.5 kg at birth, and the most common form called preterm birth
- **Metabolic Toxaemia;** (disease caused by lack of protein and vitamin which can cause death to both the mother and the baby)
- **Millennium Development Goal:** One of the eight National goals set by the Government of Ghana to be achieved by the year 2015. The fourth and fifth goals address the reduction of maternal and infant mortality. The aim is to ensure the wellbeing of mothers and their babies. Pregnant women are to have access to maternal care to receive nutritional advice, alert them of warning signs of possible complications and to give support in safe delivery. This is now considered under the Sustainable Development Goal (SDG) 3 to achieve good maternal health by the year 2030.

- **Pica:** The practice of eating non-food items such as dirt, laundry starch and clay during pregnancy
- **Pre-term:** An infant born before 37 weeks of gestation also referred to as “pre-mature birth”.
- **Spina bifida:** incomplete development of the brain or spinal cord in babies during pregnancy.
- **The European Food Safety Authority (EFSA)** recommends that all pregnant women should consume an additional 700-1400mg/week of DHA (EFSA, 2010). This is in addition to the requirement of 1750mg/week combined EPA and DHA.
- **Trimester:** three or 13 to 14 weeks into which the normal pregnancy of 37 to 41 weeks is divided.

Abbreviations

- **ACC:** Administrative Committee on Coordination
- **AOG:** American Association of Obstetrics and Gynaecologist
- **ACOG:** American College of Obstetrics and Gynaecologist
- **A N C:** Ante-natal clinic
- **CED:** Chronic Energy Deficiency
- **CDC:** Centre for Disease Control and prevention
- **DDS:** Dietary Diversity Score
- **D D N S:** Deputy Director of Nursing Services
- **DHA:** Daily healthy allowance
- **DNA:** Deoxyribonucleic acid
- **EFSA:** The European Food Safety Authority
- **EPA:** Eicosapentaenoic acid

- **FAO** : Food and Agriculture Organisation
- **FSAI**: Food Safety Authority of Ireland
- **HSE**: Health Service Authority
- **ICN**: International Conference on Nutrition
- **IUNA** :Irish Universities Nutrition Alliance
- **MDG**: Millennium Development Goal
- **NICE**: National Institute for Health and Clinical Excellence
- **PPH**: Post- partum haemorrhage
- **PUFA**: Polysaturated fatty acid
- **S C T**: Social Cognitive Theory
- **SCN**: Sub Committee on Nutrition
- **SHS**: Senior High School
- **SLAN**: Survey of Lifestyle, Attitudes and Nutrition
- **SDG**: Sustainable Development Goal
- **WFP**: World Food Programme

CHAPTER TWO

LITERATURE REVIEW

2.0 Overview

This chapter involved comprehensive review of literature. It included the theories of food habits, the conceptual framework for the study. It also established the need and relevance of the empirical data related to food habits. It is presented under the following headings; overview food habits, factors affecting food habits, nutrition in pregnancy, attitudes of pregnant women towards food, effects of food habits on nutritional status and how to improve food habits of pregnant women.

2.1 Theories of Food Habits

Social Cognitive Theory (SCT)

The Social Cognitive Theory (SCT) states that when people observe a model performing behaviour and the consequences of that behaviour, they remember the sequence of events and use this information to guide subsequent behaviours. Bandura (1986) submits that observing a model can also prompt the viewer to engage in behaviour they already learned. This study is to investigate the extent to which selected social cognitive theory constructs can predict behaviours since it offers practically useful framework for designing primary prevention interventions to reduce maternal malnutrition. Again, the SCT deals with interpersonal level determinants and emphasizes the role of environmental, cognitive, and behavioural factors that influence behaviour. This theory is easily adaptable, promotes self-efficacy and goal setting as ways to encourage behaviour change. It has been particularly effective in diabetes and nutrition education and predicting uptake of healthy behaviours (Offei-Ansah, 2013).

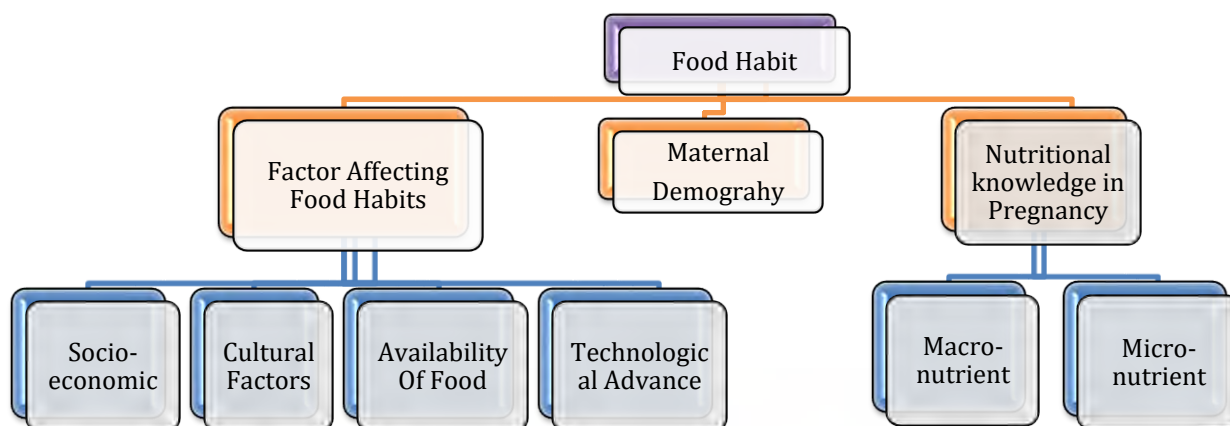


Figure1: Conceptual Frame Work: Food Habits of Pregnant Women

The conceptual framework Figure 1. is adopted and modified from UNICEF conceptual framework on Determinant of Malnutrition (UNICEF, 1998). Maternal and foetus health is greatly determined by their food habits. Availability of food, socio-cultural and economics factors, religious beliefs, technological advancement and nutrition during pregnancy has been identified as the underlying factors that influence food habits and nutrient intake during pregnancy to prevent under nutrition.

Knowledge of what to eat and quantity are pre-requisite to good health, therefore what is eaten affects one's ability to stay healthy, work and live especially during pregnancy (Offei-Ansah, 2013).

2.3 Overview of Food Habits

Food habit is the typical behaviour of a particular group of people in relation to food. It determines ones food choice, eating times, number of meals served per day, the size or portion of the food served or shared, methods of food preparation and those who takes part of the meal (Fieldhouse, 1993). Barasi (2003) also opined that food habit is the

product of the environmental influences on culture and in general resistant to change. Foskett and Cesarani (2012) expressed that the acquisition of food habit is mostly unconscious, since it is acquired at a younger age from parents, which ensures transmission between generations. However, food habits changes as social cycle of the individual widens (Foskett & Cesarani, 2012). Fieldhouse (1993) is of the opinion that people who are fortunate to have a choice of food to eat have the opportunity to choose healthy and varied food and control their food habits. However, Tull (1996) explained that the choice of food made depends on several factors, some of which may be more influential than health considerations. According to Anderson and Valyvasevi (1998), food habits of a person whether good or poor furnish presumptive evidence of the nutritional status of the individual especially, during pregnancy where optimal nutrition is integral to a healthy pregnancy outcome. It is agreed by Addow *et. al*, (1993) that each individual eats certain foods and refuses other foods. For example, favourite foods may be traced to childhood of family meals or special gatherings and the pattern of food habits reflects the foods refused as well as those accepted as one grows. The food habits acquired may be negative where poor choices of food are made and positive as one eats variety of diet (Barasi, 2003). It is opined that the basic influence of food habits formation is based on food supply which determines the quantity, quality and kind of food available to a population. Also, it is the ability of individuals and families to afford the food that is available (Whitney *et. al*, 2007). In addition, family meals customs may be deeply rooted in racial, religious and family beliefs and habits developed over generations (Karaoglu *et. al*, 2010). They continued that situations that generate pleasure, annoyance or frustration with respect to foods may be responsible for the attitudes towards the choice and eating of certain foods. According to Webb (2003), knowledge of food values may provide the basis in selecting foods because some people

eat food with no nutrients. However, presently, nutritional content of food has recently become a significance factor in the choice of food while sensory attributes contributes to ones like or dislike of food (Whitney *et. al*, 2007). Filling the gap in knowledge of maternal under nutrition and generating information for intervention it is important to have a look at maternal nutrition during pregnancy because inadequate intakes of specific nutrients in pregnancy have been reported to lead to poor maternal nutritional status resulting in variety of poor maternal and infant outcomes (Black *et. al*, 2008). For example, inadequate intake of iron in pregnancy can lead to maternal anaemia and increased risks of maternal mortality if the anaemia becomes severe (Cheng, Dibley, Zhang, Zeng & Yan, 2009). It has been said that worldwide, anaemia contributes to 20 percent of all maternal deaths and is responsible for 40 to 60 percent of maternal deaths in non-industrialized countries (Karaoglu *et. al*, 2010). It is also estimated that anaemia accounts for 3.7 percent and 12.8 percent of maternal deaths during pregnancy and childbirth in Africa and Asia, respectively (Gautam *et. al*, 2008). Anaemia has also been found to lead to premature births, low birth weight, foetal impairment and infant deaths (Kalaivani, 2009).

Moreover, maintaining a healthy diet prior to conception is also important because development of the baby depends on the health of the embryo from which it is formed. Evidence suggests that maternal nutritional status has an important influence on the proportions of cells formation of foetus and placenta. In undernourished women who do not consume enough energy or calories a greater proportion of cells are likely to form the placenta compared to the foetus. This means that the foetus will be relatively small when it begins growth and development in the womb. Also it increases the likelihood that the baby will be too small (weigh less than 2.5kg) when it is born (Bennet & Brown, 1996). Therefore when a pregnant mother does not consume enough

of particular micronutrients, it can retard foetal development in the early stages of pregnancy (Barasi, 2003). Sweet (1993) also gave strong evidence of an association between folate deficiency and deficits in the development of the neural tube ([http://www.myumc.com/medical-dictionary/neural tube-defects](http://www.myumc.com/medical-dictionary/neural-tube-defects)). In support Karaoglu *et. al*, (2010) supported that poor maternal nutrition is a key factor contributing to poor foetal development, which increases the risk that a new born baby may be sick or die. Again research shows that maternal nutritional status during pregnancy plays a more important role in determining foetal health and predisposition to some diseases. To this Webb (2003) opined that maternal nutrition during pregnancy also appears to have a “foetal programming” effect, that is, the foetus learns nutritional habits, which will influence it for the rest of its life, before it is even born. A foetus will also adapt its metabolism and other body systems to cope with different states of nutrition. For example, an under-nourished foetus, which does not receive enough macronutrients or energy, responds by reducing glucose and insulin production, which ultimately slows the rate of foetal growth and increases the risk of low birth weight. It may also alter the metabolism permanently and leave an individual predisposed to metabolic conditions such as diabetes (Bennet & Brown, 1996). Sweet, lamented that the foetus also adapts to under-nutrition by redirecting blood flow and the supply of nutrients to protect the brain, at the expense of fully developing other organs including the kidneys, muscles and endocrine system (the system which regulates the body’s hormone production). Webb (2003) continued that the nerve which regulates the foetus’s appetite is also programmed while it is developing in the womb and this affects an individual’s appetite regulation later in life. The foetal programming effect influences not only how much an individual consumes, but also their food preferences. For example an individual who is programmed to consume high-fat and sugar diets in utero

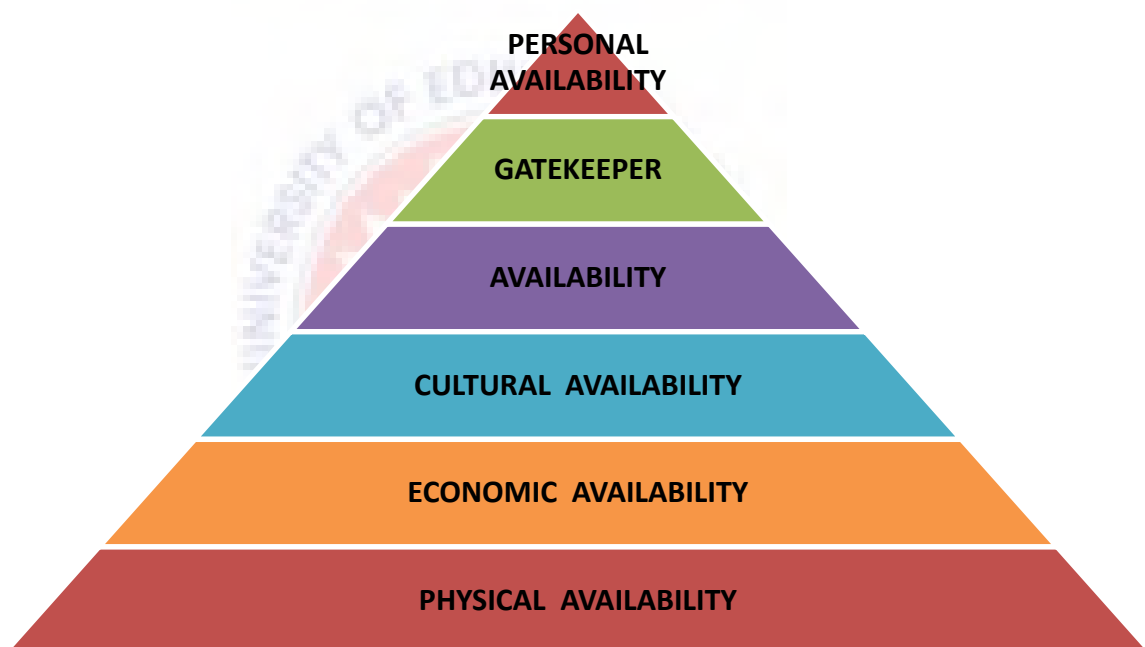
also has a greater tendency to consume such diets throughout their life (Webb, 2003). Furthermore, all women experiences increase in nutritional requirements during pregnancy, therefore, should be well informed to maintain a healthy balanced diet. However, some women may find it difficult to access or consume all the necessary components of healthy diet throughout their life and during pregnancy. For example, those who are in food insecure areas are unable to access enough food to nourish themselves and their baby (Academy for Educational Development Maternal nutrition during pregnancy and lactation, 2004).

The international community in observing maternal mortality in pregnancy especially, in developing countries unacceptable instituted the Millennium Development goal to improve maternal health. The maternal mortality rate in developing countries is higher than in developed nations and targeted to reduce maternal mortality ratio by 75 percent. They asserted that hunger and malnutrition increases the incidence and fatality of conditions that contribute to nearly 80 percent of maternal deaths. It has been universally observed that, there were an estimated 289,000 maternal deaths in 2013 which is equivalent to around 800 women dying daily. The highest rate of maternal death is in sub- Saharan and Southern Asia, which collective accounted for 86 percent of global maternal death. They continue that most of these deaths are preventable, with haemorrhage for over 27 percent in developing countries and 16 percent in developed countries. Other complications leading to death include high blood pressure, infections, unsafe abortion and complication from delivery (<https://www.mdgmonitor.org/wp-content/uploads/2015/09/MDG5-1.jpg>).

2.4: Food selection model

In food selection a model should provide a framework to organise and integrate the factors influencing food selection and eating. A simple model selection for this project

has been based on Maslow's hierarchy of needs and eating. Maslow envisaged that there should be a minimum availability of food at the lowest levels in the hierarchy to be achieved before the next level becomes significant influence upon selection. Though in practice there may be variations of different foods. The level of Maslow hierarchy in the selection of food has been addressed with five levels which are physical (can the food be obtained), economic (can the food be afforded), cultural (is the food culturally recognized and accepted as food), gatekeeper (is it provided by parent, self, spouse or other) and personal (like and dislike).



Source: Webb, (2003)

Figure 2: Food selection model using Maslow's hierarchy

2.5: Factors Affecting Food Habits

Food habits are formed or changed by factors such as availability of food, economic status, socio-cultural, personal likes and dislikes and religion. Others include education, government policies on food, technology, meal management and household food security

2.5.1 Physical Availability of Food

According to Addow *et. al*, (1993), the climatic conditions and type of soil dictates the kind of foods that can be cultivated in an area. Barasi (2003) said that this will determine the range of potential edible foods that may be available in any particular local environment. Foskett and Cesarani (2012) too was of the view that crop failure or distribution problems may make food scarce or not available at all due to poor weather conditions and that some foods will be available seasonally. Foods grown in a particular geographical location are cheaper, therefore, most people depends on the locally produced foods (Addow, Daaku, Daaku & Ofosu, 1993). Fieldhouse (1993) expressed that people can choose from wide range of food available to them but the availability of food does not mean that they have chosen the correct foods rich in nutrients.

2.5.2 Economic status

It is written in Whitney *et. al*, (2007) that the availability of money is a variable limiting influence on the types of foods to purchase and eat. According to Foskett and Cesarani (2012), the economic status of an individual is crucial to what is chosen and eaten because people can only buy what they can afford within the range of foods available to them. When income is small, it reduces the food budget and variety of foods eaten becomes smaller and the diet becomes monotonous (Barasi, 2003). Besides, the price of food depends upon the cost of growing, harvesting, storing, processing, distribution, packaging, advertising and selling of food. Seasonal foods are fresh and cheaper when in season but costly while out of season when it is scarce. Also variations in quality of a particular food determine the price of the commodity. For example fresh wholesome tomato is more costly than rotten ones (Tull, 1996).

The economic status of pregnant women in relation to their food habits, Sweet (1993) stated that suboptimal nutrition is very common among pregnant women particularly in areas where un-employment and subsequent poverty are common. In addition, Bennett and Brown (1996) contributed that in developing countries high maternal death is attributed to poverty, low status of women, female illiteracy and inadequate primary health care. Furthermore, Wardlaw (2003) said poverty, inadequate health care and poor health practices are some of the causes of malnutrition among pregnant mothers. Sweet (1993) affirmed that the incidence of congenital malfunctions is higher in areas of UK such as Wales, the West Scotland and Ireland where there are more couples in the lower socio-economic group. Sweet also observed that pregnant women overwork and cannot provide sufficient nutrients to be stored in bodies for the child. Moreover, Adigbo and Katum (2011) explained that even though, nutritional knowledge of an individual may be high, the economics status influences what and how food should be eaten. Ogunyuyigbe (2000) in his studies found that the weight and health of mothers during pregnancy and their socio-economic status affect the birth weight of infants. A study done by Murakami *et. al*, (2003) among Japanese pregnant women revealed that individuals with a higher socio-economic status were found to consume diets that were of higher in quality than those with a lower socio economic status. Other studies have also shown that families which have greater incomes and resources tend to have more diverse diets as food access is determined by income and the prices of foods (Brinkman *et. al*, 2009; Ponce, Ramirez & Delisle, 2006; Arimond and Ruel, 2004). According to Brinkman *et. al*, (2009), global financial crisis have an impact on the underlying factors of malnutrition in pregnancy which include insufficient access to food, inadequate maternal and child care practices, poor public health as well as inadequate health services. Again, a study done by Tarasuk, *et. al*, (2007), revealed that, where resources

were minimal, women with limited resources may either reduce their consumption or deprive themselves of food in order to give to their children to spare their children from deprivation and hunger. Tarasuk *et. al*, (2007) continues that this shows that food intakes of women depends on household resources and women can deny themselves with food even in pregnancy which may affect them adversely. This explains Whitney *et. al*, (2007) discussions that people may go hungry even where food supplies are plentiful due to poverty and continued that there are marked difference between the diets of the affluent and the poor which brings about inequalities in health (Whitney *et. al*, 2007).

2.5.3 Socio-Cultural

Every cultural group possesses its own typical food selection patterns as traditional foods confer a sense of identity or belongingness. This is very deeply held as it is mostly derived from socialization process in childhood (Barasi, 2003). Therefore foods that may be eaten at meals are culturally determined and people normally eat foods they recognise as food and which are culturally acceptable (Whitney *et. al*, 2007). Foods which are present and affordable but culturally unacceptable are not eaten because people belonging to specific cultures have their own food customs (Webb, 2003). Each group determines what could be eaten and what could not be eaten as food (Barasi, 2003). Foskett and Cesarani (2012) supported that the races of the world represent a great variety of cultures and each has its own choice of food and their own ways of cooking. Thus food customs are carried over to wherever the people go and sometimes no matter what happens they would still want to eat their traditional food (Addow *et.al*, 1993). According to Webb (2003) people divide potentially edible food material into food and non- food. They regard different foods as more or less appropriate for particular uses which stem from their culture. As cited in Ali (2013), pregnant women's

dietary behaviour and intake during pregnancy are strongly influenced by different cultural practices, myths and taboos. Barasi (2003), said that many cultures have prohibitions associated with food during pregnancy on beliefs and possible effects on the foetus. Some may restrict intakes of foods, such as meat or other useful sources of iron rich foods which are needed for good pregnancy outcome. She continued that others believed that certain foods eaten certain times of conception can influence the gender of embryo to be male or female.

However, many occasions and ceremonies such as funerals, marriages, religious festivals, harvest are celebrated with feast or fasts (not eating food for a specific period of time), or special meals or during special occasions (Addow *et. al*, 1993). Food taboos are foods forbidden to be consumed by some people due to certain reasons. It may be religious or cultural beliefs. Some cultures consider certain foods as dirty and therefore, prevents its member from eating such foods. For example, Krobos will not eat snails because they believe it is dirty and they may get rashes, while the Ashantis regard snails as delicacies (Addow *et. al*,). Again food fads are some practices about food engaged in by some people for a relatively short period, which may have an adverse effect on the health of the people especially, pregnant women. Besides, food fallacies are wrong opinions about the role of certain food nutrient in the body and this also contribute to the high rate of malnutrition among pregnant women and children. For example the Krobos do not eat snail because of developing skin rashes however, snail is a rich source of protein, calcium and other rich nutrients (Ali, 2013).

2.5.4 Personal likes and dislikes

Individual likes and dislikes of food avoidance due to belief or physiological intolerance may make the food personally unavailable. Personal preferences for food

are usually linked to a linking for the sensory attributes of food, which contribute to pleasure of eating it (Addow *et. al*, 1993). Also some people choose and enjoy certain foods more often than others and this may accounts for the reasons for avoiding particular foods due to the dislike of the flavour, appearance or texture of the food. Others may disagree with the way the food is produced or prepared and cooked, or associating the food with feeling ill due to allergy or past food poisoning (Tull, 1996). Adigbo and Katum (2011) said people eat foods they are familiar with and have appetite for as well as the kinds of food they like and enjoy. Fieldhouse (1993) expressed that people can choose from wide range of food available to them but the availability of food does not mean that they have chosen the correct foods rich in nutrients.

2.5.5 Education

Education has great influence on people's including their food habits. When people get educated, they gain knowledge about themselves, how they select and eat food based on their health (Webb, 2003). Therefore, most educated people attitude towards selection of food may change because they may select food to improve their health rather than foods that just fill their stomach or stimulate their palate. They may also understand the good and bad principles about superstitions and taboos therefore, they are able to make better judgement about their choice of food (Whitney *et. al*, 2007). According to Adigbo and Katum (2011), an educated individual is better able to accept different varieties of food no matter their cultural background.

2.5.6 Religious Beliefs

According to Foskett and Cesarani (2012) throughout the world religion always affect what people eat and people's diets are restricted by their religion which may include fast and special celebrations. Addow *et. al*, (1993) asserted that food and drinks are

used in the ritual and ceremonies of many religions. Adherence to dietary rules of a religion acts as a common bond and serves to differentiate one religion from the non-believers. Religion also serves as an outward symbol of a person's piety and self-discipline, for example the dawn to dusk fasting observed by Moslems during Ramadan (Webb, 2003).

2.5.7 Government policies

Some government policies affect the supply and price of food. Governments also import or export food which have some effect on the prices of these food (Webb, 2003).

2.5.8 Technological advancement

According to Addow *et. al*, (1993), quality transportation systems make selection of food possible all year round. The range and amount of food available will be limited without transportation of food from where it is grown to the market place else people would eat only foods grown and processed locally.

In addition, some foods may be unavailable without technology. It provides scientific methods of preserving food, processing and storing in the food industry so that it is available throughout the year (Tull, 1996). Furthermore, advertising and promotion of new food products on television, books, newspapers and journals increases people's knowledge about food in the context of nutrition and health (Barasi, 2003).

2.5.9 Meal management practices

Meal management practices include the skills you have, time available and energy you have for meal preparation and service. It also includes the facilities you have and how well it can be used to your advantage. Meal management practices affect food habits because you can only prepare and eat foods you can easily cook with the facilities and the knowledge you have about the particular food (Ivers & Cullen, 2011).

2.5.10 Household Food Security Status

Food security requires nutritional adequacy, and therefore, when an individual is undernourished or has a micronutrient deficiency; it may be as result of food insecurity (Ivers & Cullen, 2011).

Food insecurity is the limited or uncertain availability of nutritionally adequate and safe foods or limited or uncertain ability to acquire acceptable foods in socially acceptable ways (González *et. al*, 2008). When the amount of food available is limited, individuals tend to consume less varied diets such as less fruits, vegetables, protein foods, and usually there is lower energy and micro- nutrient intakes. Household food insecurity has been identified as one of the underlying factors affecting nutritional status (Ivers & Cullen, 2011). Food insecurity has often been associated with poverty and low income. Women are generally charged with the responsibility of taking care and maintaining the households, especially, when they have low education and with few economic opportunities they may find it difficult to maintain the home. Household food insecurity is related to lower macro- and micronutrient intakes, lower intake of fruits and vegetables, and lack of diet diversity (Ivers & Cullen, 2011).

2.6 Nutrition in pregnancy

Maternal nutrition at conception influences the growth and potential development of the foetus which contributes to the maturity of a healthy baby. It is an acceptable fact that the foetus are nourished adequately at the expense of maternal stores and needs, because foetal development can be less than optimal if certain nutrients are not available during particular sensitive windows of development (Zeisel, 2009). Nutrition during pregnancy affects not only foetal development, but also the risk of chronic diseases for the infant in adulthood (Koletzko, 2012). A nutritious diet is directly linked to a higher

chance of a normal birth-weight, improves foetal brain development, and reduces the risk of many birth defects by keeping yourself and your baby healthy (Koletzko, 2012).

Therefore, balanced diet during pregnancy period should provide women with the right amount of energy as well as certain essential nutrients in their correct quantities and ratios for good pregnancy outcome. Besides, a balanced diet may reduce the risks of pregnancy complications like anaemia; minimize morning sickness, fatigue, and other unpleasant pregnancy symptoms. Good nutrition is also thought to help balance mood swings and improve labour and delivery (Sweet, 1993). However, improper eating habits among pregnant women may have negative impact on foetal development because maternal under-nutrition results in malnutrition. These are major problems especially, in the poorest developing countries and are generally considered to be reason for the high prevalence of low birth weight and foetal growth retardation in developing countries (Sweet, 1993).

It is opined in Ceesay *et. al*, (2003) that limited access to high quality foods is the major reason for under-nutrition, but traditional food habits, taboos and limited knowledge of nutritious foods may also contribute to under-nutrition. Keletzko (2012) stressed that poor maternal nutrition can directly affect the developing foetus, impair the development of a female foetus and can permanently decrease her capacity to store nutrients which may affect her future pregnancies. The W.H.O observed that the biggest contribution to child mortality is a lifelong malnutrition which begins in the uterus. Underweight births and intra uterine growth restrictions cause 2.2 million deaths a year (Bennet & Brown, 1996).

According to Wardlaw (2003), foetal development is so rapid during the first trimester that if an essential nutrient is not available the foetus may be affected even before

evidence of the deficiency appears in the mother. The quality of one's nutritional intake is more important than quantity in the first trimester because many changes both physically and mentally occur during pregnancy of the mother as well as the unborn child. Therefore, healthy meal before and during pregnancy is needed in order to prevent dehydration and malnutrition.

Whitney *et. al*, (2007) explained that maintaining a healthy diet before and during pregnancy helps to protect both the pregnant mother and her developing baby from immediate and long-term health risks. This is because a woman's nutritional status during pregnancy depends on the availability of nutritional reserves or stores of particular micronutrients. It includes calcium, iron and vitamin B group components which have been built up in her body from prior consumption of foods. As maintaining good nutrition prior to conception is vital for ensuring adequate nutritional status during pregnancy women who are underweight or overweight, or who have deficiencies in particular micronutrients rarely "catch-up" by improving their diet once they are pregnant, as at this stage their body already faces additional nutritional demands because of the growing baby (Barasi, 2003). Moreover, where there is short interval between pregnancies, levels of some nutrients such as calcium, iron and folate may be insufficient (Barasi, 2003).

2.6.1 Essential nutrients during pregnancy

Micronutrient deficiencies and malnutrition has remained a problem of public health concern in most developing countries, partly due to the consumption of monotonous foods that lack diversity. Low micronutrient intake has been found to be a problem in many of the poorest regions across the world (Ivers & Cullen, 2011). However, it is noted that in many parts of sub- Sahara Africa, including Ghana, most women may enter pregnancy with a relatively poor nutrition. Also maternal under nutrition,

including chronic energy and micronutrient deficiencies, is prevalent in many regions, especially in South-Central Asia, where more than 10 percent of women aged 15–49 years are shorter than 145 cm (Black *et. al*, 2008). Women who suffer from chronic energy deficiency have an increased risk of obstructed labour as a result of a contracted pelvis which is more common when malnutrition is prevalent. There is an increased risk of mortality especially in communities in which under nutrition in childhood is common and it accounts for 8 percent of maternal deaths worldwide (Ivers & Cullen, 2011). There is also an increased risk of giving birth to low birth weight babies which is a well- known risk factor for neonatal and infant mortality, increased morbidity, impaired mental development, and the risk of chronic adult disease. A total of 925 million people were undernourished in 2010 worldwide (FAO, 2010). Malnutrition is a serious public health problem linked to increase in the risk of mortality and morbidity especially, among pregnant women (Blossner & De Onis, 2005).

During pregnancy, a woman's macro-nutrients and micronutrient (e.g. vitamins, mineral) requirement increases. It is even more important that she consumes foods which will give her both the energy and the specific micronutrients which are essential for maintaining her and the growing baby's health. For example, women require an additional 240 calories of energy per day in the second trimester and 452 calories per day in the third trimester of pregnancy to account for foetal growth. An additional 975 milligrams of iron is required in the course of the pregnancy to form foetal and additional maternal blood (Academy for Educational Development. Maternal nutrition during pregnancy and lactation, 2004)

2.6.2 Macronutrients

2.6.2.1 Protein

According to Wardlaw (2003), protein is very important in pregnancy for the foetal growth, cell division and making the mother healthy. Addow *et. al*, (1993) said pregnant women require extra protein to cater for the growing baby and it is needed every day since the body does not store protein. Metabolic Toxaemia of Late Pregnancy (MTLP) may result in the death of both mother and child when protein is deficient (Bennet & Brown, 1996). Addow *et. al*, (1993) and Tull (1996) expressed that pregnant women should eat balanced diet because a healthy and well-nourished mother is more likely to have a healthy baby than a mother who is badly nourished. Based on a well-nourished woman with a normal Body Mass Index BMI her intake equates to an additional 70 kcal of protein per day in the 1st trimester, 260 kcal per day in the second trimester and 500 kcal a day in the third trimester as asserted by European Food Safety Authority (EFSA), (2013). It is important to ensure adequate balance of protein to energy as high protein alone can harm the foetus (Ota *et.al*, 2012) but protein deficiency can result in thin babies (Barasi, 2003). Balanced intake of energy and protein improves foetal growth (Ota *et. al*, 2012). However, evidence is emerging on the relationship between the type of protein and foetal growth. Consumption of processed meats (such as sausage, burgers and chicken nuggets) increases the risk of small for gestational age babies (Knudsen *et. al*, 2008) while fish and eggs seem to reduce the risk (Ricci *et. al*, 2010). Particular attention should be paid to pregnant women who are at risk of inadequate protein intake or suboptimal protein choices. Women who have experienced nausea or vomiting during pregnancy are likely to have reduced intake of protein rich foods due to food aversions. Vegetarian women should be encouraged to consume adequate complimentary protein sources during pregnancy by increasing their intake of

protein rich foods including beans, lentils, chick peas, tofu, dairy products and eggs. In addition, vegetarian women should be advised on the importance of adequate protein sources to ensure optimal intake of essential amino acids, for example combining cereals and legumes in a meal. Women following a vegan diet may need dietetic review to ensure nutritional adequacy. Women from lower socio-economic groups are at higher risk of inadequate protein intake due to the expensive costs of protein. They are also more likely to choose less expensive processed foods which would put them at risk of small for gestational age babies (Thompson *et. al*, 2010).

Health-care professionals should take this into consideration when advising women and discuss less expensive ways of incorporating protein into the diet such as the use of eggs, beans or lentils in cooking. Pregnant women should be encouraged to consume two portions of protein rich foods a day and avoid processed foods such as sausages, luncheon meats (Thompson *et. al*, 2010). Maternal fish consumption during pregnancy has been positively associated with cognitive and visual abilities in the offspring but research into maternal supplementation is inconclusive yet (Gould *et. al*, 2013). The European Food Safety Authority (EFSA) recommends that all pregnant women should consume an additional fish of 700-1400mg/week of DHA (EFSA, 2010). This is in addition to the requirement of 1750mg/week combined EPA and DHA. This increased intake can be achieved by consuming 1-2 portions of omega three fish per week (FSAI, 2011). The best sources of DHA are trout, salmon, mackerel, and sardines (FSAI, 2011).

2.6.2.2 Fats

Dietary fat is an important energy source that aids in the absorption of fat soluble vitamins. However, high fat diets should be avoided during pregnancy due to the risk of excessive weight gain (FSAI, 2011). Fat has been linked to improved retinal

development and forms an important part in the grey matter of the brain tissue (Koletzko, 2012). On-going research suggests that DHA could play a role in reducing risk of maternal depression, improving mood and reducing risk of allergy in infants.

2.6.2.3 Carbohydrate

An estimated average requirement of carbohydrate increases to 0.35g/day when translated to RDA equivalent to 170g/ day.

2.6.2.4 Micro-nutrients

2.6.2.5 Vitamins

Generally, vitamins needed during pregnancy increases, especially vitamins B, D and folate. Vitamin B Group as indicated in Bennett and Brown (1996) is necessary for the formation of enzymes that are required for carbohydrate metabolism. For example nicotinic acid (vitamin B₃) is needed during pregnancy to help in the release of energy from food especially carbohydrates.

Sweet (1993) revealed that Vitamin B₆ deficiency results in clubfoot, cleft lip and palate while lack of thiamine (Vitamin B₁) is associated with heart defects affecting rhythm and heart size. They stressed that riboflavin deficiency leads to Intra-uterine growth restriction.

A pregnant mother needs vitamin B₁₂ for the foetus to store and must have enough for the first six months after birth. Vegan pregnant mothers may be deficient in vitamin B₁₂ therefore, need to take its dietary supplement (Seely *et. al*, 1999). Moreover, Barasi affirmed that lower birth weight are associated with women who have lower energy and nutrients intake including thiamine, niacin, riboflavin, folic acid, pantothenic acid, pyridoxine and biotin.

2.6.2.6 Folate/Folic acid

Folate is a B vitamin which is referred to as folic acid in the synthetic form. A daily supplement of 400 micrograms (400µg/0.4mg) folic acid is recommended prior to conception and for the first 12 weeks of pregnancy has been shown to help prevent neural tube defects (NTD's) (FSAI, 2006). Therefore, women who have a family history of NTDs or pre-existing diabetes should be provided with a prescription of a higher dose of folic acid prior to conception and through the 12 weeks gestation (HSE, 2010). There is evidence to support the supplementation of obese women with a higher doses of folic acid (Institute of Obstetricians and Gynaecologists, 2011) as the incidence of congenital malformations, including NTDs, are higher in obese women compared with normal women (Rasmussen *et. al*, 2008).

Supplementation of folic acid can be stopped at 12 weeks gestation as the neural tube will have closed and the window of opportunity for prevention of NTD will have passed but the role of folate in red blood cell manufacture and in cell replication continues to be of importance. Thus, women should continue to eat foods rich in folate and folic acid throughout their pregnancy. These include green leafy vegetables, citrus fruit, whole grains, legumes and foods fortified with folic acid such as breads and cereals. Besides, DNA requires Folic for the formation of blood cells. It is needed for the formation of brain and nervous system in the developing foetus. Folic acid deficiency can lead to premature birth, miscarriage, slow growth, brain damage and other malformations of the foetus such as spina bifida (Ivers & Cullen, 2011). Bennett and Brown (1996) supported that complications of folic deficiencies in pregnancy include infections, placenta separation, bleeding and congenital abnormalities.

2.6.2.7 Vitamin C

Vitamin C is a water soluble vitamin which helps to increase iron absorption. (www.rd.ap.gov/health/Nutrition_Center_Conceptnote_2006.pdf) Vitamin C can be obtained from fresh fruits and vegetables and provides fibre and prevent constipation. (Barasi, 2003). Pregnant women should be encouraged to eat good quantities of fresh fruits and vegetables- at least ½ kg per day. Other high fibre foods include wholemeal bread, cereals and pulses (Hofmeyr, 2007).

2.6.2.8 Vitamin D

Vitamin D is a fat-soluble vitamin necessary for the absorption and metabolism of calcium and phosphorous which is linked to the prevention of autoimmune diseases (Fronczak *et. al*, 2003; Hypponen *et. al*, 2001). According to Tull (1996), vitamin D can also help to reduce the risk of adverse pregnancy outcomes including pre-eclampsia, bone disorders of rickets and osteomalacia. Wardlaw (2003) explained that vitamin D is found naturally in few foods; dietary sources of this fat soluble vitamin including the flesh of oily fish, and eggs from hens fed with vitamin D. Foods fortified with vitamin D such as margarine, milk and cereals are a good source of vitamin D in the diet. Although vitamin D can be synthesized in the skin, exposure to sun may increase the risk of melanoma therefore, sun exposure is not an effective public health strategy to combat low vitamin D level (IUNA, 2011). In order to meet nutritional requirements of vitamin D, pregnant women should be encouraged to take oily fish (FSAI, 2011). However, the consumption of vitamin D rich foods, such as oily fish is not widespread and a vitamin D supplement is likely to be needed by most women during pregnancy to meet their requirements. The American College of Obstetrics and Gynaecologist recommends 15µg (15 micrograms/600IU) a day (ACOG, 2011) and in

UK recommendation for vitamin D is 10µg (10 micrograms/ 400IU) a day during pregnancy and lactation (NICE 2008). It has been noted that the majority of over-the-counter antenatal multivitamins contain 10 µg (10 micrograms/ 400IU) of vitamin D, therefore if a woman chooses to take a pregnancy multivitamin she will not require additional vitamin D supplementation. If there is a history of rickets in a sibling or a known maternal vitamin D deficiency, a higher dose should be given as the neonatal serum Vitamin D will be 60% of the maternal level. This is because both adequate maternal and neonatal serum levels are positively associated with bone health in childhood and later life (De-Regil *et. al*, 2012).

2.6.2.9 Vitamin K

Vitamin K in green vegetables is needed in prothrombin for blood clotting. Deficiency of vitamin K can lead to bleeding where the blood will not clot after delivery or in the first month after birth and can lead to death (Adigbo & Katum, 2011).

2.6.2.10 Vitamin E

Most vitamin E is transferred to the foetus in the third trimester of pregnancy. Therefore, if a baby is born prematurely, it may need vitamin E supplement. It is present in oils and germs of grains, green vegetables, nuts, eggs, liver and milk (Addow *et. al*, 1993)

2.6.3.1 Mineral salts

2.6.3.2 Iron

The developing foetus requires large red blood cell mass to provide sufficient oxygen for development and growth. There is a positive association with iron intake and birth weight. Iron requirements increase progressively after 25 weeks to combat the lower oxygen environment in the womb (Dewey & Chaparro, 2007). Late cord clamping at

delivery can reduce the risk of infantile anaemia (Chaparro *et. al*, 2006). However, it remains vital that the iron intake of the mother is sufficient throughout pregnancy to meet the increased requirement for foetal growth while maintaining adequate maternal stores (Health Canada, 2009). Appropriate use of supplementation and iron rich diet has the potential of reducing incidence of anaemia in pregnancy and subsequent adverse outcomes (Barroso *et. al*, 2011). The Survey of Lifestyle Attitudes and Nutrition reveals that a significant proportion of women of reproductive age do not meet the daily requirement for iron. This corresponds to research in pregnant women which revealed that majority of pregnant women are not reaching their requirements for iron during pregnancy (McGowan & McAuliffe, 2012). Foods that contain tannins such as tea should be avoided at meal times as these can inhibit the absorption of iron from the diet (FSAI, 2011). Women suspected of iron deficiency should have a full blood count (FBC) and if possible serum ferritin checked. Symptoms of iron deficiency are similar to some common problems of pregnancy such as fatigue. If there is evidence of iron deficiency, the treatment is oral iron supplementation (NICE, 2008). Iron ferrous present in some supplements, can cause unpleasant gastrointestinal (GI) side effects, impair mineral absorption, and increased risk of haemo-concentration (Zhou *et. al*, 2009). According to McGowan and McAuliffe (2012), a pregnant woman will absorb more iron than usual, from her diet and pass it on to her foetus. The World Health Organisation (W.H.O) explained that iron deficiency anaemia is the most common nutritional deficiency in the world. The estimate of iron deficiency range is as high as 80% of the world population. W.H.O said that at least 1/3 of the world is currently anaemic. Prevalence of anaemia among women is about 52% (McGowan & McAuliffe, 2012).

Moreover, Barasi (2003) affirmed that lower birth weight are associated with women, who have lower energy and nutrients intakes with stronger relationship of minerals like iron, magnesium, potassium, phosphorous and zinc.

2.6.3.3 Iodine

Bennett and Brown (1996) said iodine is needed for proper functioning of the thyroid gland and to prevent cretinism of the child. Mild iodine deficiency has been reported to reduce intelligence quotients by 10- 15% (Tull, 1996). Again iodine deficiency increases the rate of postpartum haemorrhage, miscarriages, stillbirth, prenatal and infant mortality. (<http://www.unu.edu/unupress/food2/und9c/uniOe@hotmail>). During pregnancy iodine requirements increase by 50% (Stagnaro-Green *et. al*, 2011). Iodine deficiency appears when the maternal thyroid gland cannot meet the demand for increasing production of thyroid hormones (Obican *et. al*, 2012). Research in Ireland has showed that low serum levels of iodine are low in 23% of women in winter months and 55% of women in the summer months (Nawoor *et. al*, 2006). It is suggested that maternal iodine deficiency can result in hypo-thyroinaemia in infants, which is associated with cognitive and psychomotor deficits (Obican *et. al*, 2012). Supplementation of iodine may decrease the risk of cognitive and psychomotor developmental delay (Trumpff *et. al*, 2013). Dietary sources of iodine include seaweed, iodized salt, dairy products and fish. The American Thyroid Association recommend that all pregnant women should consume 220µg (220 micrograms) of iodine daily (Stagnaro-Green *et. al*, 2011) while the WHO recommends a lower limit of 500 µg (500 micrograms) and an upper limit of 600µg/day (600 micrograms) by EFSA (2009).

2.6.3.4 Calcium

Calcium is required for the ossification of bones and teeth and to enable blood to clot. This is needed in the last weeks of pregnancy for skeletal development of the foetus. If the amount of calcium is not enough in the mother's diet she may lose calcium from her skeleton which leads to weakened bones and discolouration of teeth. Calcium is needed together with vitamin D for proper absorption and utilization in the body. (www.rd.ap.gov/health/Nutrition_Center_Conceptnote_2006.pdf). Calcium has a key role to play in the development of healthy bones, teeth, extra-cellular fluid, muscle, and other tissues. It is also involved in vascular contractions and vasodilation, muscle contractions, neural transmission, and glandular secretion. Adequate dietary calcium intake before and during early pregnancy may reduce the risk or severity of pre-eclampsia, therefore, adequate dietary intake should be encouraged. It has been confirmed that extra calcium is needed to mineralize the foetal bones and lay enough minerals for the mother especially at the advanced stage of pregnancy. Keletzko (2012) pointed out that the demands of calcium and phosphorous may also be so great in the latter part of pregnancy therefore if the mother's diet is deficient of these minerals the foetus will take enough from the mother's bones to sustain itself and this depletes the mother's blood of calcium ions. Sweet (1993) supported that hormonal change such as parathyroid hormone increases due to the increase in calcium uptake in the gut and re-absorption by the kidney. During pregnancy women should consume three portions of dairy or calcium-fortified alternatives daily (FSAI, 2011). Adolescent pregnant mothers may require additional calcium which can be best achieved with two additional portions of dairy per day (Chan *et.al*, 2006). A portion is one glass of milk (200 ml), one pot of yoghurt (125 ml) or a matchbox-sized piece of cheddar cheese (28g). Whole milk, low-

fat and skimmed milk all contain relatively similar levels of calcium and fortified milk has extra calcium and vitamin D added per day (Chan *et. al*, 2006).

2.6.3.5 Magnesium

According to Keletzko (2012), when magnesium was given as a supplement to pregnant women to treat high blood pressure and premature labour, it reduced the risk of cerebral palsy and mental retardation in babies.

2.6.3.6 Zinc

It has been opined that lack of zinc in pregnancy leads to premature birth, prolong labour, impaired growth and development, lower immunity in the baby and too many congenital abnormalities in the nervous system such as reduced learning ability, apathy and mental retardation (Webb, 2003).

2.6.3.7 Water

Pregnant women need more fluid to increase maternal blood volume and for the formation of amniotic fluid to assist in the removal of waste. With this they recommended that water is the best fluid to consume (Whitney *et. al*, 2007).

2.7 Selected nutrients associated with micro-nutrients deficiency

Deficiencies in some nutrients are associated with some types of birth defects in humans as indicated by Bennett and Brown (1996) revealed that Vitamin B₆ deficiency results in clubfoot, cleft lip and palate while lack of thiamine is associated with heart defects affecting rhythm and heart size. They stressed that riboflavin deficiency leads to intra-uterine growth restrictions. N.T.D. (Incomplete development of the brain or spinal cord also called spina bifida), hydrocephalus and numerous nervous system and brain deformities are as a result of Folic acid deficiency. About eight (800) facial defects are from low folic and related B vitamins deficiency are noted to develop in the early stages

of pregnancy before a woman is aware that she is pregnant. Studies carried on folic acid levels in pregnancy Sweet (1993) stated that 65% of mothers who gave birth to babies with malformations were folic deficient compared to 17% of mothers who had normal babies. Bennett and Brown (1996) supported that complications of folic deficiencies in pregnancy include infections, placenta separation, bleeding and congenital abnormalities. Anaemia (a condition of deteriorating iron reserves in the body caused by low dietary intake of iron, poor absorption of dietary iron, or blood loss) for example, from hookworm, repeated childbirth or heavy menstruation is a major health consequence. Even maternal anaemia in moderate cases, increases the risk of dying during delivery. It is estimated that 20% of maternal deaths are due to maternal iron-deficiency anaemia thus adding 115,000 deaths to the total maternal deaths from obstetric complications annually (Sweet, 1993). Additionally, during pregnancy, iodine deficiency disorders (which result from a lack of sufficient iodine in the diet) can result in serious and irreversible effects on child brain development and mental capacity, in the form of cretinism, miscarriage, stillbirths, and early neonatal deaths. In the developing world, the social and health problems that come along with such deficiencies are often compounded by high fertility rates, repeated pregnancies and short intervals between pregnancies (Keletko, 2012).

2.8 Exercise

Moderate exercise is not only considered safe for pregnant women, it is encouraged and thought to benefit both mother and the growing baby. Exercising thirty (30) minutes a day is proven to help circulation, strengthen muscles, and decrease stress. However, it is important to seek doctor advice before starting any exercise especially, those who are not physically active before getting pregnant. Exercise can increase energy level, improves sleep, strengthen muscles, reduces backache and relieves constipation.

Aerobic exercises, such as walking, jogging and swimming, stimulate the heart, lungs, muscles and joints which help to process and utilize oxygen. Aerobic activity also improves circulation, and increases muscle tone and strength. There are many exercise classes designed specifically for pregnant women that help to build strength, improve posture and alignment, and promote better circulation and respiration (Ivers & Cullen, 2011).

2.9 Bad habits during pregnancy

Healthy lifestyle choices will directly impact the health of the growing foetus. It is important to cut out bad habits like smoking and alcohol consumption. These have been linked to serious complications and risks for both mother and baby. Drinking alcohol during pregnancy is associated with a wide range of problems in the developing baby. Any alcohol that is consumed by the mother enters the foetal bloodstream in approximately the same concentrations as in the mother's bloodstream. Heavy drinking throughout pregnancy can result in foetal alcohol syndrome (FAS), which produces infants that are underweight, mentally deficient with multiple deformities and high mortality rate (Bennet & Brown, 1996). In addition alcohol consumption during pregnancy can lead to complications including miscarriage, premature labour and delivery, low birth weight, stillbirth, abnormal growth and developmental problems in childhood.

Cigarette smoking is the single most common cause of low birth-weight babies is the most common cause of death and illness in the first few weeks of life. Smoking is also linked to a wide variety of pregnancy complications, including vaginal bleeding, ectopic pregnancy, premature placental detachment, premature labour and delivery.

Also, smoking affects blood flow, oxygen delivery to a baby and prevents growth (Sweet, 1993).

When choosing foods to increase energy intake, focus should be given to foods which are rich in essential vitamins and minerals such as milk and milk products, high fibre foods, lean red meat, omega-3-rich fish and fruits and vegetables (FSAI, 2011). The pregnant woman should be encouraged to consume a diet which will meet all her recommended nutritional intakes, rather than focusing on energy intake alone. Overweight or obese women should be encouraged to replace energy dense snacks with foods which are nutritious.

2.10 Diseases/health challenges that affect pregnant women food habits

Knowledge of what to eat and quantity are pre-requisite to good health, therefore what is eaten affects one's ability to stay healthy, work and live especially during pregnancy (Offei-Ansah, 2013). According to Sweet (1993), pregnancy is more than the growth of the foetus because it is the stage in which many changes occur in the system of the mother's body. Wardlaw (2003) indicated that nausea may be related to increase in the sense of smell and taste induced by pregnancy related hormones circulating in the blood stream. Excessive salivation may occur and the gums tend to become swollen and some women experience craving for unusual food such as clay, ice, and corn-starch in a condition is called pica. According to Sweet (1993), the eating of clay can cause intestinal parasites which can results in premature births, miscarriages, mild and other severe consequences. Craving for ice and corn-starch is an indication of a dietary deficiency of iron and other nutrients (Sweet, 1993). Therefore, women are advised to avoid pica, however, most women with pica are reluctant to reveal this to their health service provider (Bennett & Brown, 1996).

2.10.1 Gastro-Intestinal Problems

Among the commonest problems during pregnancy are nausea and vomiting. Morning sickness affects 50 to 70 % of pregnant women. It is stated in Sweet, (1993) that excessive nausea is associated with dysrhythmias and hormonal changes that slow gastrointestinal motility. Wardlaw (2003) indicated that nausea may be related to increase in the sense of smell and taste induced by pregnancy related hormones circulating in the blood stream. Bennett and Brown (1996) confirmed that gastric secretion is reduced during pregnancy and the intestine becomes relaxed which results in constipation among pregnant women. Dietary tips can also help GI symptoms such as increased fibre and fluid intake. It is important to ensure compliance with the recommended treatment as women suffering from GI symptoms may avoid supplement, therefore variations of iron preparations should be explored. Intermittent or lower dose iron preparations seem to be sufficient in preventing anaemia without unpleasant GI symptoms (Pena-Rosas, 2012).

2.10.2 Hyperemesis Gravidarum

Bennett and Brown (1996) stated that between four to sixteen weeks after conception vomiting occurs as a result of hormonal changes but in some pregnant women severe vomiting exist throughout the pregnancy in a condition called hyper emesis gravid arum. Extreme nausea can persist past the end of the first trimester and it can lead to food aversion and the leading cause of death due to dehydration, injures and malnourishment of both mother and foetus

2.10.3 Heartburns

Heartburns are common gastrointestinal complaints experienced by approximately two-thirds of pregnant women. The main factor involved is lowered pressure across the lower oesophageal sphincter that cause increased progesterone secretion (Sweet, 1993).

2.10.4 Constipation

According to Bennet and Brown (1996), constipation during pregnancy resulting from slowed G I motility and can be aggravated by high doses iron supplements. Including adequate amount of fibre in the diet as well as fluid intake and exercise can reduce constipation in pregnancy.

2.10.5 Effects of food habits on individuals on nutritional status

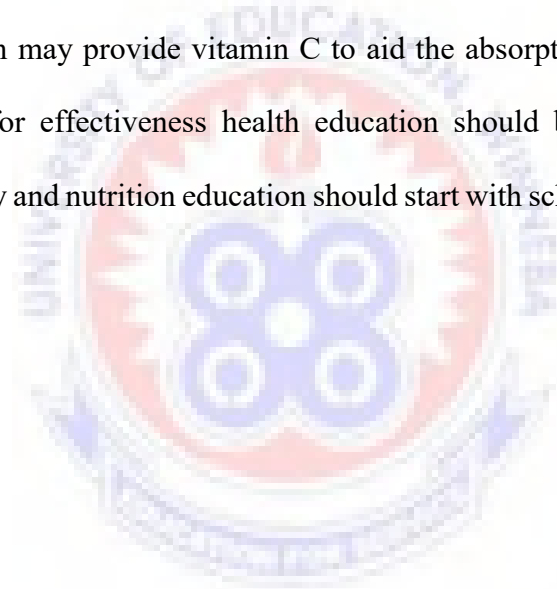
Food habits affect people positively or negatively. Positively, when people acquire good food habits, it helps them to get all the nutrients their bodies need for good health. There will not be excessive or deficiency in the intake of both macro and micro nutrients (Adigbo & Katum, 2011). Good food habits help to save money prevent waste and improve family togetherness. Food habits such as excessive salt, sugar, fat and alcohol intake may have effect on health. People who snack unnecessarily may become obese. People who diet to lose weight become too thin and become deficient in nutrients. Offei-Ansah (2013) elaborates that, some negative effects food habits leads to nutritional excessiveness, nutrient deficiencies and meal may lack variety.

2.11 How to improve the food habits of pregnant women

In recognition of the importance of adequate nutritional stores to guarantee a healthy pregnancy outcome the United Nations Population Fund Association recommended variety of actions including the following for safe motherhood. Interventions to reduce the incidence of Low birth weight and other nutritional deficiencies such as anaemia

should be done by the promotion of maternal nutrition through information, education, counselling and the promotion of longer interval between births. Strategies to eliminate iron deficiency include iron fortification of foods (adding iron to foods during the production process), iron supplementation (providing medicinal iron) and by treating intestinal parasite such as hookworms (<http://www.2008-contributingtosafemotherhood-targetingmalnutrition>).

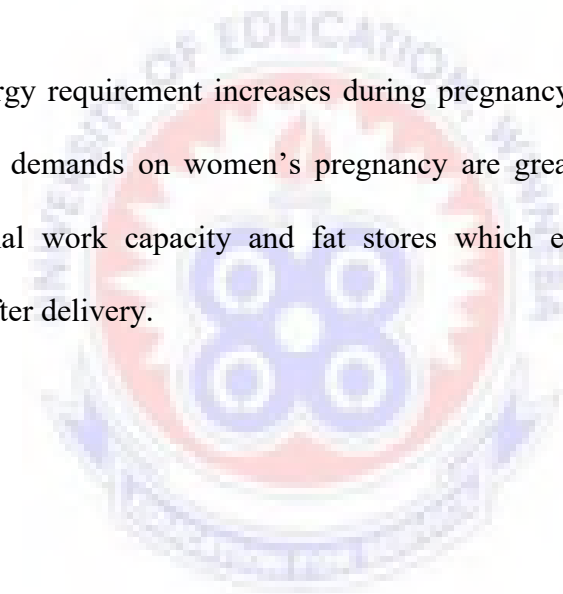
Bennett and Brown (1996) pointed out that the risk of anaemia can be prevented by advising pregnant women about sources of iron rich foods, such as red meat, whole-grain and diversification of the diet to enhance iron absorption such as eating fruits and vegetables which may provide vitamin C to aid the absorption of iron. Sweet (1993) suggested that for effectiveness health education should be intensified before and during pregnancy and nutrition education should start with school children and continue to adult life.



2.12 Summary of Literature Review

In summary, the importance of food cannot be overlooked since it significantly influences both the nutritional status of the pregnant mother and the foetal outcome. Socio-economic, cultural factors, availability of food and choice has been shown to be strongly related to food habits. There is a mounting evidence to support the importance of a good, well balanced diet both prior to and during pregnancy. This will promote optimum health of mother and foetus. A good diet in pregnancy aids foetal growth, reduces the incidence of preterm labour, low birth weight babies, prenatal and neonatal deaths.

In addition energy requirement increases during pregnancy. But when resources are limited and the demands on women's pregnancy are great, unmet needs results in reduced maternal work capacity and fat stores which even limit the success of breastfeeding after delivery.



CHAPTER THREE

RESEARCH METHODOLOGY

3.0 Overview

This chapter deals with the methods used to collect data for the study under the following headings: research design, study area, population, sample and sampling procedure, research instrument, pretesting, data collection procedure, method of data analysis and ethical considerations.

3.1 Research Design

The study was a descriptive survey which employed mixed methods. The design combined both qualitative and quantitative approaches. Descriptive analysis used was to discuss the data. Descriptive design involves acquiring information from one or more group of people about their characteristics, attitudes and opinion or experience by asking questions and tabulating their responses (Leedy & Omrod, 2005). This methodology was chosen to reveal the characteristics, attitudes, opinions and how women select food during pregnancy which determines the food habits of the pregnant women attending Ante - natal clinic (ANC) at Eastern Regional Government Hospital. Besides, quantitative data was generated from the qualitative data on the knowledge of some essential nutrients needed in pregnancy for good pregnancy outcome. In addition the information gathered was used to make inferences or generate policy or reveal unsuspected facts about the opinion, beliefs, perceptions and attitudes of the pregnant women towards their food habits in achieving the millennium development goal of good maternal health currently under the sustainable development goal.

3.2 Site selection

The study population consisted of pregnant women who visited the Eastern Regional Hospital, in Koforidua to receive ANC services. Most of the women were from higher,

middle to lower socio-economic class. The hospital also receives referrals from other parts of the Eastern region since it is the regional hospital.

3.2.1 Study area

The area of study is located at Eastern Regional Hospital in the New Juaben Municipality (NJM) in Koforidua. The NJM is located in the Eastern region of Ghana. The municipality covers an estimated area of 100 square kilometres constituting 0.57% of the land of Eastern region. The municipality shares boundaries with East – Akim municipality in the North- East, Akuapem North district in the East and the Suhum district on the South.

The Eastern regional hospital as the name implies is the Regional hospital which was established in 1926 with the mission to improve the health status of people in the surrounding communities through comprehensive, accessible, quality and affordable health care.

Their vision is to become a centre of excellence in the delivery of health care. This can be achieved through well- motivated, client focused and efficient staff sub vision of zero tolerance of both infant and maternal mortality. The hospital is at the secondary referral level. Therefore, it provides a range of services to the local and surrounding communities as well as the whole eastern region. Their services include obstetrics and gynaecology, surgery, neurology and paediatrics, dermatology, specialist care in visceral surgery, venereology and Human Immune-Deficiency Virus (HIV) medicine and laboratory medicine. The hospital is also academic centre for nursing training interns, residents and allied health students.

3.3 Population

The study population involved pregnant women who attended antenatal clinic at Eastern Regional Hospital to receive ante natal health services. The hospital received

pregnant women from most of the communities in the New Juaben Municipality. Therefore, the data obtained was a representation of the general population in the municipality. The target population of the study was centred on daily attendance of pregnant women who visited the hospital and were in their first, second and third trimester of their pregnancies. On the average, about 500 pregnant women attended the ante-natal clinic during the visit to the hospital. Most of the women were from higher, middle to lower income class. Besides, as a regional health outlet, the hospital receives referrals of pregnant women from other parts of the region, from district health facilities and their surrounding health posts. Therefore, both urban and rural pregnant women visited the hospital they were studied. Also the respondents were made up both literate and illiterate pregnant women.

3.4 Sample and Sampling Techniques

The sampling technique used was purposive non probability sampling to select the pregnant women. In purposive sampling the researcher selects the sample to reflect the purpose, and the objectives of the study determine the sample members. Thus, the sample was selected based on the discretion or judgement of the researcher taking into consideration the special characteristics or more commonly those who are likely to provide the most useful information for the purposes of the subject matter. Besides, convenience sampling technique was used to collect information from the pregnant women who were available at the time of the administration of the questionnaire and were ready to participate in the study. Convenience sampling is also a non-probability sampling technique that allows the researcher to use the respondents who are accessible during the time of administration of the questionnaires (Baumgartner *et. al*, 2002). In all, one hundred and twenty questionnaires were printed to be administered to respondents. On the average twenty five respondents were studied daily.

3.5 Research Instruments

Research instrument for collection of data of the study were questionnaire and interview guide to solicit views, opinions and information from both literate and illiterate respondents. A questionnaire is a research instrument consisting of series of questions and other prompts for the purpose of gathering information from respondents. On the other hand an interview guide is an oral questionnaire where the researcher poses the questions along with the expected answers.

The instruments were made up of two main sections A and B. Section A focused on the demographic data of respondents which included age, sex, educational level, occupation, income level, and other socio- cultural factors of respondents. Section B was based on the objectives set for the study which comprised of the following: Objective one (1) dealt with the nutritional knowledge of respondents. Objective (2) was made up of food intake during pregnancy. Objective (3) comprised of the health challenges associated with their pregnancy. The fourth objective (4) comprised of how to on improve the food habits of the pregnant women.

Furthermore, observation method was used to assess the punctuality of respondents and to find out if respondents receive nutrition education from health service providers. According to Mugenda (2008) observation is one of the most important and extensively used research instrument for data collection in the field of social sciences.

3.5.1 Questionnaire

Questionnaire is a research instrument consisting of series of questions and other prompts for the purpose of gathering information from respondents. There are two types of questions which make up a questionnaire namely open and closed ended questions. Open ended questions give the respondents the opportunity to express their opinions in a free flowing manner. These questions do not have pre-determined set of responses and respondents are free to answer whatever he/she feels right. It can give true insightful and even unexpected suggestions (Baumgartner *et.al*, 2002). On the other hand, closed-ended questions are where respondents are restricted to choose among many options. There are no fixed limits as to how many responses should be given (Leedy & Omrod, 2005). Five points likert scale questionnaire were used because some pregnant women were educated therefore, can read and write to provide the needed responses. The same questionnaire was used as an interview guide for the illiterate respondents.

3.5.2 Interview guide

An interview guide is an oral questionnaire where the researcher poses the questions along with the expected answers, much as the structured questionnaire. The questions and the expected answers were written down in what we call interview guide (Baumgartner *et. al*, 2002). It was used to obtain vivid information about the food habits of respondents and adopted the five likert scale for closed ended questions. The interview guide assisted to collect information on the demographic characteristics of respondents, nutritional knowledge of key nutrients needed in pregnancy, food intake, health/disease challenges and how to curb poor food habits among the respondents. It also assisted to obtain in-depth understanding of their food habits.

3.5.3 Sources of data

The study employed both primary and secondary data.

3.5.3.1 Primary data

Primary data is the original collected for a specific goal or information acquired through questionnaires, interview guides or observations (Baumgartner *et. al*, 2002). This is the first hand information obtained on the food habits of pregnant women receiving health care services at the Eastern Regional Government Hospital, Koforidua at the ante natal clinic.

3.5.3.2 Secondary data

Secondary data refers to the data collected and analysed already. They are obtained from literature sources or data collected by other people for other purposes. They may be published or unpublished (Leedy & Omrod 2005). Secondary data sources used included books, journal articles, newspapers, reports and publications as well as other documentary reviews from internet.

3.6 Validity and Reliability

Validity is where the data measures what they are supposed to measure (Aduke, 2011). A copy of the research instrument was given to my supervisor and two colleagues to check if it will solicit the needed data for the study. Their corrections and suggestions were used to correct ambiguous questions to ensure clarity and to elicit the required information to enhance validity. Reliability and validity are vital and allow the researcher to make important decisions based on the data collected (Leedy & Omrod 2005). Reliability of the questionnaire was tested to ensure the consistency of the test scores. Thus people's test scores are not changing over a short period of time and measures consistently each time the test is used (Leedy & Omrod 2005). Reliability was tested using the Cronbach's Alpha to measure internal consistency (reliability) since it was applicable to the questionnaire which had multiple Likert questions.

Concerning the internal reliability, Pallant (2010) specified that the internal consistency should be above 0.7.

3.7 Pre-Testing of Instruments

The instrument of five points likert scale questionnaires were pre-tested to check on the length, content, question wording and language. It was administered to ten pregnant who visited Adweso clinic in the New Juaben Municipality. This population was chosen for the pre testing because they had similar characteristics or attributes and their inputs were used to correct errors that influenced the results. Pre-testing led to the modifications of the questionnaire by correcting mistakes, inclusion of important facts that may have been missed out or eliminated or items that may not be applicable in the community. Ambiguous questions were corrected to ensure clarity and to elicit the required information to enhance reliability and validity. The Cronbach's Alpha worked was 0.7680, which indicated that the instrument was reliable.

3.8 Data Collection Procedures

An introductory letter was collected from the head of Home Economics Department, Winneba. This was used to seek permission from the administration and the Deputy Director of Nursing Services in charge of the pre-natal clinic of the Eastern Regional Hospital; Koforidua in the New Juaben Municipality. The researcher then discussed with the ante natal staff a convenient time to go for the data collection.

Data was administered personally to the sampled population with one research assistant after permission had been sought at the Eastern Regional Government Hospital, Koforidua authorities. It was administered on daily basis during working days from Monday to Friday, thus one week. Participants were assured of confidentiality to

encourage them to give their answers as freely as possible therefore there were no cohesion.

Data was collected within a week (Monday to Friday) to avoid bias which may be brought about by pregnant women who revisited the clinic for follow up in the following week since most pregnant women attended Ante natal clinic weekly or monthly depending upon their stage of trimester. However, pregnant mothers visited the clinic whenever possible especially when they were sick. In addition observation method was used to find out the punctuality of respondents and to find out if respondents receive nutrition education from health service providers.

3.9 Data Analysis Procedures

With regards to data analysis, the filled questionnaires/ interview guide was checked for accuracy and completeness in recording of responses. Twenty questionnaires were not completely filled therefore they were not analysed for the study. Editing was done again before finally coding was done before data entry. Data was analyzed using SPSS version 23 and presented in frequencies tables, percentage and charts.

Further inference was done using relevant statistical analysis T- test with p value set at 0.05 significant level to determine pregnant women's nutritional knowledge of some important nutrients needed in pregnancy. The results of data collected are presented in Chapter 4.

3.10 Ethical Considerations

An introductory letter was collected from the Head of Home Economics Department, University of Education; Winneba. This was used to seek permission from the Deputy Director of Nursing Services (DDNS) of Ante-natal clinic (ANC) at the Eastern Regional Government Hospital in Koforidua. The researcher then discussed with the staff the convenient time to go for data collection. After consent was obtained, the data were collected from respondents on daily basis during five working days from Monday to Friday. The researcher explained the purpose of the study and respondents assured of confidentiality of the information they gave and the fact that it was only for the purpose of the research. To ensure privacy, names and other means of identity were not used during the data collection. Again it was administered to pregnant women who were also willing to participate freely. The research team reported to the ANC and with assistance of the nurse on duty, identified and sampled from the target population. The respondents were interviewed after they had received their routine clinic services in a private room. Also the research assistant was briefed on what was required before she accompanied the researcher for the collection of data.

CHAPTER FOUR

RESULTS

4.0 Overview

This chapter presented the results obtained from the study after analysing the primary data. One hundred and twenty questionnaires were administered. However, one hundred (100) questionnaires were analysed for the study after it has been edited. The results are summarized as shown below using tables for easy interpretation, understanding, and discussion. Further analysis was done using one sample T test.

4.1 Demographic Data of Respondents

Table 4.1: Age distribution of the respondents

Age group	Frequency	Percent (%)
10-19yrs	10	10.0
20-29yrs	51	51.0
30-39yrs	37	37.0
40+	2	2.0
Total	100	100.0

Source: Field work, 2017.

4.1.1: Age distribution of the respondents

Table 4.1 indicates the ages of pregnant women who attended ante-natal clinic at Regional Hospital in Koforidua. Out of the one hundred and twenty respondents sampled, one hundred (100) respondents were used for the study. Ten (10%) out the 100 respondents were between 10 to 19 years, 51% were between the ages of 20 to 29 years and represent the majority while 37% respondents were between the ages of 30-39 years, 40 years and above were 2%.

Table 4.2: Marital Status of the respondents

Marital status	Frequency	Percent(%)
Single	33	33
Married	61	61
Widowed	6	6
Total	100	100

Source: Field work, 2017.

4.1.2: Marital Status of the respondents

Table 4.2 indicates that, out of the 100 respondents who were selected for the study 33 representing 33% were single, 61 representing 61% of the respondents were married whilst 6 out of the 100, representing 6% were widows.

Table 4.3: Location of the respondents

Location	Frequency	Percent (%)
Urban	47	47.0
Rural	53	53.0
Total	100	100.0

Source: Field work, 2017

4.1.3: Location of the respondents

From Table 4.3, the findings indicates that 53 (53.0%) of the respondents being the majority were women from the Rural area while 47 (47.0%) of them were urban dwellers.

Table 4.4 Highest educational status the respondents

Educational status	Frequency	Percent (%)
No formal education	18	18.0
Basic	36	36.0
Secondary / vocational/ technical training	26	26.0
Tertiary	20	20.0
Total	100	100.0

Source: Field work, 2017

4.1.4: Highest educational status the respondents

From the results in Table 4.4, it can be seen that, majority of the respondents 36 (36.0%) had basic education, respondents with secondary educational background were 26 (26.0%) while those with no formal education and tertiary background were 18 (18.0%) and 20 (20.0%) respectively.

Table 4.5: Occupation of the respondents

Occupation	Frequency	Percent (%)
Farming	8	8
public servant	12	12
self-employed	49	49
House wife	31	31
Total	100	100

Source: Field work, 2017

4.1.5: Occupation of the respondents

In Table 4.5, findings from the study shows that out, of the 100 respondents who took part in the survey, 49 (49.0%) were self-employed which represent the majority, and housewife's were 31 (31.0%). The respondents who were farmers and public servant accounted for 8 (8.0%) and 12 (12.0%) respectively.

Table 4.6: Occupation of the pregnant women's husbands

Occupation of husbands	Frequency	Percent (%)
public servant	39	39.0
self-employed	48	48.0
Unemployed	13	13.0
Total	100	100.0

Sources: Field work, 2017

4.1.6: Occupation of the pregnant women's husbands

Findings in Table 4.6 shows that out of the 100 respondents, 48 (48.0%) who formed the majority were self-employed, those who were public servant was 39 (39.0%) while husbands who were unemployed represent 13 (13.0%).

Table 4.7: Total level of income per month of the respondents

Income per month	Frequency	Percent (%)
Less than GH500.00	50	50.0
GH500.00- 700.00	27	27.0
GH800.00-900.00	23	23.0
Total	100	100.0

Source: Field work, 2017

4.1.7: Total level of income per month of the respondents

As presented in Table 4.7, it was seen that, 50 (50.0%) of the respondents received less than GH 500.0 per month 27 (27.0%) respondents who received income between GH500.00-700.00 while respondents with monthly income ranging between GH800.00 -900.00 accounted for 23 (23.0%).

Table 4.8: The main source of food for the respondents' household

Rating Scale	Frequency	Percent (%)
Bought	57	57.0
Own production from farm	25	25.0
Own farm and bought	18	18.0
Total	100	100.0

Source: Field work, 2017

4.1.8: The main source of food for the respondents' household

From the findings in Table 4.8, it could be seen that, 57 (57.0%) of their respondents purchased all their foods eaten, 25 (25.0%) of the respondents obtained their food from their cultivated farms while 18 (18.0%) of the respondents revealed that they harvested food from their own farms and purchased some foods as well.

Table 4.9: Number of dependants of respondents

Rating Scale	Frequency	Percent (%)
One	6	6.0
Two	25	25.0
Three	19	19.0
four or more	26	26.0
None	24	24.0
Total	100	100.0

Source: Field work, 2017

4.1.9: Number of dependants of respondents

Table 4.9 above represents the number of dependents of pregnant women, who receive health services at Koforidua Regional Hospital. Majority of the respondents selected for the study has four or more dependents representing 26% with only one dependent being the minority of 6%, and 24% of the respondents were without dependents. The study also revealed that those with two and three dependents were 25% and 19% respectively.

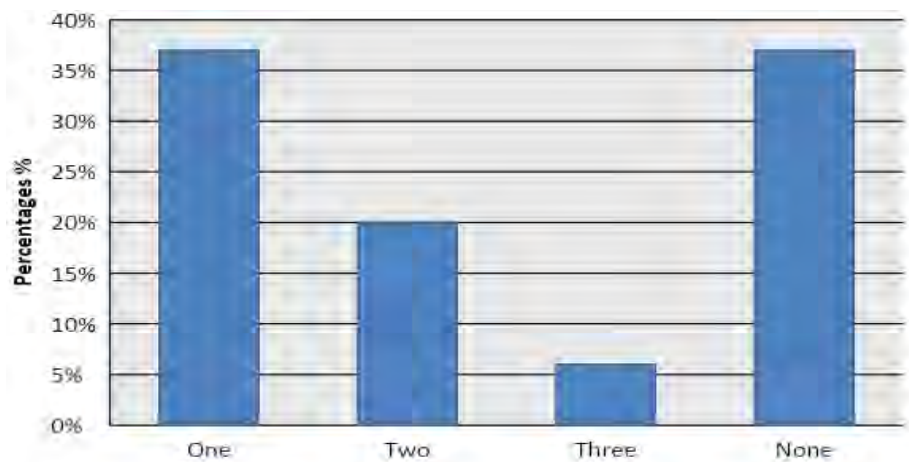


Figure 3: Number of living children

Source: Field work, 2017

Figure 4.1: Number of living children

From the output in Fig 4.1 respondents with one child alive and those with their first pregnancies were 37% as the majority. Also from the responses 20% and 6% respectively have two and three children alive.

Table 4.10: Interval between the last and present pregnancy

Rating Scale	Frequency	Percent (%)
3 months	13	13
6 months	8	8
2 year	32	32
more than 2 years	19	19
first pregnancy	28	28
Total	100	100

Source: Field work, 2017

4.1.10: Interval between the last and present pregnancy

Data collected on the time interval between women's last pregnancy and present one is presented in Table 4.10, the result shows that, out of the 100 respondents who took part in the survey about 32 (32.0%) of the respondents were those with 2 years intervals between their last pregnancy and the present one, respondents with their first time too accounted for 28 (28.0%). The study revealed that respondents with 3 months and 6 months difference were (13.0%) and (8.0%) respectively while more than 2 years intervals was (19.0%).

Table 4.11: The trimester the pregnant women received ante-natal care

Rating Scale	Frequency	Percent (%)
1st trimester	44	44
2nd trimester	35	35
3rd trimester	21	21
Total	100	100

Source: Field work, 2017

4.1.11: The trimester the pregnant women received ante-natal care

As presented in Table 4.11, the findings shown that, out of the total responses 44 (44.0%) respondents attended anti- natal care in their first trimester while 35 (35.0%) and 21 (21.0%) received ante-natal services in their 2nd and 3rd trimester respectively.

4.2: Objective 1: Nutritional knowledge of some important nutrients needed in pregnancy

Table 4.12: Nutritional knowledge of Protein

Rating Scale	Frequency	Percent (%)
Strongly disagree	20	20.0
Disagree	31	31.0
Not sure	23	23.0
Agree	20	20.0
Strongly agree	6	6.0
Total	100	100.0

Source: Field work, 2017

4.2.1: Nutritional knowledge of Protein

The Table 4.12 revealed that 6 (6.0%) of the respondents strongly agreed that they had nutritional knowledge about protein intake and its importance during pregnancy, 20 (20.0%) Agreed, 23 (23.0%) were not sure, 31 (31.0%) disagreed as the majority response, 13 (13.0%) strongly disagreed and 7 (7.0%) did not respond respectively.

Table 4.13: Nutritional knowledge of Vitamin B

Rating Scale	Frequency	Percent (%)
strongly disagree	6	6.0
Disagree	42	42.0
Not sure	25	25.0
Agree	19	19.0
Strongly agree	8	8.0
Total	100	100.0

Source: Field work, 2017

4.2.2: Nutritional knowledge of Vitamin B

Table 4.13 indicates that 6 (6.0%) of the respondents strongly agreed their nutritional knowledge about Vitamin B intake as a key element for good pregnancy outcome, 21 (21.0%) agreed, 25 (25.0%) were not sure, 42 (42.0%) disagreed as the majority respondents and 6 (6.0%) strongly disagreed.

Table 4.14: Nutritional knowledge of Vitamin C

Rating Scale	Frequency	Percent (%)
Strongly disagree	4	4.0
Disagree	38	38.0
Not sure	25	25.0
Agree	7	7.0
Strongly agree	26	26.0
Total	100	100.0

Source: Field work, 2017

Nutritional knowledge of Vitamin C

In Table 4.14, 26 (26.0%) of the respondents strongly agreed that they have nutritional knowledge about Vitamin C intake pertaining to its importance during pregnancy, 7 (7.0%) Agreed, 25 (25.0%) were not sure, 38 (38.0%) disagreed as the majority response and 4 (4.0%) strongly disagreed about their knowledge in nutritional intake in terms of Vitamin C during their period of pregnancy respectively.

Table 4.15: Nutritional knowledge of Vitamin D

Rating Scale	Frequency	Percent (%)
Strongly disagree	10	10.0
Disagree	32	32.0
Not sure	18	18.0
Agree	13	13.0
Strongly agree	27	27.0
Total	100	100.0

Source: Field work, 2017

4.2.4: Nutritional knowledge of Vitamin D

From Table 4.15, clearly indicates that 27 (27.0%) of the respondents strongly agreed that they have nutritional knowledge about Vitamin D intake, 13 (13.0%) Agreed, 18 (18.0%) were not sure, 32 (32.0%) disagreed as the majority response, and 10 (10.0%) strongly disagreed about their knowledge in nutritional intake in terms of Vitamin D during their period of pregnancy.

Table 4.16 Nutritional knowledge of Folic acid

Rating Scale	Frequency	Percent (%)
Disagree	55	55.0
Not sure	19	19.0
Agree	6	6.0
Strongly agree	20	20.0
Total	100	100.0

Source: Field work, 2017

4.2.5: Nutritional knowledge of Folic acid

The Table 4.16 indicates that 20 (20.0%) of the respondents strongly agreed that they have nutritional knowledge about Folic acid intake as an important nutrient to their pregnancy, 6 (6.0%) agreed, 19 (19.0%) were not sure, 55 (55.0%) disagreed as the majority response, and none of them strongly disagreed respectively.

Table 4.17: Nutritional knowledge of Iron

Rating Scale	Frequency	Percent (%)
strongly disagree	7	7.0
Disagree	38	38.0
Not sure	19	19.0
Agree	30	30.0
Strongly agree	6	6.0
Total	100	100.0

Source: Field work, 2017

4.2.6: Nutritional knowledge of Iron

From the Table 4.17, 6 (6.0%) of the respondent strongly agreed that they have knowledge about Iron intake, 30 (30.0%) Agreed, 19 (19.0%) were not sure, 38 (38.0%) Disagreed being the majority and 7 (7.0%) strongly disagreed on iron intake.

Table 4.18: Nutritional knowledge of Calcium

Rating Scale	Frequency	Percent (%)
strongly disagree	10	10.0
Disagree	32	32.0
Not sure	18	18.0
Agree	19	19.0
Strongly agree	21	21.0
Total	100	100.0

Source: Field work, 2017

4.2.7: Nutritional knowledge of Calcium

In the Table 4.18, it reveals that 21 (21.0%) of the respondents strongly agreed of having nutritional knowledge about Calcium intake during pregnancy, 19 (19.0%) agreed, 18 (18.0%) were not sure, 32 (32.0%) disagreed as the majority, and 10 (10.0%) strongly disagreed about their knowledge in nutritional intake in terms of Calcium respectively.

Table 4.19: Nutritional knowledge of Iodine

Rating Scale	Frequency	Percent (%)
strongly disagree	13	13.0
Disagree	31	31.0
Not sure	36	36.0
Agree	12	12.0
Strongly agree	8	8.0
Total	100	100.0

Source: Field work, 2017

4.2.8: Nutritional knowledge of Iodine

As can be observed in Table 4.19 that 8 (8.0%) of the respondents strongly agreed on the nutritional knowledge about Iodine during pregnancy, 12 (12.0%) agreed, 36 (36.0%) were not sure as the majority respondents, 31 (31.0%) disagreed, and 10 (10.0%) strongly disagreed.

Table 4.20: Nutritional knowledge of Omega 3 fatty-acid

Rating Scale	Frequency	Percent (%)
strongly disagree	7	7.0
Disagree	42	42.0
Not sure	18	18.0
Agree	6	6.0
Strongly agree	27	27.0
Total	100	100.0

Source: Field work, 2017

4.2.9: Nutritional knowledge of Omega 3 fatty-acid

As seen in Table 4.20, it shows that, 27 (27.0%) of the respondents strongly agreed that they have nutritional knowledge about omega 3 fatty acid intake as important nutrient during pregnancy, 6 (6.0%) agreed, 18 (18.0%) were not sure, 42 (42.0%) disagreed as the majority respondents, and 7 (7.0%) strongly disagreed about their knowledge in nutritional intake of omega 3 fatty acid respectively.

Table 4.21: Nutritional knowledge of Water

Rating Scale	Frequency	Percent (%)
Strongly disagree	12	12.0
Disagree	19	19.0
Not sure	25	25.0
Agree	28	28.0
Strongly agree	16	16.0
Total	100	100.0

Source: Field work, 2017

4.2.10: Nutritional knowledge of Water

As seen in Table 4.21, 16 (16.0%) respondents strongly agreed to the contribution of water intake during their pregnancy, 28 (28.0%) agreed as the majority respondents, 25 (25.0%) were not sure, 19 (19.0%) disagreed while 12 (12.0%) strongly disagreed about the contribution of water during their period of pregnancy.

4.3: Objective 2: Food intake of Pregnant Women in the New Juaben

Municipality

Table 4.22: Meals intake

Rating Scale	Frequency	Percent
Breakfast alone	7	7.0
Lunch alone	30	30.0
Breakfast and lunch	4	4.0
Breakfast and supper	7	7.0
Breakfast, lunch and supper	44	44.0
lunch and supper	8	8.0
Total	100	100.0

Source: Field work, 2017

4.3.1: Meals intake

As can be seen in Table 4.22, out of the one hundred (100) respondents questionnaires retrieved for the study, 7 (7.0%) respondents ate breakfast alone, 30 (30.0%) took lunch alone, and respondents who ate Breakfast and Supper; breakfast and lunch; breakfast, lunch and Supper; lunch and supper were also 4 (4.0%), 7 (7.0%), 44 (44.0%), and 8 (8.0%) took lunch and supper respectively.

Table 4.23: Most popular diet eaten during pregnancy

Rating Scale	Frequency	Percent
Fufu and soup	51	51.0
Any other food	7	7.0
Banku and stew	17	17.0
Ampesi, plantain and stew	25	25.0
Total	100	100.0

Source: Field work, 2017

4.3.2: Most popular diet eaten during pregnancy

Table 4.23 shows that out of the one hundred (100) respondents, 51 (51.0%) ate fufu and soup which also indicated the highest rating from the study. Also those who ate banku and stew; any other food; ampesi (plantain or yam) and stew were 7 (7.0%), (17.0%) and 25 (25.0%) respectively.

Table 4.24: Frequency of taken meals

Rating Scale	Frequency	Percent
Once	7	7.0
Twice	30	30.0
Thrice	44	44.0
more than thrice	19	19.0
Total	100	100.0

Source: Field work, 2017

4.3.3: Frequency of taken meals

The results from Table 4.24 reveals that, out of one hundred (100) respondents used for the study, 44 (44.0%) of the respondents ate three times representing the majority. Respondents who ate once, twice, and more than thrice during their time of pregnancy were also 7 (7.0%), 30 (30.0%) and 19 (19.0%) respectively.

Table 4.25: Source of meals

Rating Scale	Frequency	Percent
Cooked in the home	58	58.0
Bought ready to eat	6	6.0
Both	36	36.0
Total	100	100.0

Source: Field work, 2017

4.3.4: Source of meals

Findings from Table 4.25 shows that 58 (58.0%) respondents ate food cooked in their homes and 6 (6.0%) ate ready prepared food (bought), while 36 (36.0%) sometimes purchased and prepared their own food.

Table 4.26: Methods of cooking mostly employed

Rating Scale	Frequency	Percent
Boiling	62	62.0
Stewing	32	32.0
Grilling	6	6.0
Total	100	100.0

Source: Field work, 2017

4.3.5: Methods of cooking mostly employed

In the Table 4.26, 62 (62.0%) of the respondents mostly used the boiling method of cooking which represented majority of respondents for the study. Thirty two percent (32.0%) and 6 (6.0%) respondents used stewing and grilling methods of cooking food respectively.

Table 4.27: Mode of eating

Rating Scale	Frequency	Percent
Eat alone	42	42.0
Eat together with other members of the family	58	58.0
Total	100	100.0

Source: Field work, 2017

4.3.6: Mode of eating

The Table 4.27 shows that, 42 (42.0%) respondents ate alone, 58 (58.0%) ate together with other members of the family represent the majority of the respondents.

Table 4.28: Quantity of meals eaten

Rating Scale	Frequency	Percent
Yes	63	63.0
No	37	37.0
Total	100	100.0

Sources: Field work, 2017

4.3.7: Quantity of meals eaten

From Table 4.28, 63 (63.0%) of the respondents ate all the food served to them, and 37 (37.0%) were unable to eat all the food served to them during meal time in their time of pregnancy.

Table 4.29: Intake of snack

Rating Scale	Frequency	Percent
Yes	84	84.0
No	16	16.0
Total	100	100.0

Sources: Field work, 2017

4.3.8: Intake of snack

As indicated in Table 4.29, 84 (84.0%) of the respondents ate snack which were the majority responses and 16 (16.0%) did not take snack.

Table 4.30: Foods taken as snack

Rating Scale	Frequency	Percent
Pastry and soft drink	53	53.0
roasted plantain and groundnut	8	8.0
Fruits	33	33.0
roasted plantain alone	6	6.0
Total	100	100.0

Sources: Field work, 2017

4.3.9: Foods taken as snack

In Table 4.30, majority of the respondents, that is 53 (53.0%) took pastry and soft drink as snack and 8 (8.0%) took roasted plantain and groundnut while those who took fruits were 33 (33.0%). However, other respondents took roasted plantain alone as snack was 6 (6.0%).

Table 4.31: Fatty foods intake

Rating Scale	Frequency	Percent
Yes	49	49.0
No	51	51.0
Total	100	100.0

Source: Field work, 2017

4.3.10: Fatty foods intake

From Table 4.3, 49 (49.0%) of the respondents ate more fatty foods during their time of pregnancy while 51 (51.0%) ate fatty foods in moderation.

Table 4.32: Frequency of eating vegetables

Rating Scale	Frequency	Percent
Every day	55	55.0
Sometimes	33	33.0
None	12	12.0
Total	100	100.0

Source: Field work, 2017

4.3.11: Frequency of eating vegetables

As shown in Table 4.32, majority of the respondents, 55 (55.0%) ate vegetables every day while 33 (33.0%) sometimes ate vegetables. Also 12 (12.0%) of the respondents did not include vegetables in their meals.

Table 4.33: Intake of fruits

Rating Scale	Frequency	Percent
Yes	81	81.0
No	19	19.0
Total	100	100.0

Source: Field work, 2017

4.3.12: Intake of fruits

In Table 4.33, majority of the respondents 81 (81.0%) ate fruits during their time of pregnancy while 19 (19.0) % said did not eat fruits.

Table 4.34: Variety of foods eaten

Rating Scale	Frequency	Percent
Yes	77	77.0
No	23	23.0
Total	100.0	100.0

Source: Field work, 2017

4.3.13: Variety of foods eaten

As indicated in Table 4.34, majority of the respondents, 77 (77.0%) said that they ate variety of foods while 23 (23.0%) revealed that they were restricted in the intake of particular foods alone.

Table 4.35: Food restrictions

Rating Scale	Frequency	Percent
Yes	61	61.0
No	39	39.0
Total	100	100.0

Source: Field work, 2017

4.3.14: Food restrictions

Table 4.35 shows that out of the one hundred (100) respondents who took part in the study, 61 (61.0%) of the respondents were restricted from eating some food items during their time of pregnancy, and they represent the majority. Respondents who were not restricted from eating some food items and the no-response were also 38 (38.0%).

Table 4.36: Restricted foods: N= 61

Rating Scale	Frequency	Percent
Egg	17	27.9
Okro	6	9.8
Crab	7	11.5
Fatty foods	3	4.9
Snail	24	39.3
Red meat	4	6.6
Total	61	100

Source: Field work, 2017

4.3.15: Restricted foods: N= 61

In Table 4.36, 39 (39.0%) of the respondents were restricted from eating eggs and they form the majority. Others who were also restricted from eating food staff like Okro, Crab, fatty foods, Corn, and Red meat were 10 (10.0%), 6 (6.0%), 2 (2.0%) 5 (5.0%) and 38 (38.0%) respectively.

Table 4.37: Excessive intake of food

Rating Scale	Frequency	Percent
Yes	7	7.0
No	93	93.0
Total	100	100.0

Source: Field work, 2017

4.3.16: Excessive intake of food

Table 4.37 shows that 7 (7.0%) of the respondents who said yes from the minority and 93 (93.0%) who were the majority said no.

Table 4.38: Skipping meals

Rating Scale	Frequency	Percent
Yes	61	61.0
No	39	39.0
Total	100	100.0

Source: Field work, 2017

4.3.17: Skipping of meals

Table 4.38 as many as 61 (61.0%) of the respondents, who were the majority skipped meals and only 39 (39.0%) of them also the minority did not skipped meals.

4.4. Objective 3: Diseases or challenges pregnant women have during pregnancy**Table 4.39: Birth weight**

Rating Scale	Frequency	Percent
Strongly disagree	6	6.0
Disagree	26	26.0
Not sure	18	18.0
Agree	34	34.0
Strongly agree	16	16.0
Total	100	100.0

Source: Field work, 2017

4.4.1: Birth weight

From the Table 4.39, 16 (16.0%) of the respondents strongly agreed that given birth to low birth weight babies were some of the challenges of poor pregnancy outcomes, 34 (34.0%) agreed as the majority responded, 18 (18.0%) were not sure, 26 (26.0%) disagreed and 6 (6.0%) strongly disagreed respectively.

Table 4.40: Malformations

Rating Scale	Frequency	Percent (%)
Strongly disagree	13	13.0
Disagree	10	10.0
Not sure	26	26.0
Agree	43	43.0
Strongly agree	8	8.0
Total	100	100.0

Source: Field work, 2017

4.4.2: Malformations

According to Table 4.40, 8 (8.0%) of the respondents strongly agreed that poorly formed babies emanated from poor nutrition in pregnancy, 43 (43.0%) agreed as the majority respondents, 26 (26.0%) were not sure, 6 (6.0%) disagreed, while 13 (13.0%) strongly disagreed that poorly formed organs of babies was as a challenge of poor pregnancy outcomes.

Table 4.41: Pre- term babies

Rating scale	Frequency	Percent (%)
Strongly disagree	6	6
Disagree	23	23.0
Not sure	26	26.0
Agree	22	22.0
Strongly agree	23	23.0
Total	100	100.0

Source: Field work, 2017

4.4.3: Pre- term babies

In Table 4.41, 23 (23.0%) of the respondents strongly agreed that pre-terms babies resulted from poor food habits in pregnancy, 22 (22.0%) agreed, 26 (26.0%) were not sure, 23 (23.0%) disagreed, 6 (6.0%) strongly disagreed respectively.

Table 4.42: Miscarriage

Rating scale	Frequency	Percent (%)
Strongly disagree	13	13.0
Disagree	20	20.0
Not sure	25	25.0
Agree	19	19.0
Strongly agree	23	23.0
Total	100	100.0

Source: Field work, 2017

4.4.4: Miscarriage

The Table 4.42 indicates that 23 (23.0%) of the respondents strongly agreed that one of the major challenges in pregnancy was miscarriage, 19 (19.0%) agreed, 25 (25.0%) were not sure as the majority responded, 20 (20.0%) disagreed and 13 (13.0%) strongly disagreed.

Table 4.43: Still Birth

Rating scale	Frequency	Percent (%)
Strongly disagree	13	13.0
Disagree	32	32.0
Not sure	37	37.0
Agree	6	6.0
Strongly agree	12	12.0
Total	100	100.0

Source: Field work, 2017

4.4.5: Still Birth

As seen in Table 4.43, 12 (12.0%) of the respondents strongly agreed that still birth can be resulted from bad food habits in pregnancy, 6 (6.0%) agreed, 37 (37.0%) were not sure as the majority responded, 32 (32.0%) disagreed while 13 (13.0%) strongly disagreed.

Table 4.44: Anaemia

Rating scale	Frequency	Percent (%)
Strongly disagree	13	13.0
Disagree	15	15.0
Not sure	12	12.0
Agree	42	42.0
Strongly agree	18	18.0
Total	100	100.0

Source: Field work, 2017

4.4.6: Anaemia

In Table 4.44, 18 (18.0%) of the respondents strongly agreed that they were aware of anaemia being deadly during pregnancy, 42 (42.0%) agreed, 12 (12.0%) were not sure, 15 (15.0%) disagreed while 13(13.0%) strongly disagreed.

Table 4.45: Oedema/swellings

Rating scale	Frequency	Percent (%)
Strongly disagree	17	17.0
Disagree	13	13.0
Not sure	24	24.0
Agree	31	31.0
Strongly agree	15	15.0
Total	100	100.0

Source: Field work, 2017

4.4.7: Oedema/swellings

As indicated in Table 4.45, 15 (15.0%) of the respondents strongly agreed that oedema/swellings as one of the major challenges in pregnancy, 31 (31.0%) agreed as the majority responded, 24 (24.0%) not sure, 13 (13.0%) disagreed while 17 (17.0%) strongly disagreed.

Table 4.46: Dizziness

Rating scale	Frequency	Percent (%)
Strongly disagree	21	21.0
Not sure	28	28.0
Agree	45	45.0
Strongly agree	6	6.0
Total	100	100.0

Source: Field work, 2017

4.4.8: Dizziness

Table 4.46, indicates clearly that 6 (6.0%) of the respondents strongly agreed that they experienced dizziness during pregnancy, 45 (45.0%) agreed as the majority responded, 28 (28.0%) were not sure while 21(21.0%) strongly disagreed.

Table 4.47: Weight loss

Rating scale	Frequency	Percent (%)
Strongly disagree	13	13.0
Not sure	37	37.0
Agree	32	32.0
Strongly agree	18	18.0
Total	100	100.0

Source: Field work, 2017

4.4.9: Weight loss

Table 4.47 reveals that 18 (18.0%) of the respondents strongly agreed to weight loss during pregnancy as a major challenge, 32 (32.0%) agreed as the majority responded, 37 (37.0%) were not sure while 13 (13.0%) strongly disagreed to it.

Table 4.48: Excessive weight gain

Rating scale	Frequency	Percent (%)
Strongly disagree	12	12.0
Disagree	13	13.0
Not sure	43	43.0
Agree	24	24.0
Strongly agree	8	8.0
Total	100	100.0

Source: Field work, 2017

4.4.10: Excessive weight gain

Table 4.48, indicates that 8 (8.0%) of the respondents strongly agreed that some pregnant women gain excessive weight during pregnancy, 24 (24.0%) agreed and 43 (43.0%) were not sure. Thirteen percent (13.0%) and 12 (12.0%) disagreed and strongly disagreed respectively of experiencing weight gain.

Table 4.49 Post- Partum Haemorrhage (PPH)

Rating scale	Frequency	Percent
Strongly disagree	8	8.0
Disagree	22	22.0
Not sure	37	37.0
Agree	20	20.0
Strongly agree	13	13.0
Total	100	100.0

Source: Field work, 2017

4.4.11: Post- Partum Haemorrhage (PPH)

Table 4.49, 13 (13.0%) of the respondent strongly agreed that they Post- Partum Haemorrhage (PPH) during delivery resulted from poor food habits, 20 (20.0%) agreed, 37 (37.0%) were not sure, 22 (22.0%) disagreed while 8 (8.0%) strongly disagreed.

Table 4.50: Constipation

Rating scale	Frequency	Percent (%)
Disagree	20	20.0
Not sure	34	34.0
Agree	32	32.0
Strongly agree	14	14.0
Total	100	100.0

Source: Field work, 2017

4.4.12: Constipation

Table 4.50, 14 (14.0%) of the respondents strongly agreed that they had constipation during their time of pregnancy, 32 (32.0%) agreed, 34 (34.0%) were not sure whilst 20 (20.0%) disagreed that they experienced constipation during their pregnancy.

Table 4.51: Dehydration

Rating scale	Frequency	Percent (%)
Strongly disagree	7	7.0
Disagree	19	19.0
Not sure	43	43.0
Agree	24	24.0
Strongly agree	7	7.0
Total	100	100.0

Source: Field work, 2017

4.4.13: Dehydration

According to Table 4.51, 7(7.0%) of the respondents strongly agreed that they experienced dehydration as result of excessive vomiting, 24 (24.0%) agreed, 43 (43.0%) were not sure, 19 (19.0%) Disagreed while 7 (7.0%) strongly disagreed.

Table 4.52: Heart burns

Rating Scale	Frequency	Percent (%)
Strongly Disagree	18.0	18
Disagree	13.0	13
Not sure	26.0	26
Agree	23.0	23
Strongly agree	20.0	20
Total	100.0	100.0

Source: Field work, 2017

4.4.14: Heart burns

As seen in Table 4.52, 20 (20.0%) of the respondents strongly agreed that they experienced heart burns during their time of pregnancy, 23 (23.0%) agreed, 26 (26.0%) were not sure, 13 (13.0%) disagreed whilst 18 (18.0%) strongly disagreed that they experienced heartburns.

Table 4.53: Loss of appetite

Rating Scale	Frequency	Percent (%)
Strongly disagree	7	7.0
Disagree	13	13.0
Not sure	30	30.0
Agree	36	36.0
Strongly agree	14	14.0
Total	100	100.0

Source: Field work, 2017

4.4.15: Loss of appetite

In Table 4.53, 14 (14.0%) of the respondents strongly agreed that they experienced loss of appetite in their pregnancies, 36 (36.0%) agreed as the majority responds, 30 (30.0%) were not sure, 13 (13.0%) disagreed while 7 (7.0%) strongly disagreed.

Table 4.54: Excessive eating

Rating Scale	Frequency	Percent (%)
Strongly disagree	14	14.0
Disagree	20	20.0
Not sure	30	30.0
Agree	23	23.0
Strongly agree	13	13.0
Total	100	100.0

Source: Field work, 2017

4.4.16: Excessive eating

Table 4.54, shows that 13 (13.0%) of the respondents strongly agreed that they overate during their time of pregnancy, 23 (23.0%) agreed, 30 (30.0%) were not sure, 20 (20.0%) disagree while 14 (14.0%) strongly disagreed of over eaten.

Table 4.55: Eating of non-food substances

Rating Scale	Frequency	Percent (%)
Strongly disagree	14	14.0
Disagree	23	23.0
Not sure	24	24.0
Agree	18	18.0
Strongly agree	21	21.0
Total	100	100.0

Source: Field work, 2017

4.4.17: Eating of non-food substances

As shown in Table 4.55, 21 (21.0%) respondents strongly agreed that they ate clay and other non-food substances during their time of pregnancy, 18 (18.0%) agreed, 24 (24.0%) were not sure, 23 (23.0%) disagreed while 14 (14.0%) strongly disagreed of consuming clay and other non- food substances.

Table 4.56: Excessive vomiting

Rating Scale	Frequency	Percent (%)
Strongly disagree	14	14.0
Disagree	26	26.0
Not sure	34	34.0
Agree	18	18.0
Strongly agree	8	6.0
Total	100	100.0

Source: Field work, 2017

4.4.18: Excessive vomiting

As shown in Table 4.56, 8 (8.0%) of the respondents strongly agreed that they experienced excessively vomiting during pregnancy, 18 (18.0%), 34 (34.0%) were not sure, 26 (26.0%) disagreed, while 14 (14.0%) strongly disagreed.

Table 4.57: Maternal and child death

Rating Scale	Frequency	Percent (%)
Disagree	6	6.0
Not sure	12	12.0
Agree	49	49.0
Strongly agree	33	33.0
Total	100	100.0

Source: Field work, 2017

4.4.19: Maternal and child death

According to Table 4.57, 33 (33.0%) of the respondents strongly agreed that Death to both mother and child can be resulted during pregnancy, 49 (49.0%) agreed being the majority respondents, 12 (12.0%) not sure, 6 (6.0%) disagreed and none strongly disagreed.

4.5. Objective 4: How to improve the food habits of the pregnant women in the New Municipality

Table 4.58: Regular ante-natal attendance

Rating Scale	Frequency	Percent
Disagree	17	17
Not sure	6	6
Agree	31	31
Strongly agree	46	46
Total	100	100

Source: Field work, 2017

4.5.1: Regular ante natal attendance

As indicated in Table 4.58, 46 (46.0%) of the respondents strongly agreed that attending ante natal clinic regularly had helped them to improve their food habits, 31 (31.0%) agreed, 6 (6.0%) were not sure while 17 (17.0%) disagreed.

Table 4.59: Adherence to nutrition education

Rating Scale	Frequency	Percent (%)
Disagree	6	6
Not sure	17	17
Agree	31	31
Strongly agree	46	46
Total	100	100

Source: Field work, 2017

4.5.2: Adherence to nutrition education

As stated in Table 4.59, 46 (46.0%) of the respondents strongly agreed that receiving nutrition education and following doctors' advice during their time of pregnancy had helped them to improve their food habits, 31 (31.0%) Agreed, 17 (17.0%) were not sure, 6 (6.0%) disagree, while none strongly disagree.

Table 4.60: Eating balanced diet

Rating Scale	Frequency	Percent (%)
Disagree	10	10
Not sure	25	25
Agree	26	26
Strongly agree	39	39
Total	100	100

Source: Field work, 2017

4.5.3: Eating balanced diet

In Table 4.60, 39 (39.0%) of the respondents strongly agreed that balanced diet resulted in good pregnancy outcome, 26 (26.0%) agreed, 25 (25.0%) were not sure, 10 (10.0%) disagreed, and none strongly disagreed.

Table 4.61: Regularly eating variety of foods

Rating Scale	Frequency	Percent (%)
Disagree	6	6
Not sure	17	17
Agree	38	38
Strongly agree	39	39
Total	100	100

Source: Field work, 2017

4.5.4: Regularly eating variety of foods

Table 4.61, reveals that 39 (39.0%) of the respondents strongly agreed that eating regularly and variety of foods had improved their health in their pregnancies, 38 (38.0%) agreed, 17 (17.0%) were not sure, 6 (6.0%) disagreed and 0(0.0%) strongly disagree.

Table 4.62: Eating vegetables frequently

Rating Scale	Frequency	Percent (%)
Disagree	12	12
Not sure	23	23
Agree	38	38
Strongly agree	27	27
Total	100	100

Source: Field work, 2017

4.5.5: Eating vegetables frequently

According to Table 4.62, 27 (27.0%) of the respondents strongly agreed that eating vegetables everyday had improved their health, 38 (38.0%) agreed 23(23.0%) were not sure, 12 (12.0%) disagreed, and none 0(0.0%) strongly disagreed.

Table 4.63: Eating fruits frequently

Response	Frequency	Percent (%)
Disagree	12	12.0
Not sure	17	17.0
Agree	32	32.0
Strongly agree	39	39.0
Total	100	100.0

Source: Field work, 2017

4.5.6: Eating fruits frequently

In Table 4.63, 39 (39.0%) respondents strongly agree, 32 (32.0%) agree, 17 (17.0%) not sure, 12(12.0%) disagree and none 0(0.0%) strongly disagree.

Table 4.64: Reduce oily foods intake

Rating Scale	Frequency	Percent(%)
Strongly disagree	6	6
Disagree	19	19
Not sure	23	23
Agree	25	26
Strongly agree	27	26
Total	100	100

Source: Field work, 2017

4.5.7: Reduce oily foods intake

As observed in Table 4.64, 27 (27.0%) of the respondents strongly agreed 25 (25.0%) agree, 25 (25.0%) were not sure, 19 (19.0%) disagreed, and 6 (6.0%) strongly disagreed to avoid eating too much oily foods.

Table 4.65: Reduce salt intake

Rating scale	Frequency	Percent (%)
Strongly disagree	6	6.0
Disagree	19	19.0
Not sure	17	17.0
Agree	22	22.0
Strongly agree	36	36.0
Total	100	100.0

Source: Field work, 2017

4.4.8: Reduce salt intake

Table 4.65, reveals that 36 (36.0%) of the respondents strongly agreed, 22 (22.0%) agreed, 17 (17.0%) were not sure, 19 (19.0%) disagreed, and 6 (6.0%) strongly disagreed about the implication of eating too much salt.

Table 4.66: Avoid eating non-food substances

Rating Scale	Frequency	Percent(%)
Disagree	12	12
Not sure	18	18
Agree	42	42
Strongly agree	28	28
Total	100	100

Source: Field work, 2017

4.5.9: Avoid eating non-food substances

Table 4.66, it indicates that 28 (28.0%) of the respondents strongly agreed that they ate clay and other non-food substances during pregnancy had improved their health, 42 (42.0%) agreed, 18 (18.0%) were not sure, 12 (12.0%) disagreed, and none 0(0.0%) strongly disagreed.

Table 4.67: Eating iron and folic acid rich foods

Rating Scale	Frequency	Percent (%)
strongly disagree	6	6
Disagree	13	13
Not sure	23	23
Agree	25	25
Strongly agree	33	33
Total	100	100

Source: Field work, 2017

4.5.10: Eating iron and folic acid rich foods

As could be seen in Table 4.67, 33 (33.0%) of the respondents strongly agreed that iron and folic acid rich foods assisted in good pregnancy outcome 25 (25.0%) agreed, 23 (23.0%) were not sure, 13 (13.0%) disagree, and 6 (6.0%) strongly disagree.

4.6: Reliability Analysis

Table 4.68: Cronbach's Alpha of each of the objective questions

Variable	Number of item	Chonbach's Alpha
NK	10	0.949
D	19	0.897
HI	9	0.951

Source: Field work, 2017

Where, NK denotes nutritional knowledge of some important nutrients needed in pregnancy.

D denotes diseases or health challenges pregnant women have during pregnancy.

HI denotes how to improve the food habits of the pregnant women in the new Juaben municipality.

4.6.1: Cronbach's Alpha of each of the objective questions

Table 4.68, the findings of the study shows that the Cronbach's alpha for nutritional knowledge of some important nutrients needed in pregnancy was 0.949, diseases or challenges pregnant women have during pregnancy was 0.897 and how to improve the food habits of the pregnant women in the new Juaben municipality was 0.951. It can be seen that the Cronbach's alpha value for the variables exceeded the threshold of 0.7. This indicates that the questions used for the study were consistent.

4.6.2 Further analysis

Further inferences were done using relevant statistical analysis of one sample T- test with p value set at 0.05 significant level to determine pregnant women's nutritional knowledge of some important nutrients needed in pregnancy.

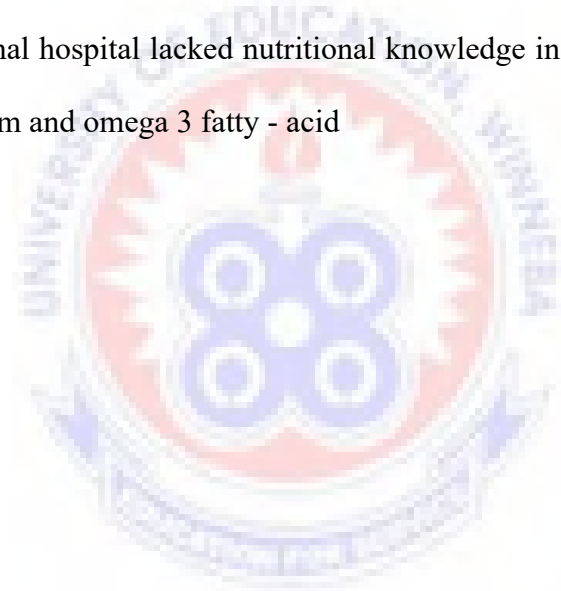
H₀₁: There was no significant difference between the nutritional value knowledge and the food habits of pregnant women attending ante natal clinic at Koforidua Regional hospital.

Table 4.69: One Sample T Test

	Test					
	Value = 3					
	T	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
				Lower	Upper	
Protein	-3.282	99	0.001	-0.390	-0.630	-0.150
Vitamin B	-1.775	99	0.079	-0.190	-0.400	0.020
Vitamin C	1.012	99	0.314	0.130	-0.120	0.380
Vitamin D	1.081	99	0.282	0.150	-0.130	0.430
Folic acid	-0.756	99	0.451	-0.090	-0.330	0.150
Iron	-0.912	99	0.364	-0.100	-0.320	0.120
Calcium	0.678	99	0.499	0.090	-0.170	0.350
Iodine	-2.650	99	0.009	-0.290	-0.510	-0.070
Omega 3 fatty acid	0.294	99	0.770	0.040	-0.230	0.310

Source: Field work, 2017

Table 4.69, it could be seen that there was statistically significant difference in the nutritional knowledge of protein $t(99) = -3.282$, $p\text{-value} = 0.001$ and iodine $t(99) = -2.650$, $p\text{-value} = 0.009$). This means that the pregnant women who attended antenatal clinic at Koforidua regional hospital had nutritional knowledge of protein and iodine, which serves as some essential nutrients needed in pregnancy. It could also be seen that there was no statistical significance in the nutritional knowledge of vitamin B ($p\text{-value} = 0.079$), vitamin C ($p\text{-value} = 0.314$), vitamin D ($p\text{-value} = 0.282$), folic acid ($p\text{-value} = 0.451$), calcium ($p\text{-value} = 0.499$) and omega 3 fatty acid ($p\text{-value} = 0.770$) among pregnant women. This means that pregnant women who attended ante natal care at Koforidua regional hospital lacked nutritional knowledge in vitamin intake as well as folic acid, calcium and omega 3 fatty - acid



CHAPTER FIVE

DISCUSSION OF RESULTS

5.0 Overview

This chapter presents detailed discussions of the study after analysing the primary data. The results are summarised as shown below for easy interpretation and understanding of the analysis.

5.1 Demographic Data of the Respondents

Table 4.1 indicates the ages of pregnant women who attended ante-natal clinic at Eastern Regional Government Hospital in Koforidua. Out of the one hundred (100) respondents used for the study, majority (87%) were between the ages of 20 to 39 years. This gives an indication of age bracket of reproductive years of women who attended ante natal clinic at Eastern Regional Hospital in Koforidua. Marital Status of the pregnant women in Table 4.2 revealed that 61% of the respondents were married according to the marriage laws of Ghana. Few were widows who indicated that they lost their husbands during their pregnancy. From the data $\frac{1}{3}$ of the respondents were pregnant out of wedlock. This may affect them financially, since they had to support themselves alone and may eat poorly which will affect their health.

The location of an individual can determine her accessibility to food. Most of the respondents studied, 53% were women from the rural folks while 47% of the respondents were urban dwellers. This was because as a regional government hospital they received referrals from the surrounding towns and region as well.

The educational background revealed that, most of the respondents (62%) being the majority had basic education and secondary while a handful had tertiary with a substantial number with no formal education. With large number of the respondents' educational background being basic and secondary, they may not be properly employed

or may not have employment. Therefore, they will not be able to buy or choose nutritious food even if food is available. They may eat anything they lay hands on without thinking of the nutritive properties the food contains. It is affirmed by Bennett and Brown (1996) that in developing countries high maternal death is attributed to poverty, low status of women, female illiteracy, and inadequate primary health care.

The occupation of the respondents was (89%) and their spouses were 69%. The occupations of respondents included artisans, and businesses while few were public servants. With the large unemployed respondents, they may not be able to support themselves and their families to choose healthy food to eat. This confirmed Sweet, (1993) assertion that suboptimal nutrition is very common among pregnant women particularly, in areas where unemployment and poverty are common.

Moreover, the economic status of an individual can dictate what she can bought to eat as food, therefore the income per month of the respondents were assessed and identified, where (50%) of the respondents received less than GHs 500.00 per month. It means their small income may affect their food budget, and therefore, they cannot eat variety of foods and also their diet become monotonous. This confirmed what Foskett and Cesarani (2012) said that the economic status of an individual is crucial to what is eaten because with the large range of foods available, people can only buy what they can afford. Beside the income, the source of food for the respondents' household indicated that, (57%) of the respondents always purchased food while the others obtained their food from their cultivated farms, and also purchased some of the foods as well. A study by Murakami *et.al*, (2003) explained that Japanese pregnant women with higher socio-economic position were found to consume diets that were of higher quality than those with a lower socio economic position. Other studies have shown that

families, which have greater incomes and resources tend to have more diverse diets as food access is determined by income and the prices of foods (Brinkman *et. al*, 2009). Number of children under ones care determines the standard of living of that person. Majority of the respondents (76%) had dependents. A study done by Tarasuk *et. al*, (2007) revealed that, women with limited resources may either reduce their consumption or deprive themselves of food in order to give to their children so as to spare their children from deprivation and hunger. Also, most of the respondents 76% had one or more children, and this depicts how the limited resources including food were shared, which may prevent the pregnant mother from having enough to eat Tarasuk *et. al*, (2007) continues that food intakes by women depend on their household resources, and therefore, women can deny themselves of food even in pregnancy which may be detrimental to their health.

About the birth interval between pregnancies, it came to light that majority (53%) of the respondents had less than 2 years interval between their last pregnancies Whitney *et. al* (2007) observed that women who give birth in succession deplete their body stores of calcium and iron, which can lead to maternal death. Women access to health care instituted in the Millennium Development Goal 4 and 5, and currently the Sustainable Development Goal 3 prompted the researcher to find out the time pregnant women start their ante natal services. It came to light that (65%) of the respondents attend ante- natal care in their 1st and 2nd trimesters. This shows that government intervention of free maternal care under the National Health Insurance has been embraced by the populace to achieve maternal and baby survival as good pregnancy outcome in Table 4.11.

5.2 Objective 1: Nutritional knowledge of some important nutrients needed in pregnancy

During pregnancy, women's macronutrient (energy) and micronutrient (e.g. vitamins, mineral) requirement increases, as such, it is very important to consume foods which provide both energy and specific micronutrients that are essential for maintenance of the mother and the growing baby's health. Sweet (1993) said that women require an additional 240 calories of energy per day in the second trimester and 452 calories per day in the third trimester of pregnancy to account for foetal growth. Therefore, knowledge of essential nutrients to be included in meals, quality and quantity to be eaten is very crucial for good health and well-being of the mother. In the light of this the respondents were assessed on their knowledge and inclusion of some important nutrients needed during pregnancy.

According to Wardlaw (2003), protein is very paramount in pregnancy for the foetal growth, cell division and making the mother healthy. The European Food Safety Authority (EFSA) (2013) said that a well-nourished woman with a normal Body Mass Index BMI, a pregnant woman needs an additional 70kcal of protein per day in the 1st trimester, 260 kcal per day in the second trimester and 500kcal a day in the third trimester. This is of support in Addow *et. al*, (1993) that for pregnant women extra protein is needed every day, since the body cannot store protein, and if not checked can lead to Metabolic Toxaemia of Late Pregnancy (MTLP), which is a protein deficiency may result in the death of both mother and child (www.rd.ap.gov/health/Nutrition_Center_Conceptnote_2006.pdf). It has been indicated clearly that only 26% of the respondents agreed to the nutritional knowledge of protein intake as an important nutrient to be included in their meals during pregnancy, and this can affect the foetus. It can also be expressed that women from lower socio-economic groups were at higher

risk of inadequate protein intake due to the expensive costs of protein. They are also more likely to choose less expensive processed foods, which would put them at risk (Thompson *et. al*, 2010).

In assessing the knowledge of Vitamin B as an important micro- nutrient, 27% had nutritional knowledge about Vitamin B group intake as a key element for good pregnancy outcome. Sweet (1993) revealed that Vitamin B₆ deficiency results in clubfoot, cleft lip and palate, while lack of thiamine (vitamin B₁) is associated with heart defects, and riboflavin deficiency leads to Intra-uterine growth restrictions Seely *et. al*, (1999) were of the view that pregnant mothers need vitamin B₁₂ for the foetus to store, and must be enough for the first six months after birth. They continue that vegan pregnant mothers may be deficient in vitamin B₁₂, therefore need to take its dietary supplement.

Only 33% of the respondents had nutritional knowledge of Vitamin C intake pertaining to its importance during pregnancy as it helps in absorption. Vitamin C from fresh fruits and vegetables provides fibre and prevent constipation, and helps in the absorption of iron (Webb, 20003).

The knowledge and inclusion of vitamin D foods in meals during pregnancy was (40%) of the respondents which revealed poor knowledge. According to Wardlaw (2003), Vitamin D helps to reduce the risk of adverse pregnancy outcomes such as pre-eclampsia, bone disorders of rickets and osteomalacia.

As low as (26%) of respondents had knowledge of folic acid, however, DNA requires folic for the formation of blood cells. It is also needed for the formation of brain and nervous system in the developing foetus. Therefore, folic acid deficiency can lead to

premature birth, miscarriage, slow growth, brain damage and other malformations of the foetus such as spina bifida (Sweet, 1993).

Besides, iron is an essential mineral element in pregnancy, (36%) of the respondents rated shows inadequate knowledge, which may adversely, limit its intake in their meals. It is required that pregnant women need an additional 975 milligrams of iron during pregnancy to form foetal and additional maternal blood (Academy for Educational Development, 2004). Lack of iron in diet can lead to anaemia and fatal consequences. This corresponds to research in pregnant women, which revealed that majority of the pregnant women were not reaching their requirements for iron during pregnancy (McGowan & McAuliffe, 2012).

Calcium is needed together with vitamin D in the development of healthy bones and teeth, extra-cellular fluid, muscles, and other tissues during pregnancy. It is involved in vascular muscle contractions and vasodilation, neural transmission, and glandular secretion (Sweet, 1993). Therefore, adequate dietary calcium intake before and during early pregnancy may reduce the risk or severity of pre-eclampsia. The extra calcium is needed to mineralize the foetal bones and lay enough minerals for the mother, especially, at the advanced stage of pregnancy. However, respondents' knowledge of calcium as an important mineral revealed that (40%) of them had knowledge in the nutritional benefits of calcium intake during pregnancy. This may affect their calcium needs as it is required for the ossification of bones and teeth, and to enable blood to clot. More calcium is needed in the last weeks of pregnancy for skeletal development of the foetus. If the amount of calcium is not enough in the mother's diet, she may lose calcium from her skeletal system, which may leads to weakened bones and

discolouration of teeth. However, calcium is needed together with vitamin D for proper absorption and its utilization in the body (Barasi, 2003).

During pregnancy iodine requirement increases by 50% (Stagnaro-Green *et. al*, 2011) however, knowledge of iodine was rated (20%) by the respondents which is low for the nutritional importance of iodine in the diet. Bennett and Brown (1996) were of the opinion that iodine is needed for proper functioning of the thyroid gland, and also prevents cretinism of the child. Again, it was observed that maternal iodine deficiency can result in hypo-thyroinaemia in infants, which is associated with cognitive and psychomotor deficits (Obican *et. al*, 2012).

Although most pregnant women included fish in their meals, they were not aware that it contains omega 3 fatty- acids mostly obtained from salmon and tuna. Twenty six percent (26%) of the respondents had knowledge about the chief source of omega 3 fatty- acids from fish. The European Food Safety Authority (EFSA) recommends that all pregnant women should consume an additional fish of 700-1400 mg/week of DHA (EFSA, 2010). This is in addition to the requirement of 1750 mg/week combined as stated by EPA and DHA. This increased intake can be achieved by consuming 1-2 portions of omega 3 fish per week (FSAI, 2011) and the best sources of DHA are tuna, trout, salmon, mackerel, and sardines (FSAI, 2011).

Water was the cheapest form of fluid and easily accessible but due to ignorance about the contribution of water intake in the body during pregnancy, it was rated as (44%) by the respondents. However, pregnant women needed more fluid to increase maternal blood volume, and also for the formation of amniotic fluid to assist in the removal of waste. With this it is recommended that the best fluid to consume is water (Whitney *et. al*, 2007).

5.3 Objective 2: Food intake of pregnant women

Food intake by pregnant women was very crucial for good health for both the mother and the developing baby. Out of the one hundred (100) respondents used for data analysis, those who ate meals thrice daily were (44%). Most of the respondents expressed that their most preferred diet was fufu and soup, which received the highest rating of (51%). Other foods consumed included Banku and stew, Ampesi (boiled plantain or yam) and stew. If pregnant women do not take their meals regularly it may affect the foetus. When choosing foods to increase energy intake, focus should be given to foods, which are rich in essential vitamins and minerals such as fruits and vegetables, and also high fibre food include cereals and grains, lean red meat and omega-3-rich fish (FSAI, 2011).

Meals prepared at home were more nutritious and hygienic therefore, the respondents were assessed on how their meals were obtained. It revealed that majority of the respondents (58%) always prepared and ate meals cooked in the home, while the rest ate ready-prepared foods (bought), while other respondents sometimes purchased and prepared their own meals as well. The respondents were asked to indicate the methods of cooking used during the preparation of their meals. Majority of the respondents (62%) expressed that they mostly used the boiling method of cooking food. The respondents who employed stewing and grilling methods of cooking were (38%) shown in Table 4.26. It can be explained that the cooking method that retain most nutrients like grilling and stewing were not used by most of the respondents, except boiling where mostly, the stock was thrown away. The method of cooking used by the respondents, where sometimes the stock was thrown away (boiling) reduced their nutrient intake more so, if the food was overcooked. Meal management practices affect food habits

because you can only prepare and eat foods you can easily cook with the facilities, and the knowledge you have about a particular food (Ivers & Cullen, 2011).

Also majority (58%) of the respondents ate their food together with other members of the family. A study done by Tarasuk, *et.al*, (2007), revealed that, where resources were minimal, women with limited resources reduced their consumption or deprived themselves of food in order to give to their children, so as to spare the children from deprivation and hunger, which may affect them adversely. It can be inferred that (76%) respondents had more dependants and hence food consumed by the pregnant women may be minimal compared to the recommended daily requirements. It was worth noted that (63%) of the respondents ate all the food served to them during meals, while $\frac{1}{3}$ were unable to eat all the food served to them during meal time. To meet the recommended daily intake during pregnancy, food should be enough with the appropriate quality of nutrients, especially, during pregnancy where optimal amount of nutrients are required (Webb, 2003).

Majority of the respondents (84%) ate snack and the rest did not take snack. Only (33%) of the respondents revealed that they took fruits for snack while most of them (67%) took pastries and soft drinks, and others ate roasted plantain alone. These foods may lack important nutrients needed for the developing foetus and the mother, but the choice of food for snack stem from their food habits.

Fat is important in the diet in transporting fat soluble vitamins to the body, but too much fatty foods is detrimental to the health of the respondents, since its digestion is slow. Almost half of the respondents (49%) ate more fatty foods while (51%) ate fatty foods in moderation. Food habits such as excessive salt, sugar, fat and alcohol intake may

have effects on health. Too much fat intake can lead to obesity and the foetus can become too large and cause complications during delivery.

Further, majority of the respondents (55%) ate vegetables every day while $\frac{1}{3}$ of the respondents sometimes ate vegetables, and quite a number of the respondents did not include vegetables in their meals. Again, majority of the respondents (81%) ate fruits every day during their time of pregnancy while the rest did not include fruits in their diet. Pregnant women should be encouraged to eat good quantities of fresh fruits and vegetables at least $\frac{1}{2}$ kg per day (www.rd.ap.gov/health/Nutrition_Center_Conceptnote_2006.pdf). This shows improvement in meeting their micronutrient needs. However, the method of cooking employed from Table 4.27 may destroy the nutrients. Moreover, majority of the respondents (77%) ate variety of foods while the rest did not. Also due to ignorance, socio-cultural, religious and health reasons particular foods were forbidden to be eaten by the respondents. Though they ate variety of foods, majority, 61% of the respondents were restricted from eating eggs, okro, crab, fatty foods, corn, and red meat. However, the said restricted foods may assist in the growth of the foetus as in the case of eggs, red meat, crab and snail. At the same time these foods were rich in calcium for strong bone and teeth, iron to prevent anaemia, macro-nutrients (protein) and other micro-nutrients. According to Barasi (2003), foods which are present and affordable, but culturally unacceptable foods are not eaten because people belonging to specific cultures and have their own food customs and each cultural group determines what could be eaten and what could not be eaten as food. As cited in Ali (2013), pregnant women's dietary behaviour and intake during pregnancy are strongly influenced by different cultural practices, myths and taboos.

Few of the respondents said yes, they ate excessively, being the minority and (93%) of the respondents said no. Again, the respondents were assessed on their regular intake

of meals and it revealed that majority of the respondents (61%) skipped meals while only (39%) did not and this can deprive the mothers of essential nutrients which may affect their health.

5.4: Objective 3: Diseases/health challenges of pregnancy

During pregnancy women face a lot of diseases and health challenges some of which result from poor food habits. Therefore, the respondents were asked to identify some of the challenges that emanated from food habits in pregnancy. Among them, they expressed that potential low birth weight babies was a major challenge to pregnant women during pregnancy. Half of the respondents (50%) agreed to it. They lamented that underweight babies were normally sent to Neonatal Intensive Care Unit (NICU), but most babies do not survive due to inadequate equipment and infections. It is opined that underweight births and intra uterine growth restrictions cause 2.2 million deaths a year (<http://en.wikipedia.org/wiki/malnutrition>). It has also been confirmed by Thompson *et al.*, (2010) that women from lower socio-economic groups are at higher risk of inadequate protein intake due to the expensive costs of protein. They are also more likely to choose less expensive processed foods, which would put them at risk because of small gestational age babies.

Another challenge which was expressed by the pregnant women was malformation of babies that emanate during pregnancy, where (51%) respondents agreed to it. Sweet (1993) affirmed that the incidence of congenital malfunctions is higher in areas of UK such as Wales, the West of Scotland and Ireland, where there are more couples in the lower socio-economic group. This is because they cannot afford to buy and eat nutritious food for themselves and the developing foetus. Also, Fieldhouse (1993) observed that people can choose from a wide range of foods available to them, but the availability of food does not mean that they have chosen the correct food rich in

nutrients. Therefore, during pregnancy women should be cautious to select nutritious food, which improves their health.

Other challenges indicated by the respondents were pre-term babies, miscarriages and still birth which were rated as (45%), (42%) and (44%) respectively. It is reported that iodine deficiency caused increased rate of miscarriages, stillbirth, prenatal and infant mortality (Thompson *et. al*, (2010)).

The respondents were further probed on more health challenges pertaining to pregnancy and it came to light that anaemia was deadly and was scored (60%) by the respondents. However, the knowledge of iron was rated low as an essential mineral element during pregnancy was rated (36%) which clearly shows that the respondents were aware of anaemia being deadly during pregnancy, but they were not aware that anaemia results from deficiency of iron, due to poor intake of iron-rich foods in their meals. As cited in Cheng *et. al*, (2009), inadequate intake of iron in pregnancy can lead to maternal anaemia and increased risks of maternal mortality, if the anaemia becomes severe. It has been said that worldwide, anaemia contributes to 20 percent of all maternal deaths and responsible for 40 to 60 percent of maternal deaths in non-industrialized countries (Karaoglu *et. al*, 2010). It is also estimated that anaemia accounts for 3.7 percent and 12.8 percent of maternal deaths during pregnancy and childbirth in Africa and Asia, respectively (Gautam *et. al*, 2008). Anaemia has also been found to lead to premature births, low birth weight, foetal impairment and infant deaths (Kalaivani, 2009). Other challenges expressed by the respondents were oedema/swellings and dizziness, which scored (46%) and (51%) respectively.

More than half of the respondents (52%) lamented that they experienced weight loss. While some pregnant women experienced weight loss, others experienced weight gain which constituted 51% of the respondents. It has been confirmed that dietary fat is an

important source of energy and assisted the absorption of fat soluble vitamins, however, high fat diets should be avoided during pregnancy due to the risk of excessive weight gain (FSAI, 2011). Weight gain or obese pregnant women should be encouraged to replace energy dense snacks with fruits and vegetables.

Other challenges such as Post- Partum Haemorrhage (PPH) was assessed and resulted clearly that 33% of the respondents agreed that pregnant women experienced Post-Partum Haemorrhage (PPH) during pregnancy and delivery. In report iodine deficiency caused increased rate in miscarriages, stillbirths, post-partum haemorrhage, prenatal and infant mortality (Thompson *et. al*, (2010). This shows that though iodine is needed in smaller quantities for normal functioning of the body because the absence of the mineral may be hazardous especially, during pregnancy.

Again, the health challenge of constipation was common among the respondents, which received (46%) from the respondents who experienced it during their time of pregnancy. Bennett and Brown (1996) explained that gastric secretion is reduced during pregnancy and the intestine becomes relaxed, which results in constipation among pregnant women. It is opined that pregnant women should be encouraged to eat good quantities of fresh fruits and vegetables- at least $\frac{1}{2}$ kg per day. Other high fibre foods include whole meal bread, cereals and pulses. Thirty one percent (31%) of the respondents agreed that they experienced dehydration due to excessive vomiting mostly in the 1st trimester. Bennett and Brown (1996) stated that between four to sixteen weeks after conception vomiting occurs as a result of hormonal changes, but in some pregnant women severe vomiting exist throughout the pregnancy in a condition called hyperemesis gravidarum. They continued that extreme nausea can persist past the end of the first trimester, and it can lead to food aversion and the leading cause of death to both mother and foetus due to dehydration, injures and malnourishment.

The experience of heartburns during pregnancy was also assessed and revealed that (43%) of the respondents had experienced heart burns during their time of pregnancy. It has been affirmed by Sweet (1993) that heartburns are common gastrointestinal complaints experienced by pregnant women. The main factor involved is lowered pressure across the lower oesophageal sphincter that cause increased progesterone secretion. Loss of appetite as a major health challenge in pregnancy was indicated that 44% respondents. According to Wardlaw (2003), nausea may be related to increase in the sense of smell and taste induced by pregnancy related hormones circulating in the blood stream. This prevented the pregnant women from eating to meet their daily requirement of nutrients. While some of the respondents experienced loss of appetite (36%) of the respondents too experienced excessive eating during the period of pregnant. Excessive eating can cause the mother to be obese and foetus to be too large which can result in complications during delivery (Whitney *et. al*, 2007).

Eating of non-food substances indicated that, (49%) of the respondents ate clay and other non-food substances during their time of pregnancy. It was commonly noticed that some women experience craving for unusual food such as clay, ice, and corn-starch in a condition called pica. According to Sweet (1993), the eating of clay can activate intestinal parasites, which can result in premature births, miscarriages, mild and other severe consequences. Craving for ice and corn-starch as cited by Sweet (1993) was an indication of a dietary deficiency of iron and other nutrients. Therefore, pregnant women were advised to avoid pica. However, most women with pica are reluctant to reveal this to their health service provider (Bennett & Brown, 1996).

Twenty four percent (24%) of the respondents experienced excessive vomiting during the pregnancy. Among the commonest problems during pregnancy were nausea, vomiting and morning sickness which affect 50 to 70 % of the pregnant women (Barasi,

2003). As stated by Sweet (1993), excessive nausea is associated with dysrhythmias and hormonal changes that slow gastrointestinal motility. Insomnia though, was not asked during the study but some pregnant women lamented that they experienced sleepless nights as one of the major challenges.

Lastly (82%) of the respondents agreed that death to both mother and child can result from poor food habits. According to Keletzko (2012) there is an increased risk of high mortality especially, in communities in which under-nutrition in childhood is common and accounts for eight percent of maternal deaths worldwide. Malnutrition is a serious public health problem linked to increase in the risk of mortality and morbidity especially, among pregnant women (Blossner & De Onis, 2005).

5.5: Objective 4: How to improve the food habits of the pregnant women

On how to improve the food habits of pregnant women in the New Juaben Municipality respondents expressed that receiving nutrition education and attending ante natal regularly and adherence were highly rated with (80%) and (77%) respectively. These responses may be due to free maternal care which has given many pregnant women the opportunity to visit ante-natal care with majority (65%) of the respondents who started ante natal clinic in their 1st and 2nd trimester.

Consuming balanced diet is essential for good pregnancy outcome which was rated by 65% of the respondents while (77%) of the respondents revealed that balanced diet was obtained by eating variety of foods regularly. A balanced diet during pregnancy period should provide women with the right amount of energy as well as certain essential nutrients in their correct quantities and ratios (Sweet, 1993). Besides, a balanced diet may reduce the risks of pregnancy complications like anaemia; minimize morning sickness, fatigue, and other unpleasant pregnancy symptoms. Good nutrition is also thought to help balance mood swings and improve labour and delivery.

In addition, (65%) of the respondents agreed that eating vegetables improve health. It is attested that vitamin K in green vegetables is needed in prothrombin for blood clotting. Deficiency of vitamin K can lead to bleeding where the blood will not clot after delivery or in the first month after birth and can lead to death. Some of the respondents (71%) agreed that eating fruits will improve their health. It has been opined that pregnant women should be encouraged to eat good quantities of fresh fruits and vegetables- at least half kilogram per day. Other high fibre foods include wholemeal bread, cereals and pulses (Whitney *et. al*, 2007). Also vitamin C from fresh fruits and vegetables provides fibre prevent constipation and helps in the absorption of iron in the body (Barasi, 2003). It can be inferred that they were aware of the importance of fruits and vegetables but their socio- economic status prevented them from consuming it.

Furthermore, reducing oily foods intake was indicated by (52%) of the respondents. Dietary fat is an important energy source and aids in the absorption of fat soluble vitamins but too high fat diets should be avoided during pregnancy due to the risk of excessive weight gain (FSAI, 2011)

Moreover, (58%) of the respondents agreed that reducing salt intake can improve their health. According to Sweet (1993) adverse implications such as hypertension in pregnancy can result in maternal death due to high blood pressure.

To improve on respondents' food habits, desisting from the eating of clay and non-food substances was scored by (70%) of the respondents. Craving for ice and corn-starch is an indication of a dietary deficiency of iron and other nutrients (Sweet, 1993). However, most women with pica are reluctant to reveal this to their health service provider (Bennett & Brown, 1996).

Finally, (58%) of the respondents confirmed that iron and folic acid rich foods assisted in good pregnancy outcome. This is because the developing foetus requires large quantities of red blood cell to provide sufficient oxygen for development and growth (Webb, 2003). There is also a positive association between iron intake and birth weight (Ivers & Cullen, 2011). Dewey and Chaparro *et. al* (2007) explained that iron requirements increases progressively after 25 weeks during pregnancy to combat the lower oxygen environment in the womb. It is supported by Chaparro *et. al*, (2006) that late cord clamping at delivery can reduce the risk of infantile anaemia therefore, it is vital that the iron intakes of the mother is sufficient throughout pregnancy to meet the increased requirement for foetal growth while maintaining adequate maternal stores (Health Canada, 2009). Moreover, DNA requires folic acid for the formation of blood cells. It is needed for the formation of brain and nervous system in the developing foetus. Folic acid deficiency can lead to premature birth, miscarriage, slow growth, brain damage and other malformations of the foetus such as spina bifida (Keletko, 2012). Studies carried on folic levels in pregnancy as stated in Sweet (1993) observed that (65%) of mother's who gave birth to babies with malformations were deficient in folic as compared to (17%) of mothers who had normal babies. Bennett and Brown (1996) supported that complications of folic acid deficiencies in pregnancy are infections, placenta separation, bleeding and congenital abnormalities.

It was realised that there was statistically significant differences in the nutritional knowledge of protein $t(99) = -3.282$, $p\text{-value} = 0.001$ and iodine $t(99) = -2.650$, $p\text{-value} = 0.009$). This means that the pregnant women who attended antenatal clinic at Eastern Regional Government Hospital in Koforidua had nutritional knowledge of some nutrients such as protein and iodine which serves as some essential nutrients needed in pregnancy. It could also be seen that there was no statistical significances in the

nutritional knowledge of some vitamins and minerals as follows; vitamin B (p-value = 0.079), vitamin C (p-value = 0.314), vitamin D (p-value = 0.282), folic acid (p-value = 0.451), calcium (p-value = 0.499) and omega 3 fatty acid (p-value= 0.770) among pregnant women. This means that pregnant women who attended ante natal care at Koforidua regional hospital lacked nutritional knowledge in vitamin intake as well as folic acid, calcium and omega 3 fatty - acid.

Therefore, it can be inferred that pregnant women who attended ante natal care at Eastern Regional Government Hospital, Koforidua know the importance of some essential nutrients such as protein and iodine and include it in their diet. However, poor knowledge of other essential nutrients such as iron, and folic acid may affect their food habits.

5.6 Observation

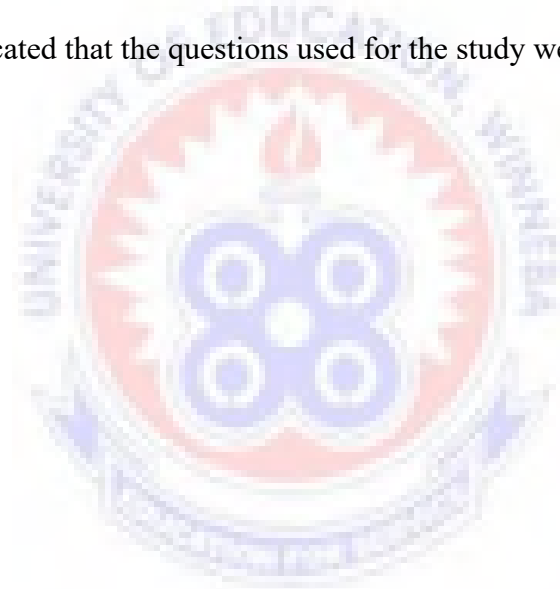
Observation was used to ascertain if nutrition education was given and it was observed that the health care providers gave nutrition education to respondents during the time of administration of questionnaires to respondents at Eastern Regional Government Hospital, Koforidua. The health care providers used food models and pictures to demonstrate the six food groups of Ghana consisted of the following:

- Animal foods and products
- Beans, nuts and oily seed
- Starchy roots and plantain
- Cereals and grains
- Fats and oils
- Fruits and vegetables

However, the health providers normally gave the nutritional education early before giving the actual ante natal services and few respondents attended this important

nutrition education and other health services tips given to the respondents during the administration of the questionnaires. In conclusion it can be said that most of the respondents missed this important session because they attended ante natal clinic late or were not punctual.

Finally, the findings from the study showed that the cronbach's alpha for nutritional knowledge of some important nutrients needed in pregnancy was 0.949, diseases or challenges pregnant women experienced during pregnancy was 0.897 and how to improve the food habits of the pregnant women in the New Juaben municipality was 0.951. It can be seen that the chronbach's alpha for the variables exceeded the threshold of 0.7. This indicated that the questions used for the study were consistent.



CHAPTER SIX

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

6.0 Overview

This chapter presents the summary, conclusions and recommendations inferred from the data.

6.1 Summary of findings

The objectives of the study were to:

- To find the nutritional knowledge of essential nutrients needed in pregnant women who attended ante natal clinic at Eastern Regional Government Hospital Koforidua
- To identify the food intake of the pregnant women who attended ante natal clinic at Eastern Regional Government Hospital Koforidua.
- To ascertain the diseases/health challenges of pregnant women who attended ante natal clinic at Eastern Regional Government Hospital Koforidua.
- To find ways to improve the food habits of pregnant women who attended ante natal clinic at Eastern Regional Government Hospital, Koforidua.

A total of 100 respondents were used for the study. Respondents were aged 10 to 41 years and above. Interview guide and observation were used to solicit views, opinions and information from respondents. Purposive and convenience non-probability sampling technique were used to select the pregnant respondents. The findings were analysed using S.P.S.S. version 23 and the results of the data were presented in frequency tables and charts.

6.2: Demography of respondents

Out of the one hundred (100) respondents used for the study, majority (87%) were between the ages of 20 - 39 years. This gave an indication of the age bracket of reproductive women in the New Juaben Municipality as shown by the women who attended ante natal clinic at Eastern Regional Government Hospital in Koforidua. Sixty one percent (61%) of the respondents were married according to the marriage laws of Ghana while $\frac{1}{3}$ of the respondents were pregnant out of wedlock. This may affects them financially, since they fend for themselves and were not able to afford or buy

variety of nutritious food to eat. Most of the respondents studied (53%) were located around Koforidua environs and the rest were urban dwellers. The reason for more rural pregnant women was due the health outlet being the regional and referral hospital and therefore, received more pregnant women from the surrounding towns and villages of the New Juaben Municipality and the region as well. With their level of education majority of the respondents (62%) had basic education and secondary including a handful who had tertiary and the rest with no formal education. With such large number of respondents' educational background being basic and secondary, they may not be gainfully employed to purchase variety of foods to eat due to lack of money.

With more respondents (50%) who received less than GH¢500.00 per month, it can be deduced that their small income may affect their food budget and variety of foods cannot be eaten and eat monotonous diet. Beside, (57%) of the respondents always purchased food while the others obtained their food from their cultivated farms and purchased some foods as well.

Furthermore, majority of the respondents selected for the study (76%) had dependants. Also, most of the respondents (76%) had one or more children. This depicted how their limited resources including food were shared; which prevented pregnant mothers to have enough which may be detrimental to their health. Again, majority (53%) of the respondents had less than 2 year's intervals between their last pregnancies and may be affected by their nutrient stores. In addition (65%) respondents attended ante-natal care in their 1st and 2nd trimesters while the others received ante-natal services in the 3rd trimester. This means that the pregnant women's access to health care has been increased since the institution of the Millennium Development Goal 4 and 5, currently considered under the Sustainable Development Goal 3 which aimed to achieve women to access good diet, good health no matter their location.

6.3: Objective 1: To find out the nutritional knowledge of some essential nutrients needed by pregnant women

To form good food habits, the knowledge of essential nutrients to be included in diet was very crucial for good pregnancy outcome. Good food habits pregnant women consumed foods which gave them both the energy and micronutrients which were essential for maintaining themselves and the growing baby's health. Twenty six percent (26%) of the respondents agreed to have much nutritional knowledge of protein intake as an important nutrient to be included in their meals during pregnancy.

In assessing the nutritional knowledge of Vitamin B as an important micro-nutrients, (27%) had nutritional knowledge of Vitamin B group while they lacked knowledge of specific B vitamins such as B₁, B₂, B₃, B₆ and B₁₂ intakes as key elements for good pregnancy outcome. Only (33%) of the respondents had nutritional knowledge of Vitamin C which helped to increase iron absorption but only (40%) had knowledge about its importance. Folic acid revealed poor knowledge among respondents as low as 26% in the formulation of DNA, blood cell and iron as an essential mineral element in pregnancy was rated inadequate knowledge by (36%) of the respondents. However, iron is needed to prevent anaemia. Calcium plays a key role in the development of healthy bones and teeth as well as extra-cellular fluid.

During pregnancy iodine requirements increases by 50% but iodine was rated very low, (20%) by respondents. Iodine is needed for proper functioning of the thyroid gland and cretinism of the child. Twenty six percent (26%) of the respondents were ignorant about the chief sources of omega 3 fatty-acids; however, they consumed fish in their meals. Most pregnant women said fish was mostly eaten in supper which means they may not meet their recommended daily intake of omega 3 fatty acid as well as protein intake in the body as a result of poverty.

The intake of water as the best fluid to increase maternal blood volume and the formation of amniotic fluid to remove waste products from the body was rated 44% due to ignorance of the contribution of water intake during pregnancy even though, water is the commonest and cheapest nutrient.

6.4. Objective 2: Food intake of pregnant women

The food intake of pregnant women is very crucial for a good pregnancy outcome but marked differences were observed in the types of foods eaten. Out of the one hundred (100) respondents used for data analysis (44%) ate thrice daily; (51%) mostly ate banku and stew while others ate Ampesi (Plantain or yam) and stew and fufu and soup. Most respondents complained that they mostly used fish because it was cheaper and affordable due to their economic status but the quantity eaten was small and mostly served with supper. Meals prepared at home are more nutritious and hygienic and majority respondents (58%) always ate meals cooked in their homes while the rest ate ready prepared food (bought). Besides, majority of the respondents (62%) mostly used the boiling method of cooking food while stewing and grilling methods of cooking which conserve nutrients received (38%) by respondents. Majority of the respondents (58%) ate their food together with other members of the family; (63%) ate all the food served to them while (83%) ate snack. They complained that due to their limited resources or poor economic status they were not able to purchase and eat enough fruits and vegetables.

Among the foods eaten as snack were pastries and soft drinks which were junk food and may contain little nutrients but were mostly enjoyed by (77%) respondents due to their food habits and $\frac{1}{3}$ of the study sample ate fruits. Furthermore, almost half of the respondents (49%) ate fatty foods while 51% ate fatty foods in moderation. Majority of the respondents claimed they ate vegetables and fruits every day. This shows

improvement in meeting their micro-nutrient needs however, as to the quality and quantity to meet the recommended daily intake was nothing to write home about.

Moreover, majority of the respondents (77%) ate variety of foods while due to ignorance, socio-cultural, religious and health reasons, 61% were restricted from eating eggs, okro, crab, fatty foods, corn, and red meat. However, the restricted food contains macro and micro-nutrients essential for the health of both mother and foetus. Few respondents over ate while minority 93% did not and 61% respondents skipped meals which may affects their health.

6.5 Objective 3: Diseases/health challenges of pregnancy

During pregnancy women face a lot of health challenges some of it stemmed from poor food habits. Therefore, respondents were asked to express some of the health challenges that emanated from food habits during pregnancy. Low birth weight babies and poorly formed organs of babies were lamented by half of the respondents (50%) and 51% respectively. They expressed that underweight babies were normally sent to Neonatal Intensive Care Unit (NICU) but most babies do not survive due to inadequate equipment and infections. Other challenges indicated by respondents were pre-term babies, miscarriages and stillbirth recorded as (45%), (42%) and (44%) respectively from iodine deficiency.

Iron deficiency anaemia was rated (60%) which clearly shows that respondents were aware of anaemia being deadly during pregnancy. However, they were not aware that anaemia resulted from deficiency of iron which may limit their intake iron rich foods. Another challenge expressed by respondents was oedema/swellings which scored (46%) and dizziness (51%) as the majority respondents. More than half of the respondents (52%) lamented that they experienced weight loss. Whereas some

experienced weight loss, others experienced weight gain recorded 51%. This may be as result of excessive dietary fat intake.

Other challenge such as Post-Partum Haemorrhage (PPH) was assessed where 33% of the respondents agreed that pregnant women can experience Post-Partum Haemorrhage (PPH) during pregnancy and delivery as result of iodine deficiency. It can be inferred that, though iodine is needed in smaller quantities it is needed for normal functions and the absence in the body can be fatal.

Constipation was rated (46%) by the respondents was a common challenge in pregnancy while dehydration due to excessive vomiting was experienced by 31% of the respondents which occur mostly in the 1st trimester and at the same time 43% of the respondents had heart burns. These health challenges can lead to food aversion and can result to the death of both mother and foetus.

Loss of appetite and over eating was rated 44%; 36% respectively as a challenge in pregnancy however, excessive eating can cause the foetus to be too large and results in complications during delivery.

Twenty four percent (24%) respondents experienced excessive vomiting while 49% ate clay and other non-food substances which can lead intestinal parasites such as worms and result in anaemia. Eighty two percent (82%) agreed that death to both mother and child can be resulted from poor food habits being the majority respondents while others reported of insomnia as they experienced sleepless nights as a challenge.

6.6: Objective 4: To find ways to improve the food habits of pregnant women in New Juaben Municipality, Koforidua.

To improve the eating habits of pregnant women the respondents agreed on regular attendance of ante-natal care to receive nutrition education and monitor early warning

of poor foetal development, malfunction due to poor nutrition were 80% and 77% respectively. The positive responds may be due to free maternal care given which has given many pregnant women opportunity to have access to ante-natal services with majority (65%) of the respondents who started their ante natal clinic in their 1st and 2nd trimester. This revealed positive signs in the achievement of the unmet MDG 4 and 5 in the SDG 3 by the year 2030. Consuming balanced diet was (65%) by eating variety of diet was (77%) where respondents disclosed that it was essential for good pregnancy outcome showed awareness of good food habits in pregnancy.

In addition they agreed that eating vegetables frequently improved their health in pregnancy. This was encouraging in the awareness of meeting micro-nutrients deficits in pregnancy. Vitamin K in green vegetables is needed in prothrombin for blood clotting after delivery and needed in the first month after birth to prevent death. Therefore, the recommended quantities should be addressed.

Further, majority (52%) and (58%) of the respondents pointed out that reducing oily and salty foods intake respectively were good in pregnancy because too much salt can cause high blood pressure which leads to death. Seventy percent (70%) of the respondents said to improve on respondents' food habits pregnant women should desist from eating clay and non-food substances. However, it was observed that most women with pica were reluctant to reveal this to their health service providers. Finally, (58%) of the respondents attested that iron and folic acid rich foods will assist in good pregnancy outcome.

6.6.1 Observation

Observation was used to ascertain if nutrition education was given by health care providers. It was observed that the health care providers gave nutrition education to respondents during the time of administration of questionnaires to the respondents at

Eastern Regional Government Hospital, Koforidua. They used food models and pictures to demonstrate the six food groups used in Ghana. However, they normally gave the nutritional education early in the morning before the actual ante-natal services but few respondents attended this important nutrition education to receive this health tips. In conclusion it can be categorically said that most respondents missed this important session because they attended ANC late or they respondents were not punctual.

6.6.2: Further analysis

From Table 4.69, it could be seen that there was statistically significant difference in the nutritional knowledge of protein $t(99) = -3.282$, $p\text{-value} = 0.001$) and iodine ($t(99) = -2.650$, $p\text{-value} = 0.009$). This means that the pregnant women who attended antenatal clinic at Koforidua regional hospital had nutritional knowledge of protein and iodine which serves as some essential nutrients needed in pregnancy. It could also be seen that there was no statistical significance in the nutritional knowledge of vitamin B ($p\text{-value} = 0.079$), vitamin C ($p\text{-value} = 0.314$), vitamin D ($p\text{-value} = 0.282$), folic acid ($p\text{-value} = 0.451$), calcium ($p\text{-value} = 0.499$) and omega 3 fatty acid ($p\text{-value} = 0.770$) among pregnant women. This means that pregnant women who attended ante natal care at Koforidua regional hospital lacked nutritional knowledge in vitamin intake as well as folic acid, calcium and omega 3 fatty-acids. Therefore, it can be inferred that pregnant women who attended ante natal care at Eastern Regional Government Hospital, Koforidua know the importance of some essential nutrients such as protein and iodine and may include it in their diet. However, knowledge of some essential nutrients such as iron and folic may affect their food habits.

Finally, the findings from the study showed that the cronbach's alpha for nutritional knowledge of some important nutrients needed in pregnancy was 0.949, health

challenges of pregnant women was 0.897 and how to improve the food habits of the pregnant women in the new Juaben municipality was 0.951. It can be seen that the cronbach's alpha for the variables exceeded the threshold of 0.7. This indicated that the questions used for the study were consistent.

6.3. Conclusions

The results indicated that several factors determined the food habits of the women during pregnancy. These factors included poor nutritional knowledge of food, socio-cultural, economic status, their food/nutrient intake and hormonal changes associated with pregnancy affected their food habits. Due to taboos, myths and food restrictions associated with certain foods, the food may be present and affordable but culturally unacceptable, therefore, it cannot be eaten because people belonging to specific cultures have their own food custom and each group determines what could be eaten as food. It is therefore important for women to maintain a healthy diet throughout their reproductive years, and particularly if they are planning to become pregnant. Good food habits before, during and after pregnancy helps to build the immune system in preparation for and protection of pregnancy. Pregnancy women should eat variety of diet with the right amount of energy (macro-nutrients) as well as essential micro nutrients in their correct quantities and qualities for good pregnancy outcome to achieve the Sustainable Development Goal 3 to prevent maternal and neonatal death by the year 2030.

6.4 Recommendations

From the conclusion, the following recommendations were suggested for improving the food habits of pregnant women.

Cultural barriers such as taboos, food restrictions and myths associated with food especially, during pregnancy should be discouraged so that pregnant women can eat variety of foods.

There should be provision of comprehensive nutritional education and counselling services for pregnant women such as identification of the most important food/nutrient that can contribute to optimal nutrition and improve on their food habits and general health. Health service providers should take into consideration when advising women to discuss less expensive ways of incorporating cheaper protein-rich foods into the diet such as the use of eggs, beans or lentils in cooking and also inclusion of locally produced foods which are nutritious, cheaper and affordable. Pregnant women especially, overweight or obese women should be encouraged to replace energy dense snacks with foods which are nutritious foods such as eating more fruits and vegetables. Pregnant women should avoid pica thus the eating of clay to prevent intestinal parasites that can result in anaemia, premature births, miscarriages and other severe consequences.

Health care providers at the ante natal care outlet should revise the timing of given nutrition education to the pregnant women so that most of them will benefit from the education and other health tips. Pregnant women should also try as much as possible to be regular and punctual and adhere to advice given at ante-natal clinics. This would promote good pregnancy outcome to support the economy.

Though nutrition education has been given during ante natal care but it should be intensified to all females of the reproductive age and pregnant women. Pre-pregnancy nutrition education centres should be established in every Municipality so that women of the reproductive age will receive pre- pregnancy nutrition education.



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APPENDIX 1

UNIVERSITY OF EDUCATION, WINNEBA

DEPARTMENT OF HOME ECONOMICS

Questionnaire/Interview Guide for Pregnant Women

This questionnaire is to **investigate the Food Habit pregnant women attending Ante Natal Clinic at Koforidua Regional Government hospital** to find out nutritional knowledge, food intake and how their food **habits** can be improved during pregnancy. The information given is strictly for academic purposes and confidentiality is assured.

Instructions

Please tick (✓) or respond where applicable. All responses would be treated confidentially

Section A: Demographic characteristics of respondents

1. Age: 15-19 years []; 20-29 yrs []; 30-39 yrs []; 40-41 yrs. and above []
2. Marital status: single []; married []; separated []; widowed []; divorced []
3. Number of dependants; one []; two []; three [] four or more []; none []
4. Number of living children; one []; two []; three [] four or more []; none []
5. What is the time interval between your last pregnancy and present one; 3months []
6 months []; 1 year []; 2 years []; more than 2 years []; 1st pregnancy []
6. Ethnic group
.....
7. Religion: Christian []; Moslem: []; other (specify)
8. Occupation: farming []; public servant []; self-employed []; housewife []
Other (specify).....
9. Occupation of husband: farming []; public servant []; self-employed []:
unemployed [] : other (specify)

10. Highest level of education: No formal education []; Basic []; Secondary [];
vocational/ technical training []; post-secondary []; tertiary []; other(specify)
.....

11. Indicate your location:

Urban- District capital d. Rural - surrounding towns in district capitals

12. At what trimester did you start receiving anti natal care?

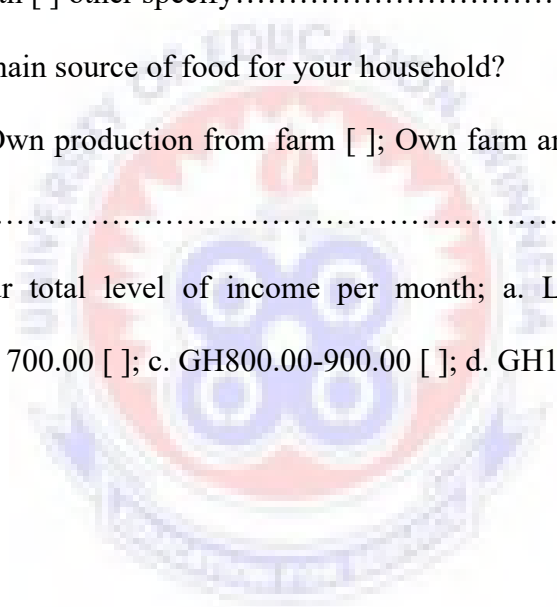
1st trimester []; 2nd trimester []; 3rd trimester []; none []

13. How often do you attend anti natal care? Once a week () ; Once in two weeks once
in every month [] other specify.....

14. What is the main source of food for your household?

Bought []; Own production from farm []; Own farm and bought []; Gifts Other
specify

15. What is your total level of income per month; a. Less than GH500.00 [];
b.GH500.00- 700.00 []; c. GH800.00-900.00 []; d. GH1000.00 and above[]



SECTION B

Instructions: Please give the appropriate answer that best explain your opinion since you became pregnant

Food intake among pregnant women in the New Juaben Municipality

1. Please indicate the type of food you mostly eat daily since you became pregnant

Breakfast	Lunch	Supper
Porridge alone	Ampesi and hot pepper	Ampesi and hot pepper
Porridge with koose		
Porridge with milk or groundnut	Ampesi and vegetable stew	Ampesi and vegetable
Ampesi and hot pepper	Banku and fish	Banku and fish
Ampesi and vegetable stew	Banku/IZ/Kenkey/akple and vegetable stew or soup	Banku/IZ/ Kenkey/akple and vegetable stew or soup
Banku and soup or vegetable stew	Rice and stew	Rice and stew
Banku and fish	Rice with oil	Rice with oil
Rice and rice	Fufu/kokonte and soup	Fufu/kokonte and soup
Rice with oil		
Waakye		
Gari and beans		
Rice and stew		
Tea and bread		
Milo and bread		

Other (specify)

2. List some of the most popular food you have been eating since you became pregnant.....
.....
3. How often do you eat in a day? Once ; twice ; thrice : more than thrice : other specify
4. How are your meals provided? Cooked in the home ;bought ready to eat : Both If you prepare your own meals what cooking methods do you mostly use? (tick one); Boiling ; stewing ; steaming ;roasting ; grilling :Baking
5. How do *you* eat as family? Eat alone eat together with other members of the family.
6. Do you eat all the food served to you during meals? Yes No
7. Do you eat snack? Yes No
8. Which of the following foods do you take as snack? Pastry and soft drink : roasted plantain and groundnut : fruits : other (specify).....
9. Do you eat fatty foods? Yes No
10. Indicate the frequency of eating vegetables: Everyday () sometimes none
11. Do you eat fruits? Yes No
12. Indicate the frequency of eating fruits: Everyday ; sometimes none
13. Do you eat variety of food? Yes no
14. Are you restricted from eating some food items? Yes ; No
15. If your response is yes, give reason. Cultural ; religious ; health dislike
16. List some foods you are restricted from eating.
01
02
03

17. Do you over eat? Yes []no []

18. Do you skip meals? Yes []: no []

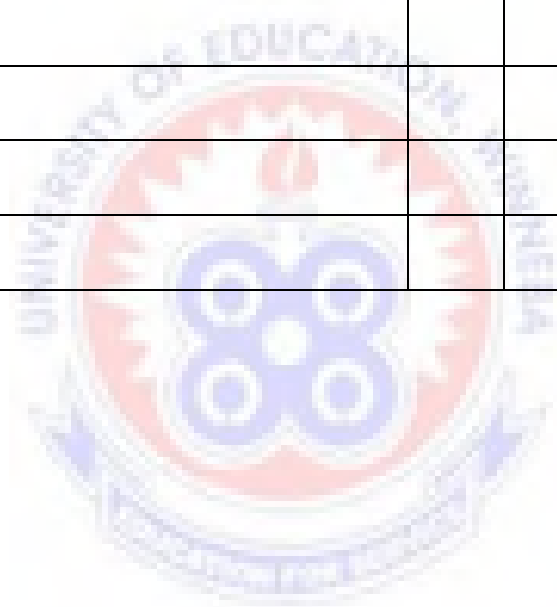
Please tick where appropriate in (lie box that best explain your opinion since **you** became pregnant 5 = strongly agree (SA): 4 = Agree (A): 3 ~ Not sure (N): 2 = Disagree (I): 1 = strongly disagree (SD)

Nutritional knowledge among pregnant women				SA	A	NS	D	S
	Nutrient	Function	Food source					D
1.	Protein	Body building, repair tissues and give energy	Meat, fish, egg, milk, beans, soya beans groundnut and agushie					
2	Vitamin B	Tissue synthesis	Whole cereals, milk and legumes					
3	Vitamin C	Heal wounds, dry skin and metabolism of protein, iron and Carbohydrates	Citrus fruits, pineapple, kontomire, alefo, dawadawa, tomatoes					
4	Vitamin D	Build strong bones, help with the absorption of calcium and phosphorous	Fortified milk, cereals, small fish					
5	Folic acid	Prevent brain and spinal cord defects and deformed babies	Green leafy vegetable e.g. Alefu and					

			kontomire, beans, yeast orang meat e.g. Liver					
6	Iron	To store iron to last baby six month after delivery. Prevents mother from anaemia	Beans, green leafy vegetables, liver, kidney					
7	Calcium	Strong bones and teeth	Herring, anchovy, sardine					
8	Iodine	Prevent cretinism and post-partum haemorrhage	Iodated salt					
9	Omega 3, fatty acid	Energy, carry fat soluble vitamins to the cells	Fish, canola oil, olive oil, soya oil					
10	Water	Digestion, transportation and excretion	Water, fruit juices, milk, drinks and soups					

Diseases/challenges pregnant women have due to their food habits

	Effects on the foetus					
1	Low birth weight babies					
2	Poorly formed organs					
3	Pre-term babies					
4	Malformed babies					
5	Miscarriage					
6	Still birth					
	Effects on the mother					
7	Anaemia					
8	Oedema/swellings					
9	Dizziness					
10	Weight loss					



How to improve the food habits of pregnant women in the New Juaben Municipality, Koforidua

1	To attend ante natal clinic regularly					
2	Receive nutrition education and follow advice					
3	Eat balanced diet					
4	Eat regularly and more often					
5	Eat variety of food					
6	Eat fruits everyday					
7	Avoid eating oily foods					
8	Avoid eating too much salt					
9	Avoid eating clay and non-food substances					
10	Eat more iron and folic acid rich foods					