

**KNOWLEDGE AND PRACTICES OF ANTENATAL MATERNAL
NUTRITION BY FIRST TIME MOTHERS: A CASE OF KENYATTA
NATIONAL HOSPITAL, NAIROBI**

**BY
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**A DISSERTATION SUBMITTED IN PARTIAL FULFILLMENT OF THE
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APPLIED HUMAN NUTRITION OF THE UNIVERSITY OF NAIROBI.**

DEPARTMENT OF FOOD SCIENCE, NUTRITION AND TECHNOLOGY

2019

DECLARATION

I, **Jane Kananu Kamanja** hereby declare that this dissertation is my original work and to the best of my knowledge has not been submitted or presented for an award in any other institution.

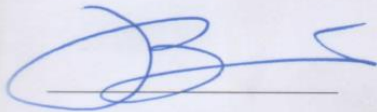


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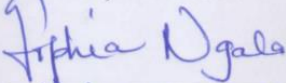
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DEDICATION

I wish to dedicate this work to my family: my husband Bernard Maina and my children Nicole, Niven, Nigel and Natalia. Thank you very much for your encouragement, love and support.

To the entire Kamanja's family, am very grateful for always being there for me throughout the entire period of my study. God bless you all.

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LIST OF ACRONYMS

AI	Adequate Intake
BMI	Body Mass Index
ERC	Ethics and Research Committee
FAO	Food and Agriculture Organization
IFAS	Iron Folic Acid Supplements
HBV	High Biological Value
IUGR	Intra Uterine Growth Restriction
KDHS	Kenya Demographic Health Survey
K I	Key Informant
KNH	Kenyatta National Hospital
LBW	Low Birth Weight
MCG	Microgram
MDG	Millennium Development Goal
MOH	Ministry of Health
RDA	Recommended Daily Allowance
SDG	Sustainable Development Goal
SPSS	Statistical Package for Social Sciences
UNICEF	United Nations Children’s Fund
WHO	World Health Organization

OPERATIONAL DEFINITIONS

Antenatal care	refers to medical, physical and psychological health care provided to the first time mother and her foetus during pregnancy, preceding labour and childbirth.
First trimester	refers to a period of pregnancy counted from the first day of the last normal menstrual period to the end of the twelfth week of pregnancy.
Second trimester	refers to a period of pregnancy from the beginning of the thirteenth week up to the end of the twenty fourth week.
Third trimester	refers to a period of pregnancy from the beginning of twenty fifth week until the fortieth week (birth).
Knowledge	it denotes the awareness or information that the first time mothers possess regarding maternal nutrition.
Malnutrition	refers to a condition of health caused by an imbalance in nutrient intake and characterized by a depletion or excess accumulation of nutritional reserves.
Maternal health	is defined by the WHO as the health of women during pregnancy, childbirth and the postpartum period.
Maternal nutrition	refers to the nutritional needs of women during the antenatal and postnatal period (i.e., when they are pregnant and breastfeeding).
Nutrients	refer to substances in food that are essential for energy, growth, normal functioning of the body, and maintenance of life.
Nutrition	refers to the process by which food is eaten, digested and utilized in the body for production of energy, growth, maintenance and regulation of body functions.

Practice	refers to ways in which mothers demonstrate their knowledge and attitudes on maternal nutrition through their actions.
Primigravidae	women who are pregnant for the first time, irrespective of their age or marital status.
Puerperium	A period of time extending from the end of the third stage of labour to the end of the sixth week following delivery.

ABSTRACT

Nutrition is a fundamental pillar of human life and its nutrient requirements vary with age, gender and physiological conditions of an individual. Poor nutrition can lead to a range of health problems for first time antenatal mothers, including cardiovascular disease, diabetes, cancer, overweight and obesity. Inadequate nutrition of pregnant mothers is a key contributing factor for stillbirths to the growing foetus prior to the onset of labour. The objective of this study was to assess the knowledge and practices of antenatal maternal nutrition by first time mothers. The study was a cross-sectional descriptive design to collect primary data from the respondents. The sample was selected using serialogical sampling. A total of 139 first time antenatal mothers were selected from those attending the Obstetrics and Gynecology clinic of Kenyatta National Hospital (KNH) in Nairobi. One nutritionist working at the Obstetrics and Gynaecology clinic of KNH participated in the study as a Key Informant. Structured questionnaires and Key informant interview guide were prepared. A research assistant was recruited and trained on data collection and recording. The questionnaire was pretested using a selected sample of fourteen first time antenatal mothers from the clinic. Data was analyzed using Statistical Package for Social Sciences (SPSS) version 20 software. Cross tabulations, one way ANOVA and independent t-test were applied to test whether there were significant differences between two or more groups or samples at a selected probability level of 0.05.

The results showed that 52.5% of the mothers were between 26-35 years and 43.2% between 15-25 years. Majority of the mothers, 77% were married. Mothers who had acquired college education were 63.3%, and 30.9% had acquired secondary education only. The gestation age range of 25- 40 weeks had the highest number of mothers at 66.2%, followed by the range 13-24

weeks at 20.1%. In the occupation category, 38.1% of the mothers were housewives and 33.1% were on salaried employment. Mothers earning a low income were 52.5% and the middle income earners were 47.5%. Majority of the mothers, 76.3% knew the meaning of a balanced diet and 23.7% of the mothers did not know the meaning. On general knowledge of the nutrients that are components of a balanced diet, the mothers scored; Carbohydrates 59.7%, Protein 66.9%, Vitamin A 40.4%, Vitamin C 41.7%, Vitamin D 33.1%, Vitamin B12 34.5%, Folate 21.6%, Iron 36%, Calcium 38.8%, and Zinc 16.5%.

In associations between socio-demographic characteristics and knowledge, older mothers in the 36-49 age category were more knowledgeable on balanced diet as shown by the anova value of **p=0.044**. Mothers who had college education were more knowledgeable on balanced diet with p value of **p=0.001**, carbohydrate **p=0.001**, protein **p= 0.003**, vitamin C **p=0.001**, Iron **p=0.001** and calcium **p=0.001**. However, mothers of middle and higher socio-economic status had higher knowledge mean scores than those of lower socio-economic status. The consumption of foods providing different nutrients was moderate.

In conclusion, the study has shown that first time antenatal mothers have poor knowledge of maternal nutrition which depends mainly on age, occupation and level of education. Older mothers, salaried mothers and those educated to college level have the highest mean knowledge in the categories of age, occupation and education respectively. Finally, mothers of middle and higher socio-economic status have higher knowledge mean scores than those of lower socio-economic status. The consumption of foods providing different nutrients is moderate, thus the practice of antenatal nutritional knowledge as determined by food frequency consumption is

moderate probably indicating that the meals for first time mothers are fairly well nutritionally balanced. These findings highlight the disconnect between the low level of knowledge of first time antenatal mothers and the moderate nutritional practice indicating that the practice does not depend on the knowledge. Nutritional education ought to be intensified to the first time antenatal mothers by isolating them as a group during antenatal clinic visits, and educate them comprehensively. This will eventually improve the knowledge levels of first time antenatal mothers.

CHAPTER ONE: INTRODUCTION

1.1 BACKGROUND OF THE STUDY

Nutrition is a basic support of human life and its necessity varies with respect to age, sex and body's biological changes such as pregnancy (Daba et al., 2013). Pregnancy is a vital event in the life of a woman requiring special attention from the time of conception to the postnatal stage. Pregnancy is also considered to be a delightful experience for the expectant mother (Daba et al., 2013). Every pregnancy is a unique experience for the woman and each pregnancy is different (Thomas, 2009-10). This is why it is important that the mother has knowledge and understanding of nutrition in pregnancy, because good care during pregnancy is essential for the health of the mother and the baby (WHO, 2012).

Pregnancy causes special nutritional demands since nutrient requirements rise during pregnancy and lactation due to the extra nutrients needed to protect and maintain health, to good birth outcomes and for infant health. If the requirements are not met, the consequences can be serious for mothers and their infants (Linkages, 2004). When the diet of a first time antenatal mother does not meet required nutrients for her and the foetus, the foetal requirements are met by withdrawing these from the tissues of the pregnant mother. This further weakens the mother and increases the probability of serious life-threatening complications and increases vulnerability of low birth weight infant who will not be able to feed appropriately during the early stages of life. An underweight mother has 30% higher risk of delivering a low birth weight (LBW) baby than her well-nourished counterpart (Swati et al., 2017).

A healthy woman eating a well-balanced diet takes about 18 months to recover from the nutritional stress of pregnancy; if the diet is not optimal, recovery can take longer (Simkiss et al., 2015).

A variety of factors cause improper nutrition or under nutrition of expectant mothers. One of the most important factors is lack of adequate food which exist in many communities and food taboos affect women, especially those of child-bearing age, maternal education, low socio-economic status and lack of nutritional knowledge (Zepro, 2012)(Daba et al.,2013).

1.2 PROBLEM STATEMENT

Maternal nutrition and health greatly influence child nutritional status (UNICEF, 2009). A woman's low weight for height or anaemia during pregnancy can lead to low birth weight and continued under nutrition in the infants (UNICEF, 2009). Globally, maternal undernutrition contributes to 800,000 neonatal deaths annually through small for gestational age births; stunting, wasting, and micronutrient deficiencies are estimated to underlie nearly 3.1 million child deaths annually (Bhutta et al., 2013). At the same time, maternal under-nutrition increases the risk of maternal death during childbirth (UNICEF, 2009).

First time antenatal mothers are considered to be at more risk for obstetrical complications because they probably lack nutritional knowledge and experience to choose appropriate foods to consume during pregnancy to maintain the required maternal nutrition. Even when the first time antenatal mothers have information with regard to prenatal care much of this information could probably be inaccurate and incomplete especially with regard to self-care concerns, diet need,

management of common diseases and the dangers within the environment which may affect the health of the unborn infant. In addition, food insecurity, myths and taboos, cultural practices, gender discrimination and low socio-economic status of the mothers are some of the most prevalent factors affecting dietary diversity and nutritional status of first time antenatal mothers (Swati,2017).The nutritional education and training carried out in the antenatal clinic (ANC) may be inadequate especially for the first time mothers because it is generalialized to all the mothers since they are placed together in one group and no special attention is given to the nutritional needs of the first time mothers. Studies carried out so far have lamped the antenatal mothers together and little attempt has been made to delineate them into categories. Little specific information therefore exists on the characteristics of first time (primigravidae) mothers. This study is necessary because studies on knowledge and practices of antenatal maternal nutrition of first time mothers are limited in Kenya.

1.3 JUSTIFICATION

Understanding the first time antenatal mothers' nutritional knowledge is important to developing effective strategies to reduce malnutrition and encourage healthier dietary behaviours (Lim, 2018). Adequate nutritional intake during pregnancy has been recognized as an important factor for healthy pregnancy and desired birth outcomes. Deficiency of nutrients during pregnancy may lead to the foetus receiving suboptimal micro and macro nutrients, causing inadequate intrauterine growth and development, inherited malformations, preterm deliveries, and pregnancy complications. Thus, it is important to maintain appropriate dietary practices and proper nutrient intake to provide adequate nourishment to achieve optimum health and nutrition for both mother and child (Perumal, 2013).

Therefore, the study is necessary and the findings would be used by the policy makers to design appropriate intervention and nutrition education programs for first time antenatal mothers as a group during their antenatal clinic visits. Antenatal clinics act as a key entry-point for implementing nutrition and health educational interventions that promote preventive health behaviours to improve maternal nutrition and neonatal health through better knowledge, attitudes and practices (Perumal, 2013). Nutritional education encourages pregnant mothers to improve their food intake (BO Ogunba and OB Abiodun, 2017). Thus, nutritional education on first time antenatal mothers will consequently reduce morbidity, mortality and complications brought about by antenatal malnutrition.

1.4 OBJECTIVES

1.4.1 Main Objective

To determine the knowledge and practices on antenatal maternal nutrition by first time mothers attending Kenyatta National Hospital Obstetrics and Gynaecology antenatal clinic.

1.4.2 Specific Objectives

1. To determine the socio-demographic and socio-economic characteristics of the first time antenatal mothers attending the Obstetrics and Gynaecology clinic at KNH
2. To determine maternal nutritional knowledge of first time mothers attending the Obstetrics and Gynaecology antenatal clinic at KNH
3. To determine the food consumption practices of first time mothers attending the Obstetrics and Gynaecology antenatal clinic at KNH

4. To determine the consumption frequency of foods rich in different nutrients by first time mothers attending the Obstetrics and Gynaecology antenatal clinic at KNH

CHAPTER TWO: LITERATURE REVIEW

2.1 INTRODUCTION

It is well documented that inadequate maternal nutrition results in increased risks of consequences such as Intra Uterine Growth Restriction (IUGR), low birth weight, preterm birth, prenatal and infant morbidity and mortality (Salam, 2014). Insufficient consumption of nutrients in pregnancy has been established to have pathophysiologic or metabolic shortfall that will appear as disorders in child growth and development as well as adult chronic disease after an extended period of insufficiency (Daba et al., 2013). Too much consumption of nutrients such as sugar and fat during pregnancy can lead to some pregnancy problems such as; pre-eclampsia and gestational diabetes, macrosomia, distocia and higher prevalence of cesarean section (Luigi et al., 2005).

Evidence manifests adequate nutrition as a key component for individual's health and well-being, particularly during pregnancy. Throughout pregnancy, mother's diet is even more significant. Healthy intake during pregnancy means performing more than simply adding on to how much the mother ingests but also bearing in mind what she eats. The ability of the mother to provide adequate nutrients for her baby is a critical factor for fetal health and its survival (Daba et al., 2013).

It is important to encourage pre-pregnancy education and counselling for first time antenatal mothers and throughout early pregnancy about correct and balanced maternal nutrition, apply good prenatal care, nutritional counselling and supplementation of iron and folic acid and other elementary nutrients that are vital for the mother and her growing foetus (Fouda et al., 2012).

2.1.1 Epidemiology and effects of poor antenatal nutrition

Globally, maternal mortality is very high. About 830 women die from pregnancy or childbirth-related complications around the world every day (WHO 2015), and millions more experience severe adverse consequences (WHO/UNICEF, 2012). These challenges are especially widespread in developing countries, with significant disparities between developing and developed regions in maternal mortality (WHO/UNICEF, 2012). Many of the 200 million women who become pregnant each year, most of them in developing countries, suffer from ongoing nutritional deficiencies (Mora and Nestel, 2000). Between 2016 and 2030, as part of the Sustainable Development Goals (SDG's), the target is to reduce the global maternal mortality ratio to less than 70 per 100 000 live births (WHO, 2015).

The 2014 KDHS reports that the maternal mortality for the seven year period before the survey (2007-2014) is 362 deaths per 100,000 live births. While this is lower than the maternal mortality rate reported in the 2008-09 KDHS of 520 per 100,000 live births, the decrease is not statistically significant. There is no evidence that the maternal mortality ratio has declined in recent years in Kenya. Though this remains below the Sub-Saharan average of 640 deaths per 100,000, Kenya has very slow progression in maternal health (WHO, 2011). Many women suffer from a combination of chronic energy deficiency, poor weight gain in pregnancy, anaemia, and other micronutrient deficiencies. These along with inadequate obstetric care, contribute to high rates of maternal mortality and poor birth outcomes (WHO, 2011).

2.2 FACTORS AFFECTING DIETARY PATTERNS OF FIRST TIME MOTHERS

Dietary patterns are associated with socio-demographic and socio-economic characteristics like age, education, occupation, parity, race and ethnicity. On one hand, increasing age and education have been associated with a healthy and diverse dietary intake in pregnant women and on the other hand, females that have less education, are non-working and have increased parity are more prone to an unhealthy, non-diverse diet (Ali et al., 2014). Financial status of the mothers affects their dietary intake and subsequently the effect on the pregnancy (Fouda et al., 2012).

In a study done in America, most of the women stated that inadequate income was considered as one of the main problems affecting the intake of well-balanced diet during pregnancy (Darnton-Hill, 2013). If a pregnant female's diet lacks diversity it will be deficient in essential nutrients such as carbohydrates, proteins, iron, calcium, zinc, folate, vitamin C, vitamin B12, vitamin A, and as a result the foetus will lack these vital nutrients for a healthy growth (Ali et al., 2014). The association between maternal nutrition and birth outcome is influenced by many biologic, socioeconomic, and demographic factors, which vary widely in different populations (Abu-Saad and Fraser, 2010).

2.3 NUTRITIONAL STATUS AND NUTRITIONAL REQUIREMENTS OF ANTENATAL MOTHERS

The nutritional status of women when becoming pregnant and during pregnancy can have significant influence on foetal, infant and maternal health outcomes. Maternal nutritional status at the time of conception is an important determinant of foetal growth and development, and therefore a healthy, balanced diet is important before, as well as during, pregnancy. It is also important to try and attain a healthy body weight prior to conception, body mass index (BMI) of

20–25, as being either underweight or overweight can affect both fertility and birth outcome (Williamson, 2006).

According to Pakistan National Nutritional Survey (2011), nutritional status of pregnant women in Pakistan is very poor and this reflects a combination of dietary deficiency and poor maternal knowledge. Poor maternal weight gain in pregnancy due to an inadequate diet increases the risk of premature delivery, low birth weight and birth defects. Maternal malnutrition is one of the most significant causes of maternal morbidity and mortality, especially in the developing countries (Fouda et al., 2012).

There are physiological changes during pregnancy such as changes in body composition and weight gain. Two studies done in Britain established that 12.5 kg as the physiological norm for average weight gain for a full-term pregnancy of forty weeks. On average, this level of weight gain was shown to be associated with ideal reproductive outcome and was used as the basis for estimating constituents of weight changes in healthy expectant mothers (Williamson, 2006).

A healthy and varied diet is important at all times in life, but particularly so during pregnancy. The maternal diet must provide sufficient energy and nutrients to meet the mother's usual requirements, as well as the needs of the growing fetus, and enable the mother to lay down stores of nutrients required for foetal development as well as for lactation (Williamson, 2006).

Maternal nutrition has direct association with foetal nutrition (Ali et al., 2014). During pregnancy all women need more food, a varied diet, and micronutrient supplements in order to provide the

important nutrients a baby needs for growth and development (Nierenberg, 2018). Although a mother needs about 300 extra calories a day, especially later in her pregnancy, when the baby grows rapidly, those calories should come from nutritious foods so that they can add to mother's and baby's growth and development. Failure in providing adequate amount of nutrients to meet foetal demand can lead to foetal undernutrition (Fouda et al., 2012). Deficiencies of energy, protein, iron, iodine, vitamin A, folate, calcium and other nutrients are associated with maternal complications and death, foetal and newborn death, birth defects, and decreased physical and mental potential of the child. According to Pakistan National Nutritional Survey (2011) Poor nutrition during pregnancy can cause low birth weight and decreased chances of survival (Suchithra, 2014).

2.3.1 Carbohydrates Requirements in Pregnancy

During pregnancy the first time antenatal mothers need for carbohydrates is increased in order to meet the demands for adequate maternal gestational weight gain, as well as the growth and development of the foetus (Williamson, 2006). The dietary carbohydrate is broken down to form glucose. The rapid growth of foetus requires that sufficient amounts of energy in the form of glucose be availed to the foetus throughout. The recommended daily allowance (RDA) for carbohydrate during pregnancy is 175g/day, increased from 130g/day for non-pregnant women (Brown, 2014). Complex carbohydrates have fibre which help in maintaining the health of the digestive system during pregnancy by regulating bowel movements and preventing constipation, assist to manage blood sugar levels and keeps it stable by thwarting any sudden spikes thereby decreasing the chances of gestational diabetes, sustain a healthy weight throughout pregnancy

and avert the risk of obesity and they provide the much-required energy boost due to fatigue experienced during pregnancy (Mrunal,2018).

Energy is needed to meet the increased basal metabolism and there is normal accumulation of fat as the energy reserves. The extra energy needs of the first time pregnant mothers is met by increasing consumption of calorie-dense foods that may provide the extra energy needed. Fat is also a source of concentrated calories. The RDA for fat intake during pregnancy is 20% to 30% of total calories remaining the same as that of non-pregnant women. Mothers need no additional calories for the first trimester, 340 kilocalories are added in the second trimester and 452 kilocalories are added in the third trimester (Kominiarek and Rajan, 2016). The most accurate way to monitor whether the mother is getting the appropriate carbohydrate intake is to monitor her weight gain. The recommended weight gain in pregnancy depends on the pre-pregnancy Body Mass Index (BMI): BMI less than 19.8kg/m^2 , the weight gain is 12.5 kilograms to 18 kilograms; BMI of between 19.8kg/m^2 to 26kg/m^2 , the weight gain is 11.5 kilograms to 16 kilograms in singleton pregnancies and seventeen kilograms to twenty five kilograms in twin pregnancies; BMI of between 26kg/m^2 to 29kg/m^2 , the weight gain is 7 kilograms to 11 kilograms in singleton pregnancies and fourteen kilograms to twenty three kilograms in twin pregnancies; BMI of above 29kg/m^2 , the weight gain is 6 kilograms or more in singleton pregnancies and eleven to nineteen kilograms in twin pregnancies; (Brown, 2014).

2.3.2 Protein Requirements in Pregnancy

Healthy foetal development is dependent on availability of adequate protein, which provides the basic building blocks necessary for formation of enzymes, antibodies, muscle and collagen.

Collagen is used as the framework for skin, bones, blood vessels and other body tissues. Increase of protein intake is also required for: Tissue growth; nitrogen balance; growth of foetus; enlarged mammary glands, uterus and placenta; increased circulating blood volume and plasma proteins; formation of amniotic fluid; reserves for labour, delivery and lactation (Elango and Ball, 2016).

During pregnancy the mother must consume adequate protein to meet the need of her growing foetus in addition to meeting her own increased needs as she physically grows in size to carry her baby. The Daily Reference Intake (DRI) for protein for a non pregnant woman is 0.8g/kg/day of body weight while the recommended amount for a pregnant woman is 1.1g/kg/day of body weight or an addition of 25g/day to meet the requirements of the pregnancy (Kominiarek and Rajan, 2016).

Rich dietary sources of proteins include milk, eggs, soy beans, meat - which provide High Biological Value (HBV) protein. Most vegetable proteins, except soy bean provide low biological value proteins. A proper dietary balance is necessary to ensure sufficient intake for adequate growth without drawing from the mother's own tissues to maintain her pregnancy. Expectant women should increase their nutrient intake by taking an extra meal in addition to the 3 regular meals. It is recommended that expectant mothers have snacks between meals to meet their daily energy requirement (Brown, 2014).

2.3.3 Micronutrient Requirements in Pregnancy

Micronutrients are required by the body for production of enzymes & hormones; formation of brain cells; regulation of physical growth & development; regulation of the immune system and

reproductive system; and for strengthening of the muscular and the nervous system (WHO,2014). During pregnancy there is an increased need for micronutrient intake.

Vitamin A, a fat soluble vitamin, and beta carotene, which can be used in the body as either an antioxidant or a precursor to vitamin A, are critical during foetal development because of their involvement in growth, vision, and protein synthesis and cell differentiation. Beta carotene is found in fruits and vegetables, and preformed vitamin A can be found in animal products like fish, meat and milk. The Recommended Daily Allowance (RDA) for pregnant women is 770 micrograms/day (Williamson, 2006).

Vitamin C has antioxidant properties, and is additionally involved in the synthesis of collagen and metabolism of iron and folate. The recommended daily allowance for pregnant women is 85 mg/day (WHO, 2019).

Vitamin D may be obtained through diet and supplements or can also be made by the body when skin is exposed to ultraviolet rays. The vitamin is important in building strong bones and teeth and it is very significant during foetal development. It also plays a central role in preventing common cancers, autoimmune diseases, type 1 diabetes, heart disease and osteoporosis. Rich dietary sources are fish, liver, egg yolks, and fortified milk. The RDA in pregnant and nursing mothers is 15 micrograms/day (Brown, 2014).

Calcium is necessary for proper bone formation in conjunction with vitamin D. The RDA for expectant mothers is the same as it is for non-pregnant women: 1000mg/day. Rich dietary

sources are milk, yoghurt, cheese, sardines with bones and some leafy green vegetables. (Brown, 2014).

Vitamin B12 is important in production of red blood cells, the production of genetic material and healthy functioning of the nervous system. The RDA in pregnant mothers is 2.6 micrograms/day. The only natural dietary sources are animal products, such as, meats, dairy products, eggs and fish. It is also added to dried cereals and included in adequate amounts in prenatal supplements. Its deficiency at beginning of pregnancy may increase the risk of birth defects such as neural tube defects and preterm delivery (Brown, 2014).

Folate, a water-soluble B-complex vitamin, is considered an essential nutrient, since it cannot be synthesized in the human body (Scholl and Johnson, 2000). Folate (folic acid) is used in the development of neurotransmitters and is particularly important during early pregnancy because of its essential role in producing DNA in the cells. The RDA is 600 micrograms per day. Rich food sources include: avocado, bananas, dry cereal, asparagus, orange juice, fruits, green leafy vegetables, dried beans and peas. Inadequate levels of the nutrient causes neural tube defects ;the most common are spina bifida and anencephaly (severe underdevelopment of the brain), which occur during the first twenty eight days of pregnancy. This makes the timing of folate supplementation of particular importance. Additional folate introduced after this critical period will not reverse earlier damage done by a lack of the nutrient (Molloy, 2008; Scholl and Johnson, 2000). The pregnant and lactating mothers need extra folic acid and vitamin B₁₂ due to the great increase in blood volume /cells and the rapid growth of the foetus (WHO, 2014). The need for folic acid increases during times of rapid tissue growth, which during pregnancy includes an

increase in red blood cell mass, enlargement of the uterus, and the growth of the placenta and foetus (Bailey, 2000).

Iron is a trace mineral that is vital for foetal growth and development because it plays a key role in oxidation-reduction reactions which occur in all cells during metabolism. It is also necessary as the component of haemoglobin that allows red blood cells to carry oxygen needed throughout the body. Most importantly, iron is essential for normal neurodevelopment during foetal and early childhood development. The RDI during pregnancy is 27 milligrams per day and particularly vital to meet this recommendation during the second and third trimesters. During the last three months the baby accumulates iron for use in early life (Brown, 2014).

Iron demands increase as the body conserves more than usual during pregnancy and the growing foetus draws on maternal iron stores. It is estimated that in the second half of pregnancy, extra iron should be offered at the rate of 2-3 mg/day, in addition to the normal intake from the diet (Sharma, 2010). Moreover, during the last few months of pregnancy the foetus lays down stores of iron to last him for the first six months of life when his diet is mainly milk which is low in iron content. The World Health Organization (WHO, 2014) has estimated that prevalence of anaemia in pregnant women was found to be 14% in developed countries, 51% in developing countries and 65-75% in India (Sahoo et al., 2014).

Zinc is extremely important during the first trimester, when organs are formed and plays a role in assisting in immune system development. The RDA for zinc during pregnancy is 11 milligrams per day. Red meat is the best source of Zinc (Shar and Sachdev, 2006).

Minerals involved in building the skeleton, that is, calcium and phosphorus are also in great demand. The requirements in pregnancy are 1000mg calcium, and 1000mg of phosphorus (Kominiarek and Rajan, 2016).The RDA for iodine is 220mcg/day, further, the RDA for choline is 450mg/day and the adequate intake of sodium is 1500mg/day (Brown,2014). Mothers also require other vitamins, minerals and trace elements such as Biotin, Pantothenic Acid, Selenium, copper, Manganese, Flouride Chromium and Molybdenum. All major and trace minerals and vitamins have a role in maternal health. The diet of the mother has to provide extra quantities of these micronutrients which are necessary for the foetus (Appendix V1).

2.4 MATERNAL NUTRITIONAL KNOWLEDGE AND PRACTICES

Studies show that nutritional knowledge affects the quality of food intake and also healthy choices of purchased food (O'Brien and Davies, 2007; Verbeke, 2008).A study conducted in the United States found that pregnant teenagers realized that they needed to eat nutritious food and exercise during pregnancy, but in practice they were unable to choose nutritious food or beneficial exercise due to the lack of knowledge of the type of food and exercise that would benefit them (Wise and Arcamone, 2011).

A study done in India on Knowledge of primigravida mothers on antenatal nutrition revealed that about 48% primigravida mothers had good knowledge and 52% had inadequate knowledge regarding nutrition during antenatal period (Swati,2017).

Food insecurity, lack of knowledge and awareness regarding nutritious foods, myths and taboos, cultural practices, and gender discrimination are some of the most widespread factors affecting dietary diversity and nutritional status of pregnant women in Pakistan (Ali et al., 2014).

In a study carried out in Ethiopia, the results showed 64.4% of women had nutrition knowledge during pregnancy. There was a positive significant relation between nutritional information, educational position of mothers and family wages and nutrition knowledge of mothers during pregnancy (Daba et al., 2013). In another study, it was discovered that more than half of women (54%) had low level of knowledge and practices concerning the consumption of important nutrients and simple food components meeting the nutritional needs of the mother and the foetus (Fouda et al., 2012).

In another study done in Malawi by Mvula (2010), it was found that, the pregnant women had limited health and nutrition knowledge either due to the limited content of the information that the nurses provided or due to their own limited health and nutrition literacy skills. According to a study done in Tanzania, it was concluded that, although most women were aware of the pregnancy risk factors, they lacked the knowledge on how the factors affected the pregnancy outcomes (Theobald and Napendaeli, 2010).

In Kenya, a study was conducted to describe the dietary habits of Maasai pregnant women in relation to pregnancy and birth weight. Both food avoidance e.g. no eating of eggs and induced vomiting played a significant role in reduction of mother's and foetus weight (Mammo, 2000).

Traditional knowledge of the Maasai influenced traditional dietary practices during pregnancy. Antenatal mothers consumed a modified diet, restricting caloric consumption during the third trimester (7-9 months) believed to ensure smaller babies, thereby easing delivery and limiting medical interventions during childbirth (Brady et al., 2008).

According to a study done in rural Uasin Gishu County among Kalenjin women where 28% of the respondents were first time antenatal mothers, it showed that food beliefs (e.g. restriction of animal organs and approval of traditional green vegetables and milk) were widely known and practiced by more than 60% of the mothers to protect the health of both the mother and the child, guaranteeing successful pregnancy outcomes. Given the entrenched nature of the beliefs, it is prudent that when nutritious foods are restricted, nutritional interventions should somewhat search for alternative sources of nutrition which are available and considered to be suitable for pregnancy (Riang'a et al., 2017).

A variety of factors cause improper nutrition or undernutrition of mothers. Culture influences the practices and beliefs of people in general. Culture also has a bearing in the beliefs and nutritional practices of first time antenatal mothers. Women's dietary behaviours and intake during pregnancy are strongly influenced by different cultural practices, myths and taboos (Ali et al., 2014). In urban Nepal, many studies have reported that foods are characterized as both hot and cold; hot foods are avoided as they are thought to cause abortion and cold foods are preferred (Nargis et al., 2010). In some cultures fish is forbidden whereas others do not eat goat's meat. In any given situation, the traditional limitations and misconceptions which exist locally should be considered and, where conceivable, the expectant mother should be assisted to see that such

restrictions are a source of risk, not only to her own wellbeing, but also to the health of the unborn child (Ali et al., 2014).

Wherever possible the men folk of the family should be requested to join in nutrition talks at the clinic so that they may give backing to their wives. Misconceptions about food practices will vanish only with improved learning. Teachings on nutrition at the antenatal clinic should not be only a talk to 'eat improved foods' or to 'eat more'. They should be well-thought-out and should take into consideration the resident eating practices as well as obtainability of foods in the region (Daba et al., 2013).

From the review above, the status of antenatal maternal nutrition knowledge and practices by first time mothers, as well as other mothers is low; globally, in the Sub Saharan Africa and in Kenya. This study will seek to find out the current situation of levels of knowledge and its application through practices in Kenya by first time antenatal mothers.

2.5 SOURCES OF NUTRITION KNOWLEDGE BY MOTHERS

A study done in America by Danrton-Hill (2013), found out that antenatal dietary advice provided with the aim of increasing protein and energy intake was sufficient to improve protein intakes during pregnancy.

It is important that nutritionists intensify the expectant mothers' knowledge and dietary practice concerning the purpose of the simple nutrients and consumption, the selection of a sufficient well balanced diet, the daily dietary allowances and the other forms of food to uphold their general

and reproductive health and also to decrease maternal malnutrition. The drive to acquire nutritional knowledge is generally greater during pregnancy because the mothers make every effort to do what is correct for their baby (Daba et al., 2013).

Education and communication are needed to disseminate information about nutrition. Face to face communication between the health care providers and the first time antenatal mother is crucial. The nutritional counsellor shows concern and positive attitude towards the expectant mother, and seeks to understand her nutritional needs and problems. Nutrition education and counselling focus on enhancing the quality of the diet, by educating mothers on which foods and what quantities they need to consume in order to achieve optimal dietary intake. Nutrition education and counselling can be provided as part of a comprehensive package of health education including components such as stress/anxiety management, smoking cessation and the dangers of alcohol and drug use and can be delivered through a number of channels including home visits and clinic or other health care facility-based sessions (WHO, 2015). A systematic review and meta-analysis of 34 studies providing nutrition education and counselling found that nutrition education and counselling improved gestational weight gain by 0.45kg, reduced the risk of anaemia in late pregnancy by 30%, increased birth weight by 105g and lowered the risk of preterm delivery by 19% (Girard and Olude, 2012).

Training should be arranged in the form of group discussions among first time antenatal mothers to enable them to exchange attitudes and perspectives and develop positive feelings toward themselves (Panthumas, 2012). Educating the first time antenatal mothers regarding antenatal care will help to prevent the maternal and infant mortality, morbidity, and it promotes the healthy

baby (Sujatha et al., 2014). Women should be educated more about the pregnancy risk factors and encouraged to begin their antenatal clinic early in pregnancy. Mothers need to be counselled on nutritional value of different food groups e.g. organ meat, eggs, poultry etc. They may be informed about the inexpensive food choices for meeting pregnancy related nutrient needs (Ali et al., 2014).

In Kenya, health and healthcare education provided at the ANC clinics may confer major improvements in health knowledge among antenatal mothers (Perumal et al., 2013). Nutritional messages can be passed through interpersonal communication and community based media through focused community dialogue days. For example on IFAS, door to door IFAS education, IFAS health talks, facility based groups like mother support groups and community women groups. Mass media campaign can be conducted through national and regional Radio and TV stations, out of home media like wall branding in markets, shopping centres, water collection points and buses, motor bikes branding, advertising in screens at the health facilities, women magazines and mobile phone reminders with nutrition messages. Social media (face book, twitter) can be used to reach out to pregnant mothers in urban areas. materials to use for pregnant mothers includes posters, leaflets, mothers' journal, flip charts, promotional materials like bags, lessos, wrist bands, umbrellas, and nutrition video documentary (MOH, 2013).

CHAPTER THREE: STUDY DESIGN AND METHODOLOGY

3.1 STUDY DESIGN

This was a cross-sectional descriptive study. This design involved the systematic collection and presentation of quantitative and qualitative data and gave a clear picture of the level of knowledge and practices of antenatal maternal nutrition among first time antenatal mothers attending the outpatient clinic of Obstetrics and Gynaecology of the KNH.

3.2 METHODOLOGY

3.2.1 Study Setting

The study was carried out in the outpatient clinic for Obstetrics and Gynecology at the Kenyatta National Hospital (KNH) in the month of March, year two thousand and sixteen. KNH is currently the largest National referral, teaching and research hospital south of Sahara. The hospital serves the whole of East and Central Africa in providing specialized quality health care. The core function of the hospital is to receive patients on referral from other hospitals or institutions within or outside Kenya for specialized health care. KNH has various departments including Nutrition, Amenity (Private Wing), Medicine, Surgical, Paediatrics, Obstetrics and Gynaecology, Human Resource, Planning and Finance. The Obstetrics and Gynaecology clinic where this study was carried out is in the Obstetrics and Gynaecology department. Antenatal mothers attend their antenatal clinic appointments in the Obstetrics and Gynaecology clinic daily from Monday to Thursday. Services provided to antenatal mothers in this clinic during visits include: anthropometric measurements and vital signs checked, biochemistry, immunization, general health and nutrition group education sessions as well individual dietary counselling and

doctors consultation. An average of two hundred first time antenatal mothers visit the clinic in a month. KNH was selected because of its diversity in the type of patients.

3.2.2 Sampling

3.2.2.1 Sampling population

The study population consisted of all antenatal mothers attending the Obstetrics and Gynaecology clinic at KNH.

3.2.2.2 Sampling frame

The sampling frame consisted of all first time antenatal mothers attending the Obstetrics and Gynaecology clinic at KNH during the month of March, the year two thousand and sixteen.

3.2.2.3 Sample size calculation

The sample size was determined using Fisher's formula; (Fisher et al., 2003) where:

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

n is sample when the total population is more than 10,000

Z = the standard normal deviation at the required confidence level

p = the proportion in the target population estimated to have characteristics being measured. 50% of first time antenatal mothers with nutritional knowledge i.e., prevalence is 50 % (as recommended by Fisher et al, when no estimate of proportion is available in the target population with characteristics of interest)

q = 1-p (1- 0.5 = 0.5); and

d = the level of statistical significance set.

$$n = (1.96)^2 (0.5) (0.5) / (0.05)^2 = 384.16 = \mathbf{385}$$

- The sample size was determined using Fisher's formula; (Fisher et al.,2003) where:
- n_f is desired sample when the population is less than 10,000
- N = the average no. of first time mothers attended to in the clinic in the month of January, the year twenty sixteen.
- $N = 200$

- $n_f = \frac{385}{1 + (385/200)} = \mathbf{131.6239 = 132}$

5% attrition

$$\mathbf{5/100 * 132 = 6.6 = 7}$$

$$132 + 7 = \mathbf{139}$$

3.2.2.4 Sampling procedure

The sampling procedure used was serialological sampling. The mothers who satisfied the inclusion criteria and who consented to participate were picked as they came to the clinic until the sample size was achieved. If the sample size was not achieved in this manner then the sampling would have been deemed exhaustive and would have used only the sample available. The mothers who were recruited and consented to participate in the study were interviewed at the Obstetrics and Gynaecology clinic, using the questionnaires and their responses written down by principle investigator or the research assistant. The interview was carried out in a private environment for confidentiality. The principle researcher purposively selected one nutritionist working in the Obstetrics and Gynaecology clinic as the Key Informant. The nutritionist was required to consent

to participate in the study, and thereafter the principle researcher carried out the interview using the key informant interview guide at the Obstetrics and Gynaecology clinic. The interview was conducted in a private environment for confidentiality.

3.2.2.5 Inclusion criteria for mothers

First time antenatal mothers attending clinic at the Obstetrics and Gynaecology clinic at KNH were eligible for the study.

They could have been in the first, second or third trimester. The assumption was that the mothers had not been pregnant before, and that there was no miscarriage or abortion procured.

3.2.2.6 Exclusion criteria for mothers

Antenatal mothers who were pregnant for the second or more times and who were attending the Obstetrics and Gynaecology clinic at KNH (Multi gravida mothers) were excluded from the study. First time mothers who were below fifteen years and above forty-nine years were excluded from the study. In this country, the age of 15 years to 49 years is perceived as the reproductive age.

3.2.2.7 Inclusion criteria for the nutritionist

Only the nutritionist working in the Obstetrics and Gynaecology clinic at KNH was included in the study.

3.3 DATA COLLECTION

3.3.1 Data Collection Tools and Materials

Data collection tools and materials consisted of 1) Structured questionnaire 2) A Key informant interview guide 3) A knowledge test and 4) Food Frequency questionnaire. The questionnaires gathered information on socio-demographic and socio-economic characteristics, maternal knowledge and practice of the knowledge. The knowledge test administered to the mothers is in the questionnaire (Appendix 11, question 7 to question 18).

For each mother, all the correct answers for each question were added up. Each correct answer attracted a score of one mark while each wrong answer attracted a score of zero mark. The maximum score for each mother was 43. Then the mothers were grouped according to the different socio-demographic and socio-economic characteristics. A composite score for each nutrient was calculated in each of the categories. The knowledge of the different groups was checked through a T-test or ANOVA against a composite variable. A food frequency test was used to test for nutritional practices in consumption of the foods rich in the nutrients indicated for. The scores in knowledge and practice domains were categorized as poor (less than and equal to 50 %), fair (51% to 69 %) and good (70 % and above)(Khan et al .,2014).

3.3.1.1 Structured questionnaire and key informant interview guide

The questionnaires had structured and unstructured questions. Each item in the questionnaire was developed to address a specific objective. The structured questions provided a list of all possible alternatives from which the respondents selected the answer that best described their nutritional knowledge and practices. The unstructured questions gave the respondent complete freedom of

response to respond in their own words. A key informant interview guide was used for the nutritionist at the Obstetrics and Gynaecology clinic. The key informant interview was in-depth interview administered to the nutritionist which asked her questions about her experiences working at the clinic. The themes of the questions were based on the research objectives.

Before actual data collection, tools and equipment were pretested at KNH, Obstetrics and Gynaecology clinic to a selected sample of fourteen first time antenatal mothers. The mothers interviewed during pretesting of the questionnaires were not included in the actual data collection. Data gathered in this exercise of pretesting was used to evaluate the validity of tools. Modification of tools was done based on the pre-test. Questions which were not well understood were corrected while irrelevant questions were omitted.

3.3.2 Data Collection Procedures

3.3.2.1 Recruitment and training of research assistant

The principle investigator recruited one research assistant for data collection. The research assistant was recruited from among three nutritionists who had been previously attached at Kenyatta National Hospital, Nutrition department during their training.

The principle investigator explained what the work of a research assistant entailed; the research setting which was KNH, Obstetrics and Gynaecology clinic, and the data collection procedures. The research assistant candidates were required to consent to participate in the study. Thereafter, proper screening was done through an interview. The candidate who met the requirements of having attained at least a certificate in nutrition training, fluent in both English and Kiswahili language, had good communication skills and ability to work as a team was selected. The

research assistant was trained on data collection procedures which involved using the questionnaire to interview the mothers and writing down the responses. The research assistant was supervised by the principal investigator. This ensured reliability and validity of the data collected.

3.3.2.2 Data collection

The researcher closely monitored and supervised the pre-testing and data collection processes as well as the entire interviewing process so as to address any unforeseen challenges that could affect the final outcome of the study. Data was collected from the mothers using the questionnaires. A key informant interview guide was used to collect data from the nutritionist working in the Obstetrics and Gynaecology clinic. There was no risk of contamination of the questionnaires since they had been serialized and the research assistant was advised to use them in a systematic manner. To avoid re-interview to the mothers, names of interviewed mothers were noted down in a confidential journal accessible only to the principle researcher and the research assistant.

The principle researcher worked together with the personnel in the Reproductive Health department. The head of the department introduced the researcher and the research assistant to the staff and allowed them accessibility to the clinic where the study took place. This enhanced cooperation and support between the researcher and the KNH staff.

3.4 DATA QUALITY ASSURANCE

The research assistant was trained on data collection techniques, correct use of equipment and accurate recording of measurement to minimize errors. The respondents were assured of confidentiality of all information given. The researcher closely supervised the data collection exercise at the same time being part of the field exercise and addressed any challenges that arose. The questionnaires were checked for completeness; proper filling and recording of information was also checked. The principal researcher was supervised by the university supervisor while carrying out the research.

3.5 DATA MANAGEMENT AND ANALYSIS

The filled instruments were serialised, cleaned and coded and put into Statistical Package for Social Sciences (SPSS) version 20 software for analysis. The computerized Data was analyzed using SPSS and generated descriptive statistics such as mean, frequencies and percentages. Cross tabulations, one way Anova and independent t-test were applied to test whether there were significant differences between two or more groups or samples at a selected probability level of 0.05. Qualitative data was analysed by organizing it into themes and concepts, and then inferences were formulated. The data was presented in form of tables.

3.6 ETHICAL CONSIDERATIONS

Clearance to conduct the study was obtained from the University of Nairobi Ethical committee, following the proposal approval. The purpose of the study and the role of the respondents were explained to the mothers and the nutritionist and after that they were requested to sign a consent form (Appendix 1 and Appendix 111) respectively. In order to ensure confidentiality, no

participant's name was indicated in the questionnaires. They were involved voluntarily and had the freedom to withdraw from the study any time, if they felt they no longer wished to participate. Data collected from the respondents was treated with confidentiality. The mothers found to have poor nutritional knowledge and practices were referred to the nutritionist working in the clinic for follow up.

CHAPTER FOUR: RESULTS AND DISCUSSION

4.1 INTRODUCTION

This chapter represents the findings of the study on knowledge and practices of antenatal maternal nutrition by first time mothers: a case of Kenyatta National Hospital, Nairobi. A total of 139 antenatal mothers responded. The results are presented according to the study objectives in form of tables and narratives.

4.2 SOCIO-DEMOGRAPHIC CHARACTERISTICS OF MOTHERS

The findings of socio-demographic characteristics which included age, marital status, level of education and gestational age of pregnancy are presented in this section.

4.2.1 Age of the Mothers

The age of the mothers ranged between 15-49 years. These results are shown in Table 1.

Table 1: Distribution of Mothers by Age

Age(years)	N=139	
	Frequency	Percent
15-25	60	43.2
26-35	73	52.5
36-49	6	4.3
Total	139	100

The majority of the mothers were between 26-35 years at 52.5% although the number between 15-25 years was also quite large at 43.2%.

The findings of the study are similar with findings from Accra, Ghana; in which women aged 25-35 years had higher mean percentage of nutritional knowledge, compared to those younger than 25 years (Alice et al.,2012).

4.2.2 Marital Status of the Mothers

Marital status of mothers considered two categories; married and single. These results are shown in Table 2.

Table 2: Distribution of Mothers by Marital Status

Marital Status	N=139	
	Frequency	Percent
Married	107	77.0
Single	32	23.0
Total	139	100

The number of mothers who were married was high at 77%, while the rest of the mothers were single at 23%.

4.2.3 Level of Education of the Mothers

The study sought to determine the highest level of education of the first time antenatal mothers. These results are shown in Table 3.

Table 3: Distribution of Mothers by Level of Education

Level of Education	N=139	
	Frequency	Percent
Primary Education	7	5.1
Secondary Education	43	30.9
College Education	88	63.3
Others	1	0.7
Total	139	100

In this study, the higher number of mothers had acquired college education at 63.3%, followed by mothers who had acquired secondary education at 30.9%. For the majority of mothers (94.2%), their level of education was higher than primary school, with over 60% having college education.

Evidence indicates that when women have greater knowledge through education, there is greater likelihood that they will have better pregnancy and delivery outcomes. A study conducted in Malaysia demonstrated that individuals with better nutritional knowledge levels are significantly higher in educational level and nutritional attitude (Daba et al., 2013). This is possible because acquiring knowledge through education equips women to make suitable decisions about their health including during pregnancy and childbirth (Daba et al., 2013).

4.2.4 Gestational Age of the Pregnancy

The age of pregnancy ranged from below 6 weeks to 40 weeks. These results are shown in Table 4.

Table 4: Distribution of Mothers by Age of Pregnancy

Age of the Pregnancy	N=139	
	Frequency	Percent
Below 6 weeks	2	1.4
6-12 weeks	17	12.2
13-24 weeks	28	20.2
25-40 weeks	92	66.2
Total	139	100

The range of 25-40 weeks had the highest number of mothers at 66.2%, followed by the range 13-24 weeks at 20.2%.The ranges correspond to the different trimesters, that is below 6-12 weeks is first trimester, 13-24 weeks is second trimester and 25-40 weeks is third trimester.

4.3 SOCIO-ECONOMIC CHARACTERISTICS OF MOTHERS

4.3.1 Occupation of Mothers

The first time antenatal mothers were distributed in four categories of occupation; housewives, casual labourers, those on salaried employment and self-employed. These results are shown in Table 5.

Table 5: Distribution of Mothers by Occupation

Occupation of Mothers	N=139	
	Frequency	Percent
Housewives	53	38.1
Casual labour	7	5.0
Salaried employment	46	33.2
Self-employment	33	23.7
Total	139	100

The results on occupation show that the mothers who were housewives were the majority at 38.1%, followed by mothers on salaried employment at 33.2%. When mothers are housewives they get limited access to information about nutrition during pregnancy due to the confinement and lack of interaction as required (Daba et al., 2013).

4.3.2 Socio-economic Status of the Mothers

The income of mothers was determined through three categories Low income (mothers earning less than KES 23,000), middle income (mothers earning KES 23,000-200,000) and high income (mothers earning above KES 200,000) (Institute of Economic Affairs, 2015). These results are shown in Table 6.

Table 6: Distribution of Mothers by Socio-economic Status

Income	N=139	
	Frequency	Percent
Low income	73	52.5
Middle income	66	47.5
Higher income	0	0
Total	139	100

Mothers earning low income had the highest number at 52.5% and then middle income mothers followed at 47.5%. A study done in Ethiopia found that educational level, monthly income and nutrition information during pregnancy were identified as important predictors of knowledge of women on nutrition during pregnancy among the study participants (Daba et al., 2013). Since most of the first time antenatal mothers were housewives, the income mostly came from their husbands and other family members.

4.4 KNOWLEDGE OF ANTENATAL MATERNAL NUTRITION

The findings of knowledge of antenatal maternal nutrition by first time mothers are presented in this section. This section will have results of; knowledge on the meaning of a balanced diet, the general knowledge of the nutrients comprising a balanced diet, and sources of nutrients comprising a balanced diet. These results are supported by the fact that good knowledge about basic nutrients and adequate well balanced diet usually results in positive dietary practices which are important determinants of optimum health from conception until death (Rochester, 2009 and Irving, 2009).

4.4.1 Knowledge of Balanced Diet

The study sought to determine the mothers who had knowledge of a balanced diet and those who did not have. These results are shown in Table 7.

Table 7: Distribution of Mothers by Knowledge of a Balanced Diet

N=139		
Balanced Diet	Frequency	Percent
Yes	106	76.3
No	33	23.7
Totals	139	100

The findings showed that majority of the mothers 76.3% had knowledge of the meaning of a balanced diet while 23.7% of the mothers did not have knowledge of the meaning of a balanced diet. A balanced diet is a fundamental part of wellbeing at all times in a woman's life (Fouda et al., 2012).

4.4.2 General Knowledge of the Nutrients Comprising a Balanced Diet

The study determined the level of knowledge of the mothers on the nutrients that comprise a balanced diet. The word **yes** in Table 8 indicates mothers who had knowledge of the nutrient indicated as one of those comprising a balanced diet and the word **no** indicates mothers who did not have knowledge that the nutrient indicated is one of those comprising a balanced diet. These results are shown in Table 8.

Table 8: General Knowledge of the Nutrients Comprising a Balanced Diet

Nutrients Comprising a Balanced Diet	N=139		
		Frequency	Percent
Carbohydrates	Yes	83	59.7
	No	56	40.3
Proteins	Yes	93	66.9
	No	46	33.1
Vitamin A	Yes	56	40.3
	No	83	59.7
Vitamin C	Yes	58	41.7
	No	81	58.3
Vitamin D	Yes	46	33.1
	No	93	66.9
Vitamin B12	Yes	48	34.5
	No	91	65.5
Folate	Yes	30	21.6
	No	109	78.4
Iron	Yes	50	36.0
	No	89	64.0
Calcium	Yes	54	38.8
	No	85	61.2
Zinc	Yes	23	16.5
	No	116	83.5

Majority of the mothers 76.3 % indicated that they had knowledge of the meaning of a balanced diet and yet when asked on the individual nutrients, only 59.7% said carbohydrate is one of the nutrients that make up a balanced diet. This means not all mothers who said they had knowledge of the meaning of a balanced diet actually had the knowledge. It also applies to knowledge of all other nutrients, that is, proteins 66.9%, vitamin A 40.3%, vitamin C 41.7%, vitamin D 33.1%, vitamin B12 34.5%, folate 21.6 %, iron 36.0%, calcium 38.8%, and zinc 16.5%. Mothers had slightly more knowledge on the macronutrients being components of a balanced diet as compared to the micronutrients, but still none of the nutrients surpassed knowledge indicated for a balanced diet. This can be attributed to the fact that these first time antenatal mothers had limited access to nutrition information due to confinement and lack of interaction since most of them were housewives and from low socio-economic status. A study done in America at El-Menshawy Hospital reported that about half of women didn't have enough knowledge regarding the meaning, the importance, and the constituents of a well-balanced diet for the pregnant women (Latifa et al., 2012).

4.4.3 Knowledge of the Sources of Nutrients Comprising a Balanced Diet

The word **Yes** in Table 9 indicates mothers who had knowledge of the sources of different nutrients constituting a balanced diet and the word **no** indicates mothers who did not have knowledge of the sources of different nutrients constituting a balanced diet. These results are shown in Table 9.

Table 9: Knowledge of the Sources of Nutrients comprising a Balanced diet

Nutrients	Food Sources	N=139		
			Frequency	Percent
Carbohydrates	Cereals	Yes	94	67.6
		No	45	32.4
	Root crops	Yes	81	58.3
		No	58	41.7
	Fats and Oils	Yes	22	15.8
		No	117	84.2
Proteins	Meat	Yes	113	81.3
		No	26	18.7
	Milk and milk products	Yes	110	79.1
		No	29	20.9
	Eggs	Yes	105	75.5
		No	34	24.5
	Cereals and cereal products	Yes	14	10.1
		No	125	89.9
	Legumes	Yes	101	72.7
		No	38	27.3
Vitamin C	Fruits	Yes	72	51.8
		No	67	48.2
	Vegetables	Yes	45	32.4
		No	94	67.6
Vitamin D	Eggs	Yes	6	4.3
		No	133	95.7
	Milk and milk products	Yes	13	9.4
		No	126	90.6
	Fortified cereals	Yes	13	9.4
		No	126	90.6
	Cod liver oil	Yes	24	17.3
		No	115	82.7

	Margarine	Yes	14	10.1
		No	125	89.9
Vitamin B12	Animal foods	Yes	22	15.8
		No	117	84.2
	Fermented foods	Yes	33	23.7
		No	106	76.3
Iron	Green leafy vegetables	Yes	55	39.6
		No	84	60.4
	Liver	Yes	96	69.1
		No	43	30.9
	Meat	Yes	21	15.1
		No	118	84.9
	Fish	Yes	41	29.5
		No	98	70.5
Calcium	Milk and milk products	Yes	102	73.4
		No	37	26.6
	Green leafy vegetables	Yes	25	18.0
		No	114	82.0
Zinc	Meat	Yes	7	5.0
		No	132	95.0
	Poultry	Yes	7	5.0
		No	132	95.0
	Whole fish	Yes	31	22.3
		No	108	77.7

The knowledge of carbohydrates sources was moderate; cereals 67.6% and root crops 58.3% but for fats and oils knowledge was low at 15.8%. Mothers had the knowledge of balanced diet at 76.3%, but the knowledge of the individual nutrients did not prove that. It is not clear why the fats and oils were not indicated as sources of energy in spite of the yield of 9 kcal of energy per gram of fats or oil. Fat is a source of concentrated calories and may be beneficial to women at risk of energy malnutrition during pregnancy (Brown, 2014). It is probably due to the fact that fats and oils are given negative publicity as sources of cholesterol. In addition, fats and oils are only used in small quantities as cooking aids but not as components of a meal.

Knowledge of proteins sources was: meat 81.3%, milk and milk products 79.1%, eggs 75.5% and legumes 72.7%. This shows that mothers were knowledgeable especially for the nutrient sources of proteins with a score of above 70% for each of them. Cereals were not indicated as rich sources of protein probably because they were already indicated as rich sources of carbohydrates. The protein content in the cereals ranges between 7.7g in 100g edible portion to 12.5g in 100g edible portion (FAO, 2016).

On vitamin C, fruits and vegetables were identified as rich sources at 51.8% and 32.4% respectively. Mothers were not very knowledgeable on vegetables being a rich source of this vitamin probably because vegetables are associated more with provision of roughage other than vitamins.

Knowledge of the rich sources of vitamin D in animal and plant foods as well as the oils and fats was very low. For example in animal products, knowledge of eggs was only at 4.3% while milk

and milk products was only at 9.4%. This may have been contributed to by the fact that the major source of vitamin D that is commonly known is the sun light. Fortified cereals as well as margarine were not indicated as sources of the vitamin despite the fact that their packaging is clearly indicated.

Mothers' knowledge of rich sources of vitamin B12 was very low. Animal products 22% and fermented foods 33% being the rich sources were not indicated probably because animal products are known to provide proteins.

For iron, liver was indicated as a rich source of iron at 69.1%, green leafy vegetables 39.6%, meat 15.1%, and fish 29.5%. Liver as a rich source of iron is well known to antenatal mothers as it is commonly mentioned in antenatal clinics during nutrition education sessions. Green leafy vegetables, meat and fish were not indicated as rich sources of iron. It is likely that green leafy vegetables are identified with providing bulk in diet and meat in providing mainly proteins together with fish.

Milk and milk products were indicated as the rich sources of calcium at 73.4%. Green leafy vegetables at 18% were not indicated as a main source of calcium probably due to the fact it is known to be a rich source of roughage in the diet. Lynna and Jon (2005) stressed the fact that during pregnancy extra calcium is required for foetal bone development.

For zinc rich foods; the knowledge of zinc rich foods was very low, meat at 5%, poultry at 5% and whole fish at 22.3%. Failure to identify them shows they were probably more known to

provide proteins and not zinc. Also, zinc is a mineral rarely mentioned except in nutrition education sessions and so mothers may never have heard about it leave alone knowing foods rich in it.

In a study concerning the pregnant women dietary practice, it showed that most women had a poor level of knowledge and practices about calcium, zinc and iron (Fouda et al.,2012). The knowledge of first time mothers on the foods rich in important nutrients will enable them make right choices for optimum nutrition during antenatal period, but it becomes equally important to make mothers aware about the food sources for nutritive content in them because balanced nutrition is most vital, especially during pregnancy, (Swati et al., 2017).

4.5 PRACTICES OF ANTENATAL MATERNAL NUTRITION

Practices of antenatal maternal nutrition by first time mothers were checked on the basis of food frequency or consumption of a balanced diet.

4.5.1 Consumption Frequency of Carbohydrate Rich Foods by the Mothers

Consumption frequency of carbohydrate rich food was determined and these results are shown in Table 10.

Table 10: Consumption Frequency of Carbohydrate Rich Foods by the Mothers

Consumption Frequency	Cereals		Root Crops		Fats and Oils	
	N=139		N=139		N=139	
	n	%	n	%	n	%
Never	1	0.7	23	16.5	1	0.7
Once a week	4	2.9	37	26.6	2	1.5
Twice a week	9	6.5	28	20.1	3	2.2
Thrice a week	14	10.1	21	15.1	-	-
Four times a week	8	5.7	13	9.4	2	1.4
Five times a week	12	8.6	3	2.2	-	-
Six times a week	3	2.2	1	0.7	1	0.7
Seven times a week	88	63.3	13	9.4	130	93.5
Seldom	-	-	-	-	-	-
Total	139	100	139	100	139	100

According to this study, 99.3% of mothers consumed cereals at least once in a week, 83.5 % consumed root crops at least once a week and 98.3% consumed fats and oils at least once a week. The knowledge score of a balanced diet was high at 76%, cereals 67.6%, and root crops 58.3%. These results show that the mothers' practice of energy giving foods was high. The consumption of cereals and root crops has even surpassed their knowledge; this is probably because these foods are usually consumed in main diets so there is no choice, thus the practice does not depend on knowledge. Consumption of carbohydrate rich foods helps meet the demands of energy for the mother and the baby for the day; fueling baby's growth and carrying around the extra weight of the unborn baby requires good energy.

4.5.2 Consumption Frequency of Protein Rich Foods by Mothers

The study determined the food frequency of all the foods rich in proteins. These results are shown in Table 11.

Table 11: Consumption Frequency of Protein Rich Foods by the Mothers

Consumption Frequency	Meat		Milk & Milk Products		Eggs		Cereal & Cereal Products		Legumes	
	N=139		N=139		N=139		N=139		N=139	
	n	%	n	%	n	%	n	%	n	%
Never	16	11.5	10	7.2	32	23.0	–	–	6	4.3
Once a week	30	21.6	8	5.8	32	23.0	3	2.2	24	17.3
Twice a week	36	25.9	9	6.5	32	23.0	10	7.1	42	30.2
Thrice a week	22	15.8	10	7.2	13	9.5	13	9.4	35	25.2
Four times a week	17	12.2	5	3.6	5	3.6	9	6.5	10	7.2
Five times a week	4	2.9	5	3.6	2	1.4	8	5.8	6	4.3
Six times a week	–	–	1	0.7	–	–	2	1.4	1	0.7
Seven times a week	6	4.3	89	64.0	2	1.4	93	66.9	12	8.6
Seldom	8	5.8	2	1.4	21	15.1	1	0.7	3	2.2
Total	139	100	139	100	139	100	139	100	139	100

Up to 63% consumed meat at least once a week. Only very few ate meat seven days a week. Then 11.5% of mothers never ate meat at all. Milk was consumed by up to 64% seven times a week. Most of the milk was probably consumed with tea but not as pure beverage. Up to 61.8% consumed eggs at least once per week while 23% did not consume eggs at all. In some

communities, it is a taboo for a pregnant woman to eat eggs. Cereals were consumed by 66.9% of mothers at seven times in a week. This consumption of cereals would be in ugali and chapati which are staple foods for many communities in Kenya. Legumes were consumed by 72.7% at least once a week.

It has also been observed that due to cultural traditions, consumption of meat, liver and eggs is discouraged in some communities. According to the findings, the consumption of all foods rich in proteins was moderate (between 50% and 70%) but lower than 76%, the score for knowledge of balanced diet, which means the mothers were not as knowledgeable on balanced diet as indicated or probably the mothers failed to put into practice the knowledge they had due to discouragements by their cultural beliefs. During pregnancy, an exceptional stage of life defined by rapid growth and development and enormous maternal physiologic changes from the time of conception to birth, adequate dietary protein is crucial to ensure a healthy outcome (Elang'o and Ball, 2016).

4.5.3 Consumption Frequency of Vitamin C Rich Foods by Mothers

The vitamin C rich foods were considered to be mainly fruits and vegetables. The consumption frequency was determined and these results are shown in Table 12.

Table 12: Consumption Frequency of Vitamin C Rich Foods by Mothers

Consumption Frequency	Fruits		Vegetables	
	N=139		N=139	
	n	%	n	%
Never	1	0.7	4	2.9
Once a week	6	4.3	5	3.6
Twice a week	4	2.9	9	6.5
Thrice a week	4	2.9	13	9.3
Four times a week	2	1.4	15	10.8
Five times a week	2	1.4	5	3.6
Six times a week	3	2.2	2	1.4
Seven times a week	116	83.5	86	61.9
Seldom	1	0.7	-	-
Total	139	100	139	100

Most mothers 83.5% consumed fruits seven times a week. Vegetables were consumed by 61.9% of mothers, seven times a week while consumption at four times a week was by only 10.8%. Mothers applied their knowledge of balanced diet (76.3%) on fruits and thus consumption was high. However, the consumption of vegetables by mothers was moderate while the knowledge of vegetables as a source of vitamin C was low.

Vitamin C also known as ascorbic acid is essential to repair tissues, heal wounds, bone growth, and boost the immune system. This antioxidant protects cell from being damaged. Reports of vitamin C deficiency in the country are not very common. This is probably because vitamin C is

common in most of the foods consumed. It is therefore possible to satisfy the RDA for the vitamin by eating a diverse diet (Mason, 2016).

4.5.4 Consumption Frequency of Vitamin D Rich Foods by Mothers

The foods rich in Vitamin D were considered to be eggs, milk and milk products, fortified cereals, cod liver oil and fortified margarine. These results are shown in Table 13.

Table 13: Consumption Frequency of Vitamin D Rich Foods by Mothers

Consumption Frequency	Eggs		Milk and Milk products		Fortified Cereals		Cod Liver Oil		Margarine	
	N=139		N=139		N=139		N=139		N=139	
	n	%	n	%	n	%	n	%	n	%
Never	33	23.7	8	5.8	102	73.4	134	96.4	45	32.4
Once a week	33	23.7	10	7.2	12	8.6	-	-	15	10.8
Twice a week	33	23.7	8	5.8	5	3.6	-	-	15	10.7
Thrice a week	12	8.6	8	5.8	4	2.9	-	-	8	5.8
Four times a week	5	3.6	8	5.7	-	-	-	-	3	2.2
Five times a week	2	1.4	4	2.9	-	-	-	-	6	4.3
Six times a week	-	-	1	0.7	-	-	-	-	2	1.4
Seven times a week	2	1.6	90	64.7	3	2.2	4	2.9	36	25.9
Seldom	19	13.7	2	1.4	13	9.3	1	0.7	9	6.5
Total	139	100	139	100	139	100	139	100	139	100

Eggs were eaten by 59.6% of the mothers at least once a week. A Quarter (23.7%) of the mothers never ate eggs and 13.7% seldom ate them. Milk and milk products were consumed well by 64.7% seven times in a week and 5.8% never consumed it. Majority 73.4% of mothers never consumed fortified cereals. Others 9.3% seldom ate fortified cereals. Majority 96.4% of the mothers never took cod liver oil and only 2.9% consumed cod liver oil seven times a week. For margarine, 32.4% of mothers never used it and only 25.9% used it seven times in a week.

Although there was very little consumption of the foods, in the tropical and subtropical countries, people obtain vitamin D from the sunshine as this helps to synthesize the vitamin under the skin. This would cease to be the case when the persons are confined indoors, unlikely for the pregnant mothers unless they are indisposed.

Vitamin D now has its role in immune function, healthy cell division and bone health. It is essential for the absorption and metabolism of calcium and phosphorus. Many studies are discovering an association between low serum vitamin D levels and an increased risk of certain types of cancers, autoimmune disease, neurological disease, insulin resistance, and cardiovascular disease (Rinehart, 2018).

4.5.5 Consumption Frequency of Vitamin B12 Rich Foods by Mothers

The Foods considered as good sources of vitamin B12 were animal foods and fermented foods. The study determined the consumption frequency and these results are shown in Table 14.

Table 14: Consumption Frequency of Vitamin B12 Rich Foods by Mothers

Consumption Frequency	Animal Foods		Fermented Foods	
	N=139		N=139	
	n	%	n	%
Never	4	2.9	22	15.8
Once a week	20	14.4	21	15.1
Twice a week	26	18.7	30	21.6
Thrice a week	17	12.2	13	9.4
Four times a week	16	11.5	10	7.2
Five times a week	2	1.4	5	3.6
Six times a week	1	0.7	4	2.9
Seven times a week	49	35.3	17	12.2
Seldom	4	2.9	17	12.2
Total	139	100	139	100

Only 35.3% of mothers consumed animal foods seven times a week and 2.9 % never consumed it. Fermented foods were consumed by 65.5 % of mothers at least once a week while 15.8% of mothers never consumed it.

The consumption of animal products was low. RDA for vitamin B12 for pregnant women is 2.6 µg/day. Vegetarian mothers will need supplementation throughout pregnancy and during lactation in sufficient amounts to ensure adequate supplies for themselves and their child. (Schweikart, 2018).

4.5.6 Consumption Frequency of Iron Rich Foods by Mothers

The iron rich foods are green leafy vegetables, liver, meat and fish. These results are shown in Table 15.

Table 15: Consumption Frequency of Iron Rich Foods by Mothers

Consumption Frequency	Green leafy Vegetables		Liver		Meat		Fish	
	N=139		N=139		N=139		N=139	
	n	%	n	%	n	%	n	%
Never	3	2.2	52	37.4	16	11.5	39	28.1
Once a week	4	2.9	40	28.8	25	18.0	37	26.6
Twice a week	7	5.0	12	8.6	39	28.1	20	14.4
Thrice a week	17	12.2	8	5.8	24	17.3	13	9.4
Four times a week	16	11.5	1	0.7	17	12.2	1	0.7
Five times a week	3	2.2	-	-	2	1.4	-	-
Six times a week	2	1.4	-	-	-	-	1	0.7
Seven times a week	87	62.6	1	0.7	7	5.0	-	-
Seldom	-	-	25	18.0	9	6.5	28	20.1
Total	139	100	139	100	139	100	139	100

Many mothers 62.6% consumed green leafy vegetables seven times a week and 12.2% thrice per week. About a third of mothers 37.4% never consumed liver and 43.2% consumed it at least once per week. 75.6% of mothers ate meat at least once a week, and 11.5% never ate it. A quarter of the mothers 28.1% never ate fish and 50.4% ate it at least once per week. Mothers

indicated knowledge of balanced diet but the same is not applied in consumption of iron rich foods. The low consumption could also be attributed to the fact that meat, liver and fish being expensive foods are out of reach for many mothers and this hinders consumption. Some mothers have the belief that fish may contain mercury and this may affect their health and that of the unborn baby. It has been reported that, undesirable attitude and/or health practice of mothers may persist in spite of correcting their knowledge regarding adequate nutrition during pregnancy (Jolliffe, 2012). The mothers continue to practice such behaviors because they are insensitive to change and that understanding is not necessarily followed by change. This may be attributed to the believed cultural factors and dietary habits (Fouda et al., 2012). Most pregnant women develop anaemia because of not consuming enough iron-rich foods or eating foods that inhibit the absorption of iron (Ransom and Elder, 2003). Iron is exceptionally important and gestating babies need it to grow normally; iron intake has a direct impact on baby's red blood cells and it's also a building block of muscle cells. According to the International Life Sciences Institute, a nonprofit organization in Washington, D.C., babies born to anaemic mothers don't gain as much weight as babies of iron-replete women, and iron deficiency anaemia also increases the chance of premature delivery (Schweikart, 2018).

4.5.7 Consumption Frequency of Calcium Rich Foods by Mothers

Foods considered as good sources of calcium are milk and milk products and green leafy vegetables. These results are shown in the Table 16.

Table 16: Consumption Frequency of Calcium Rich Foods by Mothers

Consumption Frequency	Milk & milk Products		Green Leafy Vegetables	
	N=139		N=139	
	n	%	n	%
Never	8	5.8	3	2.2
Once a week	9	6.5	4	2.9
Twice a week	8	5.7	7	5.0
Thrice a week	9	6.5	16	11.5
Four times a week	6	4.3	16	11.5
Five times a week	3	2.2	3	2.2
Six times a week	1	0.7	2	1.4
Seven times a week	94	67.6	88	63.3
Seldom	1	0.7	-	-
Total	139	100	139	100

The consumption of milk and milk products was moderate, 67.6 % of mothers consumed it seven times a week and 5.8 % never took it. Majority of the mothers 63.3% consumed green leafy vegetables seven times in a week and 11.5% four times a week.

Despite the mothers' knowledge of a balanced diet, the consumption of foods rich in calcium was moderate. Milk is expensive and mothers may not afford to drink it alone as a beverage but make tea which can be shared by the whole family. A developing baby needs calcium to build strong bones and teeth, develop a healthy heart, nerves, muscles as well as develop a normal heart rhythm and blood-clotting abilities. Calcium is also essential for strong bones for the

mother and it also reduces risk of hypertension and pre-eclampsia in mothers. If a mother doesn't get enough calcium in her diet when pregnant, the baby will draw it from her bones, which will impair her own health afterwards (Murray, 2018).

4.5.8 Consumption Frequency of Zinc Rich Foods by Mothers

The zinc rich foods are considered to be meat, poultry and whole fish. The consumption frequency of the mothers was determined. These results are represented in Table 17.

Table 17: Consumption Frequency of Zinc Rich Foods by Mothers

Consumption Frequency	Meat		Poultry		Whole Fish	
	N=139		N=139		N=139	
	n	%	n	%	n	%
Never	17	12.2	23	16.5	41	29.5
Once a week	26	18.7	49	35.3	37	26.6
Twice a week	39	28.1	18	12.9	20	14.4
Thrice a week	23	16.5	5	3.7	12	8.7
Four times a week	17	12.2	2	1.4	1	0.7
Five times a week	2	1.4	-	-	-	-
Six times a week	-	-	-	-	1	0.7
Seven times a week	7	5.0	-	-	1	0.7
Seldom	8	5.9	42	30.2	26	18.7
Total	139	100	139	100	139	100

Meat was consumed by 63.3% of mothers at least once a week and 12.2% of mothers never consumed meat. Poultry was consumed by 51.8% of mothers at least once a week and 16.5% mothers never consumed it. Fish was never consumed by 29.5% of mothers and 49.6% consumed it at least once a week.

Depending on the level of knowledge of mothers, zinc sources consumption was moderate. These foods are expensive and also some mothers associate fish to having mercury and in some communities it is a taboo for pregnant mothers to consume fish. Zinc helps organize developing tissues properly and helps the baby gain a healthy amount of weight before birth.

4.6 ASSOCIATION BETWEEN SOCIO-DEMOGRAPHIC CHARACTERISTICS AND KNOWLEDGE OF FIRST TIME MOTHERS

4.6.1 Mother’s Age and Nutritional Knowledge

4.6.1.1 Mother’s age and knowledge of balanced diet, carbohydrate and protein rich foods

These results are shown in Table 18.

Table 18: Distribution of Mothers by Knowledge of Balanced Diet, Energy and Protein Rich Foods by Age

Mean Value of Knowledge			
Age (Years)	Balanced Diet	Carbohydrate Foods	Protein Foods
15-25	3.55a	2.28a	3.05a
26-35	3.92a	2.21a	3.29a
36-49	7.33b	3.00a	3.33a
P value	0.044	0.281	0.495

Means in the same column with the same letter are not significantly different.

For balanced diet, there was a significant difference between knowledge mean scores of mothers of age range 36-49 years as compared to those of age range 15-25 years and 26-35 years as shown by the anova value of **p=0.044**. This means mothers of higher age category were more knowledgeable than the mothers of lower age categories. For knowledge mean scores of carbohydrate and protein foods, there was no significant difference among the three age categories as shown by p values of **p=0.281** and **p=0.495** respectively. Therefore the age of the mother did not determine the knowledge of energy and protein foods.

4.6.1.2 Mother's age and knowledge of vitamin C, vitamin D, vitamin B12, iron, calcium and zinc rich foods.

These results are shown in Table 19.

Table 19: Distribution of Mothers by Knowledge of Vitamin C, Vitamin D, Vitamin B12, Iron, Calcium and Zinc Rich Foods by Age.

Mean Value of Knowledge						
Age (Years)	Vitamin C Foods	Vitamin D Foods	Vitamin B12 Foods	Iron Foods	Calcium Foods	Zinc Foods
15-25	0.77a	0.55a	0.42a	1.50a	0.83a	0.39a
26-35	0.85a	0.48a	0.40a	1.53a	0.99a	0.29a
36-49	1.50b	0.33a	0.17a	2.00a	0.83a	0.50a
P value	0.090	0.752	0.583	0.542	0.321	0.595

Means in the same column with the same letter are not significantly different.

There was no significant difference in mean knowledge of vitamin C, vitamin D, vitamin B12, iron, calcium and zinc foods among the age categories of mothers. However, in post hoc analysis

the mean for vitamin C, iron and zinc in the category of 36-49 years was higher although not significant.

4.6.2. Marital Status and Nutritional Knowledge

4.6.2.1 Marital status and knowledge of balanced diet, carbohydrate and protein rich foods by mothers

There was no significant difference between the mean scores of the two marital status considered on the knowledge of balanced diet, carbohydrate and protein rich foods as shown by the p value of **p=0.053**, **p=0.831** and **p=0.820** respectively.

4.6.2.2 Marital status and knowledge of vitamin C, vitamin D vitamin B12, iron, calcium and zinc rich foods.

These results are shown on Table 20.

Table 20: Distribution of Mothers by Knowledge of Vitamin C, Vitamin D, Vitamin B12, Iron, Calcium and Zinc Rich Foods by Marital Status.

Mean Value of Knowledge						
Marital Status	Vitamin C Foods	Vitamin D Foods	Vitamin B12 Foods	Iron Foods	Calcium Foods	Zinc Foods
Married	0.80	0.46	0.42	1.56	0.94	0.32
Single	0.97	0.66	0.31	1.47	0.81	0.34
P value	0.297	0.205	0.340	0.666	0.275	0.817

Means in the same column with the same letter are not significantly different.

There was no significant difference between the knowledge mean scores of the two groups on vitamin C, vitamin D, vitamin B12, iron, and calcium and zinc rich foods. Thus, marital status did not determine knowledge of all these nutrients.

4.6.3 Level of Education and Nutritional Knowledge

4.6.3.1 Level of education and knowledge of balanced diet ,carbohydrate and protein rich foods

These results are shown on Table 21.

Table 21: Distribution of Mothers by Knowledge of Balanced Diet, Carbohydrate and Protein Rich foods by Level of Education

Mean Value of Knowledge			
Level of Education	Balanced Diet	Carbohydrate Foods	Protein Foods
Primary	1.75a	1.88a	2.25a
Secondary	2.65ab	1.70a	2.95b
College	4.72b	2.59b	3.39b
P Value	0.001	0.001	0.003

Means in the same column with the same letter are not significantly different.

Results showed that there was significant difference between the knowledge mean scores of balanced diet of mothers with college education as compared to mean scores of mothers with primary education as shown by the anova values of: **p=0.001**. Thus, the level of education determined the knowledge of balanced diet. These findings agree with a study done in western

Kenya which reported that maternal education level was positively associated with health and nutrition knowledge, health attitudes, and dietary diversity (Perumal et al., 2013).

With regards to carbohydrate foods, the knowledge mean scores for primary school educated mothers were not significantly different from the secondary educated mothers. However, the knowledge mean score for college educated mothers was significantly different from both means of primary educated and secondary educated mothers as shown by the anova values of **p=0.001**.

The results showed that for protein foods, there was no significant difference between the mean scores of mothers with secondary education and mothers with college education but there was a significant difference between the means of mothers with college and secondary education and the means of mothers with primary education as shown by the anova values of **p= 0.003**. This means mothers with higher education were more knowledgeable than mothers with primary education.

4.6.3.2 Level of education and knowledge of vitamin C, vitamin D, vitamin B12, iron, calcium and zinc rich foods.

These results are shown on Table 22.

Table 22: Distribution of Mothers by Knowledge of Vitamin C, Vitamin D, Vitamin B12, Iron, Calcium and Zinc Rich foods by Level of Education.

Mean Value of Knowledge						
Level of Education	Vitamin C Foods	Vitamin D Foods	Vitamin B12 Foods	Iron Foods	Calcium Foods	Zinc Foods
Primary	0.25a	0.00a	0.13a	0.75a	0.75ab	0.00a
Secondary	0.60ab	0.49b	0.28a	1.14a	0.65a	0.23a
College	1.01b	0.56b	0.48a	1.81b	1.05b	0.40b
P value	0.001	0.149	0.060	0.001	0.001	0.064

Means in the same column with the same letter are not significantly different.

On vitamin C, there was significant difference between the knowledge mean scores of college educated and primary educated mothers as shown by p value of **p=0.001**. This means college educated mothers had more knowledge than primary educated mothers.

For Vitamin D, there was no significant difference in the mean scores of knowledge between the levels of education as shown by the anova value **p=0.149**. However, for iron and calcium rich foods there was significant difference between the knowledge mean scores of college educated mothers and primary educated mothers as determined by the anova values of **p=0.001** and **p=0.001** respectively. Thus, the college educated mothers had more knowledge than secondary and primary educated mothers.

On vitamin B12 and zinc, there was no significant difference between the knowledge means of primary and secondary educated but the college educated mothers had higher mean scores, meaning college educated mothers had more knowledge on foods rich in these nutrients as shown by p value of **p=0.060 and p=0.064**.

A study done by Masuku and Lan (2014) concluded that educational level was recognized as a common predictor of nutritional knowledge, attitude, and practices.

4.6.4 Gestational Age of Pregnancy and Nutritional Knowledge

There was no significant difference of knowledge mean scores among the different categories of gestational age of mothers. So the age of pregnancy (gestation age of mother) did not determine nutritional knowledge of mothers.

4.6.5 Income of Mothers and Nutritional Knowledge

There was no significant difference in knowledge mean scores among the categories of income of mothers considered. However, mothers of middle and higher socio-economic status had significantly higher knowledge scores than those of lower socio-economic status.

4.6.6 Occupation of Mothers and Nutritional Knowledge

4.6.6.1 Occupation of mothers and knowledge of balanced diet, carbohydrate and protein rich foods

There was no significant difference on knowledge mean scores of balanced diet, carbohydrate and protein foods among the different occupations as shown by the P value of **p=0.179**,

p=0.751 and p=0.075 respectively. Therefore, the different occupations did not determine the knowledge of balanced diet, carbohydrate and protein foods.

4.6.6.2 Occupation of mothers and knowledge of vitamin C, vitamin D, vitamin B12, iron, calcium and zinc rich foods

These results are shown on Table 23.

Table 23: Distribution of Mothers by Knowledge of Vitamin C, Vitamin D, Vitamin B12, Iron, Calcium and Zinc Rich Foods by Occupation.

Mean Value of Knowledge						
Occupation	Vitamin C Foods	Vitamin D Foods	Vitam in B12 Foods	Iron Foods	Calcium Foods	Zinc Foods
Not employed	0.68a	0.47a	0.32a	1.49a	0.85ab	0.17ab
Part time employment	1.00a	0.71a	0.29a	1.00a	0.57a	0.00a
Formal employment	0.93a	0.52a	0.50a	0.70a	1.02b	0.48b
Self-employment	0.94a	0.48a	0.39a	1.52a	0.94ab	0.42b
P value	0.294	0.887	0.424	0.396	0.212	0.010

Means in the same column with the same letter were not significantly different.

There was no significant difference on knowledge mean scores of vitamin C, vitamin D, vitamin B12, iron and calcium among the different occupations as shown by the P values of **p=0.294, p=0.887, p=0.424, p=0.396, and p=0.212 respectively.** Therefore, the different occupations did not determine the knowledge of vitamin C, vitamin D, vitamin B12, iron and calcium rich foods.

However, there was significant difference on knowledge mean scores of zinc between mothers with formal employment and mothers on self-employment as shown by p value of **p=0.01.**

This was so probably because mothers on formal employment have a regular salary and those on self-employment have small businesses which gives some income which enables them to access more nutrition information.

The findings of the study are similar to those from a recent study done by (Tenaw et al., 2018) on first time pregnant women attending public hospitals in Addis Ababa, whereby 27% had nutritional knowledge and 48.4% had good practices of nutrition during pregnancy. These findings highlight the current knowledge gap on nutrition that exists among first time antenatal mothers. Nutritional education ought to be intensified to enlighten the mothers on the optimum nutrition during pregnancy and improve the knowledge levels of first time antenatal mothers as well as their practices.

CHAPTER FIVE: CONCLUSIONS AND RECOMMENDATIONS

5.1 CONCLUSIONS

The study has shown that majority of the first time antenatal mothers are aged between 26-35 years, married, have acquired college education and most of them are in the third trimester. Majority of them are housewives followed by those on salaried employment. Majority come from low socio-economic status followed by those from middle socio- economic status.

The first time antenatal mothers have poor knowledge of maternal nutrition which depends mainly on age, occupation and level of education. Older mothers, salaried mothers and those educated to college level have the highest knowledge mean scores in the categories of age, occupation and education respectively. Finally, mothers of middle and higher socio-economic status have higher knowledge mean scores than those of lower socio-economic status.

The consumption of foods providing different nutrients is moderate, thus the practice of antenatal nutritional knowledge as determined by food frequency consumption is moderate probably indicating that the meals for first time antenatal mothers are fairly well nutritionally balanced.

These findings highlight the disconnect between the low level of knowledge of first time antenatal mothers and the moderate nutritional practice indicating that the practice does not depend on the knowledge. Nutritional education ought to be intensified to the first time antenatal mothers by isolating them as a group during antenatal clinic visits, and educate them comprehensively. This will eventually improve the knowledge levels of first time antenatal mothers.

5.2 RECOMMENDATIONS

The first time antenatal mothers should be provided with antenatal maternal nutrition educational materials with nutritional information on appropriate dietary practices for mothers throughout pregnancy and during lactation such as brochures or leaflets, which will reinforce messages about healthy eating.

The MOH should formulate policies, nutritional programmes and educational guidelines which will be beneficial in improving first time mothers' knowledge regarding different aspects of antenatal period that could have a positive impact on the health and nutrition of both the mother and the child.

Further research is required to assess the nutritional status of first time antenatal mothers so as to generate data that is enlightening and valuable in developing appropriate interventions to address gaps that may exist.

The first time antenatal mothers should be isolated as a group and offered nutrition education and training on the optimal antenatal maternal nutrition during their clinic visits.

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APPENDICES

APPENDIX I: CONSENT FORM FOR MOTHERS

STUDY PARTICIPATION CONSENT FORM FOR MOTHERS ON KNOWLEDGE AND PRACTICES OF ANTENATAL MATERNAL NUTRITION BY FIRST TIME MOTHERS (PRIMIGRAVIDAE): A CASE OF KENYATTA NATIONAL HOSPITAL, NAIROBI

Form No. _____

Name of Interviewer _____

Date of Interview _____

Principal Investigator: Kamanja Jane Kananu

Introduction

Ms Kamanja Jane Kananu, a Master in Applied Human Nutrition student from the University of Nairobi is conducting a survey among antenatal mothers attending the Obstetrics and Gynaecology clinic of KNH. You have been selected as one of the mothers to participate in this study. This consent form is to give you information which will help you decide whether to participate in this study or not. Please read it carefully or listen as I read it for you. You may ask questions on areas that are not clear to you on the purpose of the study, procedures, risks, benefits, compensation and your rights as a volunteer.

Purpose

The purpose of the study is to provide information showing the current level of knowledge and practices of antenatal maternal nutrition among first time mothers to the policy makers and other stakeholders. This will contribute in promoting optimal antenatal maternal nutritional knowledge

and feeding practices, and also in planning and implementing health programmes on antenatal maternal nutrition.

Procedure

Once you agree to participate in the study you will be asked questions about yourself and about nutritional knowledge and practices. The interview will take approximately 20-30 minutes and the answers to the questions will be recorded for study purposes.

Confidentiality

Confidentiality will be maintained throughout. All the filled questionnaires will be stored in a lockable filing cabinet only accessible to the principle investigator and research assistant. There will be a password protected database for the electronic stored data which will be accessible only through the principle investigator. Only study numbers will be used for analysis and report writing, therefore no details will be provided at any point that might identify a mother. There shall be no mention of names or identifiers in the report or publications which may arise from the study. The information obtained will be used only for the purpose of the study.

Risks/ Discomfort

This study has no risks. However, you will be asked questions which may cause psychological discomfort, if you feel uncomfortable then you may decline to answer the questions. The questions will be asked in a private environment for confidentiality.

Benefits

The information obtained may be used to improve the level of nutritional knowledge and practices for first time antenatal mothers and consequently improving their nutritional status. A copy of the report will be submitted to this health facility to be used for planning nutritional guidelines and strategies for interventions to address the study findings.

Compensation

There will be no compensation for participation in the study in form of money or any other gift however the information you give will be highly appreciated.

Rights as a Volunteer

Participation in the study is voluntary and will be highly appreciated. If you choose not to participate, you will not be denied any service. You will be free to withdraw from the study at any time.

For any questions/ clarification, contact the principle investigator on:

P.O. BOX, 5134-00200 Nairobi, Kenya

Telephone number: 0721 404980

Email address: janekananu@yahoo.com

You can also contact my supervisor:

Prof. Jasper K. Imungi

P.O BOX 29053 – 00625, Kangemi, Nairobi – Kenya

Phone: 0721-468181

Email address: jasper.imungi@uonbi.ac.ke

As well as the Chairman KNH/UON-ERC through:

P.O.BOX 19676-00202 Nairobi, Kenya

Phone :(020) 2726300 Ext 44355

Email address: uonknh_erc@uonbi.ac.ke

PARTICIPANT’S STATEMENT

I Mrs/Ms/Miss..... being a person aged 18 years and over, having read/ been explained to the above and in the knowledge that it is voluntary, acknowledge that a thorough explanation of the nature of the study has been given to me. I hereby give consent to participate in this study. I understand that I have the right to withdraw from the research at any time, for any reason, without penalty or harm or denial of health services.

Participant’s signature

.....

Date...../...../2016

Researcher/Assistant’s signature

.....

Date...../...../2016

APPENDIX II: QUESTIONNAIRE FOR MOTHERS**STUDY TITLE: KNOWLEDGE AND PRACTICES OF ANTENATAL MATERNAL NUTRITION BY FIRST TIME MOTHERS (PRIMIGRAVIDAE): A CASE OF KENYATTA NATIONAL HOSPITAL, NAIROBI***Questionnaire no* _____*Name of Interviewer* _____*Date of Interview* _____***Instructions***

Tick the most appropriate answers applicable to you by the use of options corresponding to your choice where necessary or by writing on the spaces provided.

SECTION A: SOCIO-DEMOGRAPHIC INFORMATION

Q1. Age: 1=15-25 [] 2=26-35 [] 3=36-45 [] 4=46-49 []

Q2. Mother's marital status: 1= Married [] 2=Single [] 3=Widowed []

4=Separated 5=Divorced

Q3. Please indicate your highest level of education (*One option only*)

1=Primary School [] 2= Secondary School [] 3.College/University []

4= others (specify) []

Q4. How many weeks old is your pregnancy?

1= Below 6 weeks [] 2= 6 – 12 weeks [] 3=13 –24 weeks []

4=25 – 40 weeks

KNOWLEDGE AND PRACTICES OF ANTENATAL MATERNAL NUTRITION BY FIRST TIME MOTHERS

SECTION B: SOCIO-ECONOMIC CHARACTERISTICS

Q5. Please indicate your occupation (*One option only*)

1=Not employed (No work at all) []

2=Not employed /part time employment (Casual labour at times) []

3=Formal employment (with monthly pay) []

4=Self-employment []

5=Others (Specify) _____ []

Q6. What is your individual/family income per month?

1=Low income [] 2= Middle income [] 3= High income []

SECTION C: KNOWLEDGE ON ANTENATAL MATERNAL NUTRITION

Q7. Do you know what a balanced diet for an antenatal mother is? 1= Yes [] 2=No []

Q8. If Yes to question 7, which of the foods indicated are the components of a balanced diet for an antenatal mother? (*Indicate with a tick in the box*)

1=Energy foods [] 2= Proteins [] 3= Vitamin A [] 4= Vitamin C

5= Vitamin D [] 6= Vitamin B₁₂[] 7= Folate [] 8= Iron []

9= Calcium [] 10= Zinc []

Q9. Among the foods below, which ones do you consider are rich in energy for both the mother and the baby?

1=Cereals [] 2=Root crops e.g. potatoes [] 3= Fats and oils [] 4= Fruits []
5= Vegetables []

KNOWLEDGE AND PRACTICES OF ANTENATAL MATERNAL NUTRITION BY FIRST TIME MOTHERS

Q10. Indicate which of the following foods are rich in proteins for both the mother and the baby?

1=Meat [] 2= Milk and milk products [] 3= Eggs [] 4= Cereals and cereal products []
5= Legumes e.g. beans, pulses [] 6= Root crops e.g. cassava, sweet potatoes []
7= Fruits []

Q11. Indicate which of the following foods are rich in Vitamin A for both the mother and the baby?

1=fruits [] 2= leafy vegetables [] 3= liver [] 4=eggs [] 5=oils and fats []
6= legumes e.g. beans, peas []

Q12. Indicate which of the following foods are rich in Vitamin C for both the mother and the baby?

1=Fruits [] 2= Vegetables [] 3= Meat [] 4= Cereals []

Q13. Indicate which of the following foods are rich in Vitamin D for both the mother and the baby?

1=Eggs [] 2= Milk and milk products [] 3= Fortified cereals []
4= Cod liver oil [] 5= margarine [] 6= leafy vegetables []
7= root crops e.g. Sweet potatoes, cassava []

Q14. Indicate which of the following foods are rich in Vitamin B₁₂ for both the mother and the baby?

1=Animal foods (meat, milk, eggs) [] 2= Fermented foods []

3= Vegetables []

Q15. Indicate which of the following foods are rich in folic acid-vitamin (see IFAS) for both the mother and the baby?

1=Green leafy vegetables [] 2= Legumes [] 3= Nuts [] 4= Liver []

5=Cereals []

KNOWLEDGE AND PRACTICES OF ANTENATAL MATERNAL NUTRITION BY FIRST TIME MOTHERS

Q16. Indicate which of the following foods are rich in iron for both the mother and the baby?

1=Green leafy vegetables [] 2= Liver [] 3= Meat [] 4= Fish []

6= Beans and legumes []

Q17. Indicate which of the following foods are rich in calcium for both the mother and the baby?

1=Milk and milk products [] 2= Green leafy vegetables [] 3= Fruits []

4= Beans and legumes []

Q18. Indicate which of the following foods are rich in zinc for both the mother and the baby?

1=Meat [] 2= Poultry [] 3= Whole fish [] 4= Root crops []

5= Beans and peas []

KNOWLEDGE AND PRACTICES OF ANTENATAL MATERNAL NUTRITION BY FIRST TIME MOTHERS

SECTION D: FOOD FREQUENCY

Q19. For each food item, indicate with a checkmark (x) the category that best describes the frequency with which you usually eat that particular food item.

FOOD ITEM	1=Once per week	2=Twice Per week	3=Thrice per week	4=Four times per week	5=Five times per week	6=Six times per week	7=Seven times per week	8=seldom	0=Never
Energy foods									
Cereals									
Root crops									
Fats and oils (margarine and cooking oil)									
Protein foods									
Meat									
Milk and milk products									
Eggs									
Cereals and cereal products									
Legumes e.g. beans, peas									
Foods giving vitamins									
Vitamin A									
Fruits									
vegetables									

Liver									
Eggs									
Fats and oils									
Vitamin C									
Fruits									
vegetables									
Vitamin D									
Eggs									
Milk and milk products									
Fortified cereals									
Cod liver oil									
margarine									
Vitamin B₁₂									
Animal foods (e.g. meat, milk)									
Fermented foods									
Folic acid-vitamin (see IFAS)									
Green leafy vegetables									
Legumes									
Nuts									
Liver									
Iron									

Green leafy vegetables									
Liver									
Meat									
Fish									
Calcium									
Milk and milk products									
Green leafy vegetables									
Zinc									
Meat									
Poultry									
Whole fish									

KNOWLEDGE AND PRACTICES OF ANTENATAL MATERNAL NUTRITION BY FIRST TIME MOTHERS

Q20. How many meals do you eat per day? 1= One [] 2= two [] 3= three []

Q21. Do you eat anything between meals? 1=Yes [] 2=No []

Q22. If yes in **21**, what do you eat? 1= Tea and Bread [] 2= Tea and Mandazi []

3= Porridge [] 4= Tea and Arrow root [] 5= Tea and Sweet potato 6= Fruits

7=Plain Tea 8= Others (Indicate) _____

Q23. Are there any foods that you are avoiding due to personal preferences or due to taboo?

1=Yes [] 2= No []

Q24. If yes in **Q. 23**, which foods are these? 1= Meat [] 2=Eggs [] 3=Fish []

4= Fruits [] 5=Vegetables [] 6=Milk [] 7=others (indicate)

Q25. Do you have any food cravings? 1=Yes [] 2=No []

Q26. If yes in **Q. 25**, which foods do you crave? _____

Q27. Do you have cravings for none food items? 1= Yes [] 2= No []

Q28. If yes in **Q. 27** which ones? _____

APPENDIX III: CONSENT FORM FOR NUTRITIONIST

STUDY PARTICIPATION CONSENT FORM FOR THE NUTRITIONIST ON KNOWLEDGE AND PRACTICES OF ANTENATAL MATERNAL NUTRITION BY FIRST TIME MOTHERS (PRIMIGRAVIDAE): A CASE OF KENYATTA NATIONAL HOSPITAL, NAIROBI

Form No. _____

Name of Interviewer _____

Date of Interview _____

Principal Investigator: Kamanja Jane Kananu

Introduction

Ms Kamanja Jane Kananu, a Master in Applied Human Nutrition student from the University of Nairobi is conducting a survey among antenatal mothers attending the Obstetrics and Gynaecology clinic of KNH. You have been selected as the nutritionist working in the clinic to participate in this study. This consent form is to give you information which will help you decide whether to participate in this study or not. Please read it carefully. You may ask questions on areas that are not clear to you on the purpose of the study, procedures, risks, benefits, compensation and your rights as a volunteer.

Purpose

The purpose of the study is to provide information showing the current level of knowledge and practices of antenatal maternal nutrition among first time mothers to the policy makers and other stakeholders. This will contribute in promoting optimal antenatal maternal nutritional knowledge

and feeding practices, and also in planning and implementing health programmes on antenatal maternal nutrition.

Procedure

Once you agree to participate in the study you will be asked questions about nutritional knowledge and practices of first time antenatal mothers attending the clinic. The interview will take approximately 15 minutes and the answers to the questions will be recorded for study purposes.

Confidentiality

Confidentiality will be maintained throughout. The filled interview guide will be stored in a lockable filing cabinet only accessible to the principle investigator and research assistant. There will be a password protected database for the electronic stored data which will be accessible only through the principle investigator. Only study numbers will be used for analysis and report writing, therefore no details will be provided at any point that might identify the nutritionist. There shall be no mention of names or identifiers in the report or publications which may arise from the study. The information obtained will be used only for the purpose of the study.

Risks/ Discomfort

This study has no risks. However, you will be asked questions which may cause psychological discomfort, if you feel uncomfortable then you may decline to answer the questions. The questions will be asked in a private environment for confidentiality.

Benefits

The information obtained may be used to improve the level of nutritional knowledge and practices for first time antenatal mothers and consequently improving their nutritional status. A

copy of the report will be submitted to this health facility to be used for planning nutritional guidelines and strategies for interventions to address the study findings.

Compensation

There will be no compensation for participation in the study in form of money or any other gift however the information you give will be highly appreciated.

Rights as a Volunteer

Participation in the study is voluntary and will be highly appreciated. If you choose not to participate, you will not be denied any service. You will be free to withdraw from the study at any time.

For any questions/ clarification, contact the principle investigator on:

P.O. BOX, 5134-00200 Nairobi, Kenya

Telephone number: 0721 404980

Email address: janekananu@yahoo.com

You can also contact my supervisor:

Prof. Jasper K. Imungi

P.O BOX 29053 – 00625, Kangemi, Nairobi – Kenya

Phone: 0721-468181

Email address: jasper.imungi@uonbi.ac.ke

As well as the Chairman KNH/UON-ERC through:

P.O.BOX 19676-00202 Nairobi, Kenya

Phone :(020) 2726300 Ext 44355

Email address: uonknh_erc@uonbi.ac.ke

NUTRITIONIST’S STATEMENT

I Mrs/Ms/Miss..... being a person aged 18 years and over, having read/ been explained to the above and in the knowledge that it is voluntary, acknowledge that a thorough explanation of the nature of the study has been given to me. I hereby give consent to participate in this study. I understand that I have the right to withdraw from the research at any time, for any reason, without penalty or harm or denial of health services.

Nutritionist’s signature

.....

Date...../...../2016

Researcher/Assistant’s signature

.....

Date...../...../2016

APPENDIX IV: KEY INFORMANT INTERVIEW GUIDE FOR NUTRITIONIST

STUDY TITLE: KNOWLEGDE AND PRACTICES OF ANTENATAL MATERNAL NUTRITION BY FIRST TIME MOTHERS (PRIMIGRAVIDAE): A CASE OF KENYATTA NATIONAL HOSPITAL, NAIROBI

Interview guide no _____

Name of Interviewer _____

Date of Interview _____

Instructions

Tick the most appropriate answers by the use of options corresponding to the choice where necessary or by writing on the spaces provided.

1. How long have you worked in Obstetrics and Gynaecology clinic?

2. What guidelines do you follow when giving information on antenatal maternal nutrition ?

3. a) Do all the first time mothers follow the advice given to them on appropriate diet during pregnancy? Yes [] No []

b) If **No in Q.3 (a)**, what are the reasons?

4. a) What foods do the first time antenatal mothers prefer to eat?

b) what reasons do mothers give for preferring the foods in **4(a)** above?

5. What are some of the nutritional challenges faced by first time antenatal mothers in terms of eating a balanced diet?

6. How do you help the antenatal mothers deal with the nutritional challenges?

7. Any other comment relating to antenatal maternal nutrition?

Thank you for participating

APPENDIX V: TRAINING MODULE FOR RESEARCH ASSISTANT

DAY 1			
TIME	OBJECTIVE	LEARNING ACTIVITY	LEARNING RESOURCES
8.00-10.30 am	<p><i>To give brief explanation on the overall objective of the study.</i></p> <ul style="list-style-type: none"> • General objective • Specific objective 	<ul style="list-style-type: none"> • Lecture • discussion 	<ul style="list-style-type: none"> • Flip chart • Marker pens • Notebooks • Pens • Note book
10.30-11.00 am	Break		
11.00 - 1.00 pm	<p><i>Familiarity of survey protocol by enumerator</i></p> <ul style="list-style-type: none"> • Distribution of protocol <p><i>Explaining data collection procedures</i></p> <ul style="list-style-type: none"> • Filing questionnaires and key informant guide 	<ul style="list-style-type: none"> • Lecture • Demonstration • Brainstorming • discussion 	<ul style="list-style-type: none"> • Sample questionnaire • Survey protocol • Note books
1.00- 2.00 pm	Break		
2.00 – 3.00 pm	<p><i>To equip enumerators with interview technique and persuasive skills</i></p>	<ul style="list-style-type: none"> • Demonstration • Role play 	<ul style="list-style-type: none"> • Flip chart • Marker pens • Note book
3.00 – 4.00 pm	<ul style="list-style-type: none"> • <i>To discuss practical constraints during implementation of the study</i> 	<ul style="list-style-type: none"> • Discussion 	<ul style="list-style-type: none"> • Flip chart • Marker pen • Note book
4.00- 5.00 pm	<p><i>Ethics of Research and conduct;</i></p>	<ul style="list-style-type: none"> • Lecture • Discussion 	<ul style="list-style-type: none"> • Flip chart • Marker pen

	<ul style="list-style-type: none"> • Professional conduct in the field • Confidentiality • Working hours • Allowances • Q & A 		<ul style="list-style-type: none"> • Note book
DAY 2			
8.00 - 8.30 am	<i>Recap of previous day</i>	Discussion	<ul style="list-style-type: none"> • Notebooks • Pens
8.30 -11.30 am	<i>Pretesting questionnaires</i>		<ul style="list-style-type: none"> • Questionnaires • Notebooks • Pens • Pencils • erasers
11.30-11.45 am	Break		
11.45-1.00 pm	<i>Revise questionnaire based on results of pretest.</i>	<ul style="list-style-type: none"> • Discussion • Demonstration 	<ul style="list-style-type: none"> • Questionnaires • Flip chart • Marker pens • Notebooks • Pens
1.00-2.00 pm	Lunch break		
2.00 – 3.30 pm	<i>Conclusions and Closing of training.</i> <ul style="list-style-type: none"> • Clearing up 	2.00 – 3.30 pm	<i>Conclusions and Closing of training.</i> <ul style="list-style-type: none"> • Clearing up

APPENDIX V1: NUTRITION RECOMMENDATIONS IN PREGNANCY AND LACTATION

Recommended daily dietary allowances for pregnant and lactating women (Adapted from: Otten et al., 2006)

Nutrient	Non-Pregnant	Pregnant*	Lactation*
Vitamin A (µg/d)	700	770	1300
Vitamin D (µg/d)	5	15	15
Vitamin E (mg/d)	15	15	19
Vitamin K (µg/d)	90	90	90
Folate (µg/d)	400	600	500
Niacin (mg/d)	14	18	17
Riboflavin (mg/d)	1.1	1.4	1.6
Thiamin (mg/d)	1.1	1.4	1.4
Vitamin B ₆ (mg/d)	1.3	1.9	2
Vitamin B ₁₂ (µg/d)	2.4	2.6	2.8
Vitamin C (mg/d)	75	85	120
Calcium (mg/d)	1,000	1,000	1,000
Iron (mg/d)	18	27	9
Phosphorus (mg/d)	700	700	700
Selenium (µg/d)	55	60	70
Zinc (mg/d)	8	11	12


*Applies to women >18 years old

Data from Otten JJ, Pitz Hellwig J, Meyers LD, Editors. Dietary reference intakes. The essential guide to nutrient requirements. Washington, DC: National Academies Press; 2006.

APPENDIX VII: SIMILARITY INDEX REPORT

10/29/2018

Turnitin Originality Report

 Turnitin Originality Report

KNOWLEDGE AND PRACTICES OF ANTENATAL MATERNAL NUTRITION BY FIRST TIME MOTHERS: A CASE OF KENYATTA NATIONAL HOSPITAL, NAIROBI by Jane Kananu Kamanja

From project (FOOD SAFETY)

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4

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[Submitted to Mahidol University on 2009-05-25](#)

5

1% match (Internet from 06-Aug-2015)

http://www.who.int/elena/titles/bbc/nutrition_counselling_pregnancy/en/

6

1% match (Internet from 07-Dec-2017)

<http://researchbank.acu.edu.au/cgi/viewcontent.cgi?article=1652&context=theses>

7

1% match (Internet from 24-Jun-2016)

<http://www.fitpregnancy.com/nutrition/prenatal-nutrition/eat-energy>

8

1% match (publications)

["20th International Congress of Nutrition, Granada, Spain, September 15-20, 2013". Annals of Nutrition and Metabolism, 2013](#)

9

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[Submitted to Kenyatta University on 2017-07-14](#)

10

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<http://ccsenet.org/journal/index.php/gjhs/article/download/15706/11310>

11

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[Submitted to Oklahoma State University on 2012-10-10](#)

12

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<http://dc.uwm.edu/cgi/viewcontent.cgi?article=1212&context=etd>

13

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[Submitted to Higher Education Commission Pakistan on 2018-01-11](#)

14

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[Submitted to University of Kufa on 2017-08-17](#)

15

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<http://www.ijssrp.org/print-journal/ijssrp-jan-2016-print.pdf>

paper text:

https://www.turnitin.com/newreport_printview.asp?eq=1&eb=1&esm=65&oid=1028831458&sid=0&n=0&m=0&svr=336&r=38.916371774720645&lang... 1/20

APPENDIX VIII: LETTERS OF ETHICAL CLEARANCE AND STUDY APPROVALS



UNIVERSITY OF NAIROBI
COLLEGE OF HEALTH SCIENCES
P O BOX 19676 Code 00202
Telegrams: varsity
Tel: (254-020) 2726300 Ext 44355



KNH-UoN ERC
Email: uonknh_erc@uonbi.ac.ke
Website: <http://www.erc.uonbi.ac.ke>
Facebook: <https://www.facebook.com/uonknh.erc>
Twitter: @UONKNH_ERC https://twitter.com/UONKNH_ERC



KENYATTA NATIONAL HOSPITAL
P O BOX 20723 Code 00202
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Telegrams: MEDSUP, Nairobi

Ref: KNH-ERC/A/61

17th February, 2016

Jane Kananu Kamanja
Reg. No. A56/76211/2014
Dept. of Food Science, Nutrition and Technology
Faculty of Agriculture
College of Agriculture and Veterinary Sciences
University of Nairobi

Dear Jane,

Revised research proposal: Knowledge and Practices of Antenatal Maternal Nutrition by First Time Mothers (Primigravidae): A Case of Kenyatta National Hospital (P669/10/2015)

This is to inform you that the KNH- UoN Ethics & Research Committee (KNH-UoN ERC) has reviewed and **approved** your above proposal. The approval period is from 17th February 2016 – 16th February 2017.

This approval is subject to compliance with the following requirements:

- Only approved documents (informed consents, study instruments, advertising materials etc) will be used.
- All changes (amendments, deviations, violations etc) are submitted for review and approval by KNH-UoN ERC before implementation.
- Death and life threatening problems and serious adverse events (SAEs) or unexpected adverse events whether related or unrelated to the study must be reported to the KNH-UoN ERC within 72 hours of notification.
- Any changes, anticipated or otherwise that may increase the risks or affect safety or welfare of study participants and others or affect the integrity of the research must be reported to KNH- UoN ERC within 72 hours.
- Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. (*Attach a comprehensive progress report to support the renewal*).
- Clearance for export of biological specimens must be obtained from KNH- UoN ERC for each batch of shipment.
- Submission of an *executive summary* report within 90 days upon completion of the study.
This information will form part of the data base that will be consulted in future when processing related research studies so as to minimize chances of study duplication and/ or plagiarism.

For more details consult the KNH- UoN ERC website <http://www.erc.uonbi.ac.ke>

Yours sincerely,



PROF. M.L. CHINDIA
SECRETARY, KNH-UoN ERC

- c.c. The Principal, College of Health Sciences, UoN
 The Deputy Director, CS, KNH
 The Chair, KNH-UoN ERC
 The Assistant Director, Health Information, KNH
 The Chair, Dept. of Food Sciences, Nutrition and Technology, UoN
 Supervisors: Prof. Jasper K. Imungi, Dr. Mwangi A. Mboganie



KENYATTA NATIONAL HOSPITAL,
P. O. BOX 20723-00202, NAIROBI
Tel: 2726300-9/2726450/2726550

Fax: 2725272

Email: knhadmin@knh.or.ke

KNH/RH/16/Vol.1

DATE: 29th February, 2016

To

Jane Kananu Kamanja
Dept. of Food Science, Nutrition and Technology
Faculty of Agriculture
College and Veterinary Sciences
UNIVERSITY OF NAIROBI

RE: RESEARCH PROPOSAL KNOWLEDGE AND PRACTICES OF ANTENATAL
MATERNAL NUTRITION BY FIRST TIME MOTHERS (PRIMIGRAVIDAE): A
CASE OF KENYATTA NATIONAL HOSPITAL

The Department of Reproductive Health has no objection for you to carry out the above study.

Please liaise with Senior Assistant Chief Nurse Reproductive Health and in-charges of post natal wards and Clinic 18 to facilitate your study

DR. I.S.O. MARANGA
ASSISTANT DIRECTOR
REPRODUCTIVE HEALTH DEPARTMENT
KENYATTA NATIONAL HOSPITAL

CC: ✓ SACN – Reproductive Health Department
I/C Clinic 18



KENYATTA NATIONAL HOSPITAL
P.O. Box 20723-00202 Nairobi

Tel.: 2726300/2726450/2726565
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Email: knhresearch@gmail.com

KNH/R&P/FORM/01

Study Registration Certificate

- Name of the Principal Investigator/Researcher
JANE KANANI KAMANTA
- Email address: Jane.kanani@yahoo.com Tel No. 0721404980
- Contact person (if different from PI).....
- Email address: Tel No.
- Study Title
KNOWLEDGE AND PRACTICES OF ANTENATAL MATERNAL NUTRITION BY FIRST TIME MOTHERS (PRIMIGRAVIDAE): A CASE OF KENYATTA NATIONAL HOSPITAL (P669/10/2015)
- Department where the study will be conducted REPRODUCTIVE HEALTH
(Please attach copy of Abstract)
- Endorsed by Research Coordinator of the Department where the study will be conducted.

Name: Signature Date

- Endorsed by Head of Department where study will be conducted.

Name: D. Masanga ISO Signature [Signature] Date 26/2/16

- KNH UoN Ethics Research Committee approved study number P669/10/2015
(Please attach copy of ERC approval)

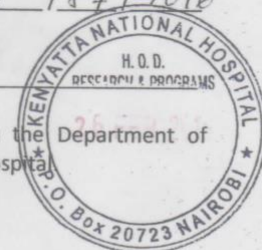
- I JANE KANANI KAMANTA commit to submit a report of my study findings to the Department where the study will be conducted and to the Department of Research and Programs.

Signature: [Signature] Date 24/02/2016

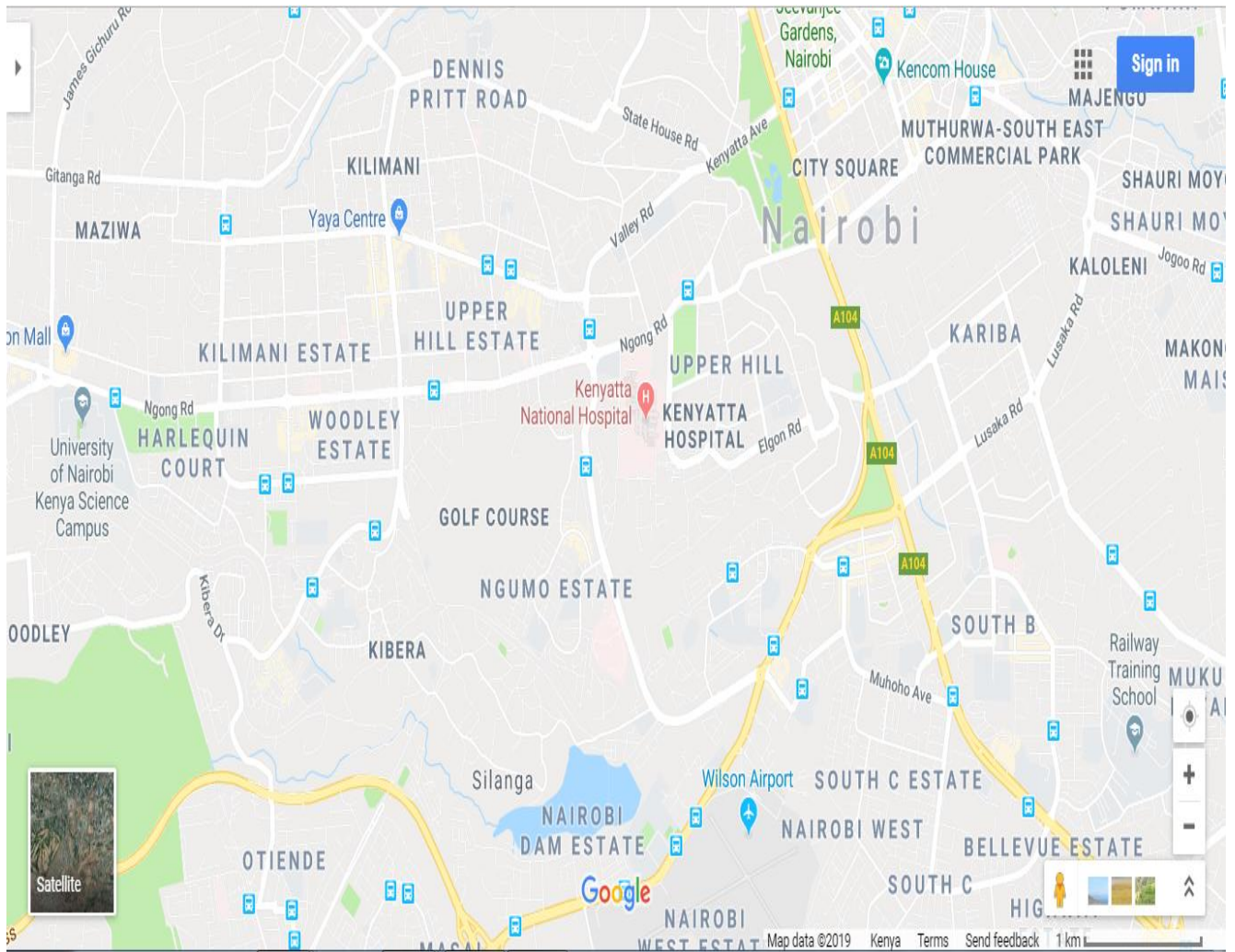
- Study Registration number (Dept/Number/Year) Reproductive Health 1871/2016
(To be completed by Research and Programs Department)

- Research and Program Stamp _____

All studies conducted at Kenyatta National Hospital **must** be registered with the Department of Research and Programs and investigators **must commit** to share results with the hospital.



APPENDIX IX: MAP OF NAIROBI SHOWING KENYATTA NATIONAL HOSPITAL



Source: Google Maps (2019)

APPENDIX X: THE KENYATTA NATIONAL HOSPITAL



Source: Google Maps (2019)