FACTORS INFLUENCING THE STATE OF MATERNAL NUTRITION IN JINJA DISTRICT, SOUTH-EASTERN UGANDA

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DEDICATION

To my late mother Mrs. Janet Nabwonso for starting a good work in me. The candle you lit is still burning. I would also like to dedicate this piece of work to my beloved family and to my brother Mr. Francis Mugomba for the inspiration and contribution towards my studies. You shouldn't be forgotten.

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Lastly to all those who encouraged, supported and prayed for me throughout my studies. Thank you so much.

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OPERATIONAL CONCEPTS AND DEFINITIONS

Maternal nutrition: refers to nutrition of a woman during her reproductive period which finally affects her health as well as that of the foetus/infant. So failure to comply makes the woman and foetus/infant vulnerable to complications.

Malnutrition: refers to nutritional disorders in all their forms (including imbalances in energy, specific macro and micronutrients, and dietary patterns. Conventionally, the emphasis is put on inadequacy, but it also refers to excess imbalanced intakes (WHO, 2013). When the intake of essential macronutrients and micronutrients fails to meet or exceeds the metabolic demands for those nutrients, malnutrition surfaces.

Feeding habits: refers to the food one eats, how and why he/she eats it (Rodigreuz et al, 2004). Proper feeding habits require the consumption of balance of vitamins, minerals, carbohydrates, proteins and fats according to Caulifield et al (2015).

Geo-economics is the study or application of the influence of geography on economics. However in this study, **geo-economic factors** refer to the influence of geographical/ environmental and economic factors on food and nutrition security.

Socio-cultural practices: refers to practices, attitudes and beliefs held by people in their society over generations (Ezeama & Ezeamar 2014). According to Alonso (2015), significant life events like pregnancy and lactation are generally characterized with numerous cultural or religious beliefs and practices regarding food and health. Some of these practices and beliefs may be beneficial or may not but interact with other factors to affect their nutrition.

Under-nutrition: Refers to a situation which occurs to an individual due to inadequate consumption, or to impaired absorption and use of nutrients. It refers to a deficit in energy intake

or deficiencies of specific nutrients like proteins, mineral and vitamins and can be either acute or chronic.

Vitamin A deficiency (VAD): Is a condition which results when there is inadequate intake of Vitamin A rich foods (WHO, 2013). During pregnancy, VAD is linked to impaired immunity, increased susceptibility to worsening iron-deficiency anemia, which is relatively common during pregnancy and VAD is known to manifest itself as night blindness.

Anemia: Is a condition in which there is insufficient red blood cells to transport oxygen in the body. When tissues don't receive enough oxygen, many organs and functions are affected. However, during pregnancy, anemia is associated with low birth weight (LBW), premature birth or maternal mortality. Typically, there are many types anemia but iron deficiency anemia and folate-deficiency anemia are the most prevalent during pregnancy.

ACRONYMS AND ABBREVIATIONS

AHSPR: Annual Health Sector Performance Report

BMI: Body Mass Index

DGLV   Dark Green Leafy Vegetable

FANTA: Food and Nutrition Technical Assistance

FAO: Food and Agricultural Organisation

IFPRI: International Food Policy Research Institute

IUGR   Intra-Uterine Growth Retardations

MUAC   Mid-Upper Arm Circumference

MoH: Ministry of Health

NCD: Non-Communicable Disease

PAHO   Pan American Health Organisation

UDHS   Uganda Demographic and Health Survey

UN: United Nations

UNAP: Uganda Nutrition Action Plan

UNICEF: United Nations Children's Fund

USAID   United States Agency for International Development

WHO: World Health Organisation

WASH   Water Sanitation and Hygiene

ABSTRACT

CONTEXT: Due to the existence of variations and complexity of determinants of maternal malnutrition across the globe (Black et al, 2013; Newcombe el al, 2015), research need not to only concentrate on magnitude of this problem but also immensely consider the factors that influence it. Since what is works in one region may not necessarily be significant in another. More so, Black et al (2008) highlighted that the nutritional status of an individual is a complex interaction of several factors while Ruel et al (2013) insinuated that scaling up of nutrition requires addressing its underlying factors. Today in Uganda, evidence shows that it is still difficult to determine region specific causes of maternal malnutrition (FANTA II, 2010). This study assessed the factors influencing the state of maternal nutrition in Jinja district in order to increase understanding of the context in which maternal malnutrition occurs and be able to guide development of intervention plans. Specifically, the study determined the proportion of pregnant and lactating mothers with good nutritional status; described their feeding habits and then assessed the geo-economic and socio-cultural factors influencing the state of maternal nutrition in Jinja district.

METHODS: A cross-sectional study using mixed methods (quantitative and qualitative) was utilized to collect data from a sample size of 124 participants. The study applied a multi-stage study design; stratified random sampling method to select 10 government health facilities out of 15 offering antennal and postnatal services in Jinja district; census method to sample participants who passed the selection criteria at every individual health facility and purposive random sampling method to choose in-charges from antenatal or postnatal clinics to respond in-depth interviews. The nutritional statuses of mothers were assessed using anthropometry (MUAC), clinical (presence of night blindness) and biochemical analysis (Hb level) obtained from the current medical records of the sampled mothers whereas their feeding habits were assessed by using both

Women's Dietary Diversity Scores (WDDS) followed by Food Frequency Questionnaires (FFQ). Interviews documenting geo-economic and socio-cultural factors influencing the state of maternal nutrition in Jinja district were also examined. Data was analyzed using SPSS windows version 20.0. Descriptive statistics were then performed into frequency tables, charts and graphs while a multivariate analysis was computed using Multiple Linear Regression Model to determine the associations between: nutritional status and socio-demographic; geo-economic and socio-cultural factors.

FINDINGS: The results indicated that there was a poor state of maternal nutrition in Jinja district with 25% of pregnant women wasted, 49.2% of them anemic while 15.3 % had VAD compared to 30.2% wasting, 27.8% anemic and 12.8% with VAD among the lactating mothers. This was explained by poor feeding habits of participants caused high consumption of starchy staples (97.3%) coupled with low consumption of micronutrient rich foods especially of iron (36%) and vitamin A (65%). However, the Multiple Linear Regression model analysis showed nutritional status of participants to greatly depend location (urban or rural), marital status and sex of household head with significant P values (0.028, 0.001 and 0.009 respectively) while geo-economic factors like annual income of participants, main use of food crops grown in their households and geographical distribution of foods (lack of food in the area but plenty in other areas) significantly determined low consumption of micronutrient rich foods (Vitamin A) whereas reduction on household workload during pregnancy or lactation was revealed to be the only significant socio-cultural factor influencing the low consumption of micronutrient rich foods (Vitamin A rich foods).

CONCLUSION: Geo-economic factors such as annual income of participants, geographical distribution of foods and main use of food crops grown; Socio-cultural factor of workload

reduction during pregnancy and lactation as well as Socio-demographic characteristics of location, sex of household head and marital status of participants were specifically responsible for the poor state of maternal nutrition in Jinja district.

CHAPTER ONE: INTRODUCTION

1.0   Background to the key research issues

The state of maternal nutrition varies significantly across regions with maternal malnutrition highly concentrated in some regions than others. Generally in resource-poor settings, maternal under-nutrition varies from 10% to 19% but reaches up to more than 20% in areas like sub-Saharan Africa and south-eastern Asia (Tang et al, 2016). Rather than concentrating on the magnitude of the problem of maternal malnutrition alone, research should also consider the factors that influence it since the nutritional status of an individual is a complex interaction of several factors (Black et al 2008). More so, in countries like Uganda, the state of maternal nutrition is further complicated by co-existence of both maternal under- and over-nutrition (Turi et al, 2014). This notwithstanding double burden of maternal malnutrition is the underlying cause of the increased maternal and child mortality (Lartey, 2008 & Caulfield et al 2006). However, although scaling up nutrition requires addressing key underlying factors (Ruel et al, 2013), evidence indicates that in Uganda, it is still very difficult to determine region specific causes of maternal malnutrition (FANTA II, 2010). But based on the synthesis of literature from the Lancet reviews by Bhutta et al (2013), there is wide-scale availability of proven and promising interventions to improve the state of maternal nutrition. Maximising utilization of these interventions actually requires addressing factors influencing the state of maternal nutrition.

Global statistics indicate that more than 3.5 million mothers and children under five years die every year due to underlying factors of under-nutrition (Black et al, 2008). Furthermore, in developing countries where 90% of the worlds' chronically undernourished children live (UNICEF, 2009), many women especially pregnant and lactating women fail to consume sufficient diets due to a number of factors (Caulfield et al, 2015). Yet these diets often consumed lack sufficient amounts

of micronutrients (Black et al, 2013). Science indicates that adequate nutrition is critical during pregnancy and lactation due to heightened nutritional needs (Black et al, 2008) while failure to meet these needs often spans a life cycle of malnutrition (Victora et al, 2010). Although generally all women seem to have similar nutritional needs, their feeding habits differ due to a number of factors some of which may be unique to their locality (The United Nations University Press, 1982). Surprisingly, the nutritional needs highlighted in the several studies bear little relation to the needs of most mothers especially in the third world countries. However, in Sub-Saharan Africa, environmental and economic conditions generally insert extra burdens on nutritional status; poverty on quality of diets while heavy workload of women worsen the situation as it depletes energy hence increases nutritional needs (Lartey, 2008). More so, every social group in the world is known to have unique cultural practices and beliefs (Ezeama & Ezeamah, 2014). This seems to explain why geo-economic and socio-cultural influences interact to worsen the burden of maternal nutrition

Globally, maternal under-nutrition is still a serious problem across sub-Saharan Africa, south-central and south-eastern Asia, and Yemen, where more than 20% of women have a body-mass index (BMI) of less than 18·5 kg/m². The situation is even worse in India, Bangladesh, and Eritrea, where 40% of their women have low BMI which is rendered critical (Black et al. 2008). It is also highlighted that almost half of all pregnant women in the world have micronutrient deficiencies of iron and vitamin A (WHO, 2008). The highest proportions of these women live in Africa and Asia (De Benoist, 2008). Generally in Uganda, 49% of women of reproductive age are anemic, 12% are undernourished while 18.3% of those who are pregnant and 17.9% of lactating mothers are Vitamin A deficient (VAD) (UNICEF, 2012). However, statistics vary across regions VAD in Busoga region is 31% which is almost twice the national figure.

With regard to scientific and programmatic evidence by World Health Organisation (WHO), Pan American Health Organisation (PAHO) and USAID, there is need for every nation to identify core sets of practices that characterize diets and feeding practices of women (Caulfield et al 2015). But according to Manoff Group (2011), maternal nutrition practices characterizing feeding habits of women vary dramatically by culture, geography, social, economic, and other family and community factors. It is therefore very clear that there is need to investigate what pregnant and lactating women feed on, how and why they feed on it as well as the factors responsible for this. So based on this, this study was undertaken to assess the factors influencing the state of maternal nutrition and their interactions with socio-demographic characteristics so as to lay evidence-based foundation for identifying specific and effective models for improving maternal nutrition.

1.2   Back ground of Jinja district

Jinja district is found on East of River Nile and along the Northern shores of Lake Victoria. It has an area of 767.7sq Km of which 701.9sq Km is land and the rest (65.8sq Km is covered by water bodies. It is bordered by Kamuli district in the North, Luuka district to the East Mayuge district to the Southeast, Buvuma district to the South, Buikwe district to the West and Kayunga district to Northwest. It is elevated 3,937· above sea level. The coordinates of the district are: 00 30N, 33 12E. (Latitude: 0.5000; Longitude: 33.2000). It is also about 87 km east of Kampala.

Before 1906, Jinja was a fishing village but has since then developed into a commercial town due to its location along the long distance trade routes. Cotton packing, nearby sugar cane estates and railway access have all enabled Jinja to grow in size. The name Jinja means "rock" in Luganda. The town was founded in 1907 by the British, as the administrative centre for the Provincial Government Headquarters for Busoga region. This was around the time when Lake Victoria's importance in transport rose due to the Uganda railway from Kisumu, Kenya. Currently, the district

is made up three counties namely Jinja Municipality, Kagoma and Butembe. There are 11sub-counties, 69 parishes and 617 villages in Jinja district.

But although Jinja district has been known for food production especially vegetables in the country, Jinja district production department says that the sub-counties of Butagaya, Budondo, Busede and Buyengo have increasingly become food insecure since a larger portion of their land meant for food production has been hired out to private individual for sugar cane growing. Neglecting food production in favour of sugarcane growing has affected household food insecurity hence resulting into prevalence of maternal nutrition according to Lwanga et al (2015). The effect of malnutrition resulting from household food insecurity in Jinja district has caused more harm on the mothers than the rest of the population according to UBOS (2012) survey. High vitamin A deficiency and iron deficiency anemia remain a cause for alarm in this area (FANTA II, 2010)

Secondly, the complexity of this region in terms of in social and cultural practices like gender, tradition, religion as well as attitudes and beliefs all seem to influence what women eat, how and why they eat it. Care and status are not exceptional from those practices and beliefs. It is also interesting to note that though the largest proportion of food production is a responsibility of women in this area, men solely have the power to make decisions in a home. In addition to care for children and men, women seem to bear the health effects of heavy workloads as they fetch water and firewood, prepare food, do household chores yet succumbing domestic violence and other gender inequalities. This devastates women much more especially when basic resources are limited thus undermining their ability to ensure their optimum health and nutrition (FANTA II, 2010). However it seems several interrelated are also factors responsible for this. Therefore there is need to dig deeper on what actually influences the state maternal nutrition in Jinja district.

1.3   Problem Statement

Maternal malnutrition has remained a major concern for Uganda. Currently, 49% of women of reproductive age are anemic, 12% are undernourished while 18.3% of those who are pregnant and 17.9% of lactating mothers are Vitamin A deficient (VAD). This situation has led to loss of over 1200 mothers annually (UNICEF, 2012). Whereas the state of maternal nutrition is already a major worry for the country, Busoga sub-region where Jinja district is located seems to be more devastated than the rest of the country; 31% of its women have VAD, a situation which is paralyzing because it is two times worse than the national figures while anemia is not exceptional either as it so prevalent and affects women and children in almost equal measure (FANTA II, 2010).

Although some common factors are driving the prevalence of maternal malnutrition like disease burden and inadequate dietary intake, it has been very difficult to determine the region-specific underlying causes across Uganda (FANTA II, 2010). This is due to complexity of determinants of maternal nutrition especially in Busoga region and particularly in Jinja district where women spend most of their prime time in a continuous state of pregnancy and lactation, work long hours in food production and care for the children (Shively & Hao, 2012). However, it is unfortunate that the anecdotal evidence from available reports and statistical abstracts do not either seem to show or reflect the true state of maternal nutrition. Neither do they also clearly state the proportion of pregnant nor lactating women with good nutrition status; what they eat, how and why they eat it (feeding habits) and what might be influencing these feeding habits?

But for a country where every pregnancy is rendered unplanned (MoH, 2010), not paying the desired attention to maternal nutrition is risky. It is even worse if its determinants are not specifically addressed region-wise. Research indicates that effective acceleration of progress to

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improve nutrition requires addressing key underlying factors (Ruel et al, 2013). Therefore efforts towards improving maternal nutrition need paying attention to its drivers. However, though many studies that have investigated the factors influencing maternal nutrition (Eneama & Eneamah (2014); Otoo et al 2015; Alonso, 2015; Mucha, 2012 and Oluwafolahan (2014), it is rare to find empirical evidence on factors influencing maternal nutrition comprehensively addressed. More so the nutritional needs highlighted in studies reviewed do not actually reflect needs of pregnant and lactating mothers in most areas yet the state of maternal nutrition for Jinja district is still in abstract form. Hence the need to assess factors which influence the state of maternal nutrition.

1.4   Goal

To assess factors influencing the state of maternal nutrition in order to increase understanding of the context in which maternal malnutrition occurs and be able to guide development of intervention plans.

1.5   Objectives and Research Questions

1.5.1   Specific objectives

1. To determine the proportion of pregnant and lactating mothers with good nutritional status in Jinja district.

2. To describe the feeding habits of pregnant and lactating mothers in Jinja district.

3. To assess the geo-economic factors influencing the state of maternal nutrition in Jinja district.

4. To establish the socio-cultural factors influencing the state maternal nutrition in Jinja district.

1.5.2   Research Questions

1. What is the proportion of pregnant and lactating mothers with good nutritional status in Jinja district?

2. What are the feeding habits of pregnant and lactating mothers in Jinja district?

3. What are the geo-economic factors influencing the state of maternal nutrition in Jinja district?

4. What are the socio-cultural factors influencing the state of maternal nutrition in Jinja district?

1.6   Significance of the study.

The Uganda Nutrition Action Plan (2011-2016) implores that for the country to have a strong nutritional foundation, women (15-49years) must receive proper nutrition especially during pregnancy and lactation (Government of Uganda, 2011). Despite existence of effective interventions in the health system to improve maternal nutrition in the country according to Ministry of health (2010) and Bhutta et al (2013) and the fact that Uganda is regarded self-sufficient in terms of food production (Bahiigwa, 1999), one would expect good nutrition among the populace. Surprisingly, maternal malnutrition remains so rampant because a good proportion of pregnant and lactating women continuously fail to consume adequate diets (FANTA II, 2010). More so, studies elsewhere have repeatedly demonstrated that women consume less food than they are supposed to due to a number of factors such as knowledge, attitudes and cultural practices held by their communities for generations (Otoo et al, 2014, Ezeama & Ezeamah, 2014) which are further affected by unforgiving consequences of the environment on food and nutrition security (Alonso, 2015).

This research which was carried out successfully will provide:

- Policy makers, health and nutrition program implementers with the much needed evidence-based information to guide them when addressing maternal malnutrition.

- Health workers with specific and evidence-based information to enable them deliver adequate nutrition education and counseling to mothers attending antenatal and postnatal services as they have been always uncertain on how to translate general requirements into specific individual recommendations according to Njeri (2014).

1.7   Scope of the study

1.7.1   Content scope

This study was only limited to factors influencing the state of maternal nutrition in Jinja. Therefore it determined the state of maternal nutrition for only pregnant and lactating women; assess the geo-economic and socio-cultural factors influencing the state of maternal nutrition in Jinja district. This helped the researcher to make informed recommendations on how maternal nutrition could be improved.

1.7.2   Geographical scope

The study was carried out in Jinja district because it is the heart of Busoga region which is implicated with astonishing prevalence of maternal malnutrition (FANTA II, 2010). The burden of maternal malnutrition in this area seems to be driven by a complexity of interrelated factors which are not well understood. However, the study was restricted to only Jinja district and its residents.

1.7.3   Time scope

The study covered a period of four months from May 2015 to September 2015.

1.8   Conceptual framework
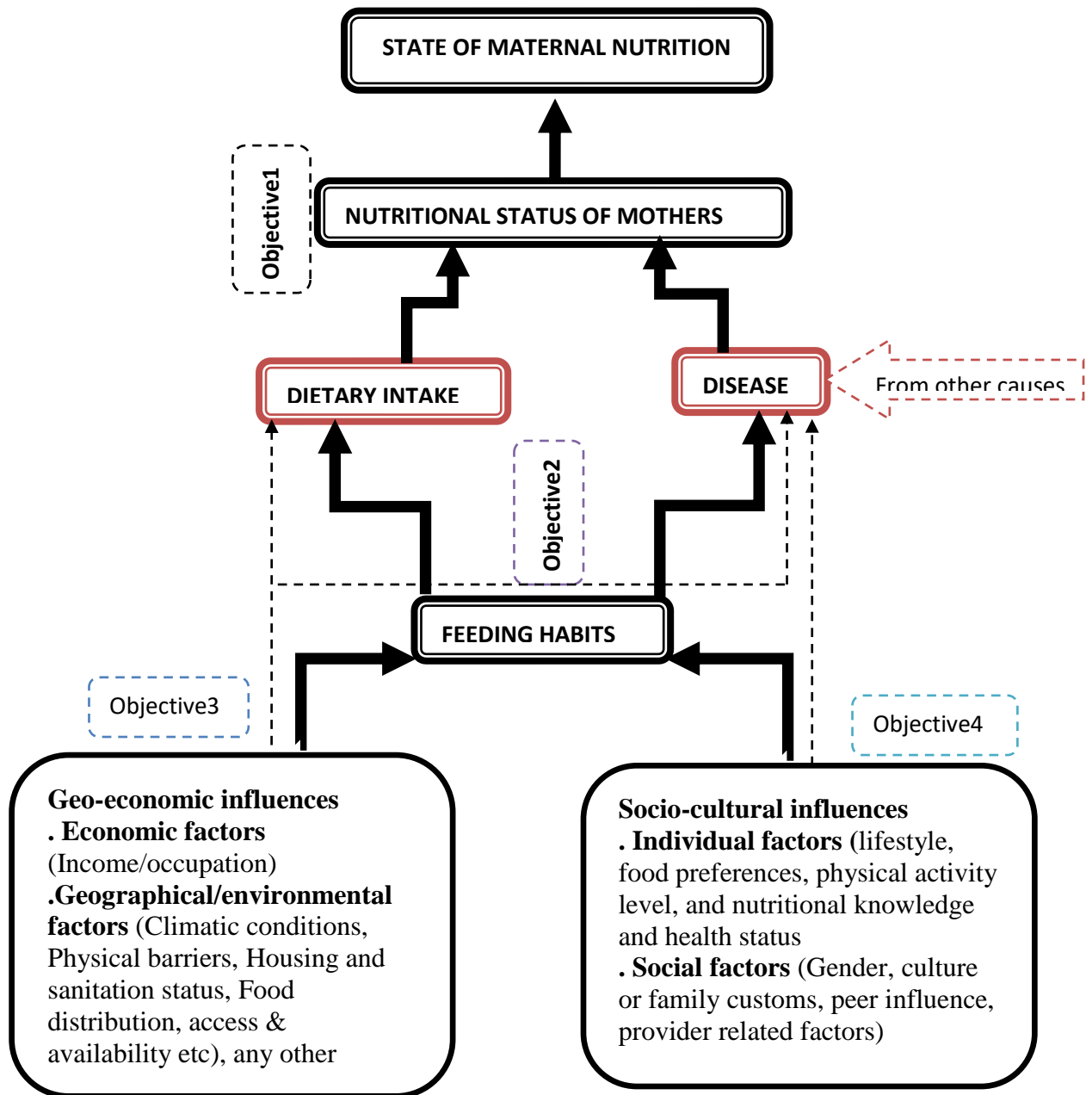
Figure 1: Conceptual framework of the thesis: Factors influencing the state of maternal nutrition; geo-economic and socio-economic factors

The conceptual framework shown in the illustration above specifies the variables that were explored during the investigation. This conceptual framework was derived from the modified UNICEF conceptual framework on maternal nutrition put forward by Black et al (2008) in the Lancet journal. The researcher considered geo-economic and socio-cultural factors to influence

the feeding habits of pregnant and lactating women similar to what Rodriguez (2004) highlighted. In other words good feeding habits are known to promote, protect and support maternal nutrition according to Manoff Group (2011). Poor feeding habits are generally a predisposing factor for malnutrition (Lartey, 2008). A review of maternal diet published by McGuire and Popkin (1990) indicated that pregnant and lactating women in developing countries consume insufficient energy intakes and this was later justified by Black et al (2008; 2013) and Caulfield et al (2015). Therefore for maternal nutrition to yield benefits, addressing its determinants is a prerequisite.

1.9   Summary of chapter one.

Across the spectrum, evidence indicates that there is a strong linkage between state of maternal nutrition and the influence of geo-economic and socio-cultural factors. That is why nutrition implementers are advocating for nutrition to be addressed in more than one sector. However, though the importance of maternal nutrition is very clear everywhere; little attention has been given to the mother herself and the factors that link them (sectors). The key points that need recapitulation from this chapter include the following:

1. Maternal malnutrition is a big problem in Uganda in general and Jinja district in particular.

2. The factors influencing the state of maternal nutrition have been generalized for so long and little knowledge exists about the specific factors leading to this state especially in Jinja district.

3. The thesis of this study was that geo-economic and socio-cultural factors in Jinja district contribute to the current state of maternal nutrition.

The following chapter highlights the related literature that deeply explains the connection between those factors and the state of maternal nutrition.

CHAPTER TWO: LITERATURE REVIEW

2.0   Introduction

The literature review in this chapter was discussed in four sections aligned to the study objectives. Desk review was done to confirm findings from related studies. This provided the basis for comparative analysis. The first section of this chapter introduces details about maternal nutrition. This exposes why refocusing on maternal nutrition is relevant for further research. In section two, the state of maternal nutrition globally, in Africa and Uganda has been reviewed. A conceptual framework as expressed in the previous chapter was adopted to provide framework for the study whereas the theory of compromised eating behaviours by Furman (2012) provided the conceptual basis for analyzing relationships between factors and the state of maternal nutrition. Lack of eating or diminished eating behavior caused by several factors may contribute to inadequate dietary intake which is a risk factor for under-nutrition (Furman, 2012). The third part of this chapter entails the influence of geo-economic factors on the state of maternal nutrition. Lastly, socio-cultural factors and its influence on maternal nutrition have been also critically highlighted.

The study was informed by targeted searches of electronic journals and online databases (ScienceDirect, PubMed, the Cochrane library, Oxford journals, The Lancet, the BMJ and Cambridge journals). Data reports and position papers by governmental and non-governmental organisations as well as those of international bodies like PAHO, FANTA, World Bank, UNICEF, Food and Agriculture Organization (FAO), WHO etc were used. Where possible the study also used illustrations from systematic reviews, peer-reviewed journal articles, meta-analyses and Randomised Control Trials (RCTs).

The literature considered for this study was published between the year 2006 and 2015 because this literature was relatively current and had achieved enough recommendations and criticism

which enabled the researcher to make valid arguments. Also selected literature contained the key words of the subject under context. Unless rendered so relevant that the author used literature from studies published before 2006. Rather, literature without key words of the subject under context was excluded.

2.1 Why maternal nutrition

Maternal nutrition broadly refers to nutrition of a woman before, during and after pregnancy (Manoff Group, 2011). Good maternal nutrition is vital for maternal and child health, notably, dietary interventions advanced during pregnancy and lactation period can influence maternal, fetal and infant health (Cetin & Laoreti, 2015). However, in spite of the substantial increase in global recognition and commitment to nutrition in recent times, over 3.5 million mothers and their children continue to die every year due to underlying factors of under-nutrition (Black et al, 2008). Also as already noted in the previous chapter, Failure to ensure adequate maternal nutrition during pregnancy and lactation perpetuates a life cycle of malnutrition (Victora et al, 2010). Scaling up maternal nutrition therefore requires addressing what influences women's feeding habits.

Principally, maternal malnutrition result primarily from diets that are inadequate in macronutrients (under-nutrition), excess of macronutrients (over-nutrition) as well as from diets poor in micronutrients (micronutrient deficiency). Based on scientific and programmatic evidences by FAO (2013) and USAID (2014), measuring dietary diversity of women should put much more emphasis on micronutrients. However, though poor micronutrient status of women is a global problem and particularly severe for poor women, evidence indicates that there is still very limited information on micronutrient status of women. More so, comparable data on dietary intakes, dietary patterns and diet quality for women across countries is also scarce and fragmented

(Arimond et al, 2011). For this reason, well designed studies are needed to characterize dietary quality for women and identify those that are at risk of nutritional inadequacy.

Many countries in the world are now confronted with the double burden of malnutrition (Turi et al, 2014) and evidence indicates that this varies region by region (Crowder, 2009). But what is not clear is why it is still difficult to determine the region-specific underlying causes as highlighted by FANTA II (2010) when it is already known that every social group in the world has unique cultural practices and beliefs (Eneama & Eneamah, 2014). Similarly, evidence by Manoff Group (2011) indicates that maternal nutrition practices vary dramatically by culture, geography, social, economic, and other family and community factors. Revitalizing efforts to scale up maternal nutrition actually requires understanding the factors that influence the state in which it occurs in the various regions (Ruel et al, 2013). This can help to boost and secure nutritional status of women especially those who are pregnant and lactating. The first 1,000 days of life between pregnancy and lactation is the most critical period which has irreversible physical, cognitive, and health consequences, reducing a person's lifetime earning potential (Mucha, 2012).

2.2 Maternal nutrition during preconception

Preconception nutrition is a vital part of preparing for pregnancy (WHO, 2012). Preconception underweight or overweight, short stature and micronutrient deficiencies all contribute to excess maternal and fetal complications during pregnancy (Dean et al, 2014). However, many women fail to consume a well-balanced diet before pregnancy so will not gain appropriate nutritional status to meet the needs of pregnancy. Yet the nutritional status of a woman before conception is very important for optimal health of mother and the fetus. Research has it that many women have low iron stores resulting from monthly menstruations yet their diets often lack sufficient iron. So

building iron stores helps to prepare maternal iron stores to meet the needs of the fetus during pregnancy (Schroll, 2011).

Proper maternal nutrition is therefore rendered essential since periconceptional problems; pre-pregnancy maternal underweight, severe iodine deficiencies, and folate deficiencies, negatively affect pregnancy outcomes (Caulfield et al 2015). Ideally, preconception dietary counseling should be addressed for adjustment to optimize weight during preconception in women who are underweight, overweight or obese and therefore reduce associated risks during pregnancy. For this reason, nutritional status of women should start during preconception to optimize maternal health and reduce the risk of pregnancy complications, birth defects, and chronic diseases in their children in later adulthood. Pre-conception weight is said to have a direct influence on birth weight. Evidence from studies indicates that underweight during pre-conception is a predisposing factor for LBW. Overweight during preconception on the other hand is shown to increase health risks such as gestational diabetes and high blood pressure according to a systematic review of preconception risks and interventions by Bhutta et al (2011),

2.3 Maternal nutrition during pregnancy

Pregnancy is rendered critical for the mother and the infant and emphasizing proper nutrition remains a major prerequisite during pregnancy because of increased nutrient needs (Black et al, 2008). So adjusting nutrition and lifestyle of women to appropriate levels is important. However, the nutritional needs of women during pregnancy are always misaddressed by practitioners due the complexion of many interacting factors (USAID's IYCN, 2011). Currently, the estimates of nutrient requirements are based on healthy, mature women, who arrive at conception adequately nourished and who are only moderately active during their pregnancy (Caulfield, et al, 2015). Generally, although all women seem to have similar nutritional needs, their feeding habits differ

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due to a number of factors some of which may be unique to their locality (The United Nations University Press, 1982). Thus improving the state of maternal nutrition especially during pregnancy should consider addressing factors responsible for determining the state of maternal nutrition and should start at preconception to influence proper growth and potential development of the fetus that matures into a healthy baby (Mecacci et al, 2015). So once pregnancy is confirmed, health workers are supposed to emphasize the importance of maternal nutrition to the pregnant woman (MoH, 2010). But, evidence by Duffy et al (2015) stipulates that maternal nutrition is so often ignored in health, population and nutrition programs. Optimising nutritional status of pregnant women should involve promotion of gestational weight gain, health eating and staying physically active.

2.3.1 Weight gain during pregnancy

Appropriate weight gain during pregnancy is important for the healthy pregnancy outcome of both the mother and the baby because inadequate weight gain may not support the growth of the fetus, leading to Intra-Uterine Growth Retardations (IUGR) or birth weight which is small for gestational age (Caulfield et al, 2015). Therefore, women in reproductive age should understand the risks associated with overweight (gestational diabetes, still birth, caesarean section, congenital heart defects etc) or underweight (preterm birth, small for gestational age neonates) because weight gain during pregnancy does not sufficiently reduce for the pregravid underweight women. This is why it is recommended to monitor weights of all pregnant women. However, it is not clear whether health workers endeavor to do so when these mothers attend antenatal or postnatal services. This because several studies relating pregnancy-related complications with weight gain during pregnancy indicate that weight gain is not always routinely monitored (Rush, 2001; Schumann et al, 2014 and Changamire et al, 2014). Excess weight gain during pregnancy has been shown to be

associated with multiple maternal and offspring short- and long-term complications (Fraser et al, 2010). According to further evidence by Caulfield et al (2015), excess weight gain during pregnancy may lead to problems associated with gestational diabetes, macrosomia (birth weight > 4000 g) and related complications, some delivery complications, and difficulties during lactation. A review by Englund-Ogge et al (2014) suggests that dietary intervention during pregnancy is safe and potentially cost-effective in limiting weight gain during pregnancy, improving maternal and child health and reducing the risk of gestational diabetes, gestational hypertension, pre-eclampsia and preterm birth among other complications. Proper nutrition counseling using behavioral change techniques has been shown to be effective in improving weight gain during pregnancy.

2.3.2   Health feeding and supplementation demands during pregnancy

To acquire good nutritional status and health weight gain, health feeding is vital for all women during pregnancy. The optimal mode of ensuring adequate nutrition for pregnant women emphasizes consumption of extra food, a diverse or varied diet, and micronutrient supplements (Black et al, 2008). In poor resource settings, low quality monotonous diets are often the cause of various micronutrient deficiencies during pregnancy (Arimond et al, 2011). Failure to meet the nutritional demands of a pregnant woman subjects her to deficiencies. Some of these deficiencies are associated with maternal complications and death, fetal and newborn death, birth defects, and decreased physical and mental potential of the child (Abu-Saad & Freizer, 2010).

But since micronutrient intakes don't fit the demands of pregnancy, supplementation is always recommended to avoid these deficiencies and adverse pregnancy outcomes (Cetin & Laoreti, 2015). For instance, in a meta-analysis of 21 randomized controlled trials on the effects of multiple supplementations on pregnancy outcome found out that, women who received multiple supplements had a significant reduction in the risk of SGA offspring compared with women who

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received iron/folate supplements alone (Haider & Bhutta, 2012). Therefore, Caulfield et al (2015) recommends that failure to add specific nutrient-rich food choices or adjusting feeding habits, extra micronutrients needed to support pregnancy will not be met. But despite the fact that staying physically active is also recommended, research by Currie et al (2013) suggests that most women in developing countries instead remain sedentary during pregnancy.

2.4   Maternal nutrition during lactation

Good nutrition is critical for survival, health and development for both current and future generations (Hundera et al 2015). Since lactating mothers not only live for themselves but also for their babies, family as well as the society at large and they bear these burdens alone, addressing their nutrition is critical. Therefore, adequate nutrition is emphasized since lactation imposes high demands on maternal stores of energy, protein, and other nutrients and so these stores need to be established, conserved, and replenished. So often, much of the efforts to improve maternal diet and nutritional status during lactation particularly place much attention on the baby by emphasizing breast milk quantity and the quality than for the mother's health benefit. For instance, Alemayehu et al (2015) and Jelliffe & Jellife (1978) insinuated that the volume of breast milk produced by malnourished women is lower than that produced by women adequately nourished. This much of their efforts to improve nutrition during lactation were focused on improving the nutritional status of infants and children. Yet nature itself is very forgiving – whatever situation; be hardship or famine, breast milk from the mother is meant to provide for and protect the baby. Therefore, a poor diet is more likely to affect the mother than her breastfed baby.

Therefore, supporting maintenance of good nutrition during lactation by ensuring that mothers consume a healthy diet not only for themselves but also to meet the increased nutritional demands of lactation is one of the goals effective postnatal care (MoH, 2010). Promotion of healthy eating

during lactation is also important for three reasons: first of all in some settings maternal plate is the infant's "first plate"; secondly, it is an avenue to promote healthy eating for the next pregnancy and over the long term, it may influence family eating patterns (Sanusi & Falana, 2009). To prevent this, extra food must be made available to the breastfeeding mother which also increases her need for water. It is important that a mother drinks enough water to satisfy her thirst. Research evidence indicate that although a rich body of dietary intakes of pregnant women exists, there is relative lack of literature on the dietary intakes of lactating mothers and adolescents' micronutrient intakes (Caulifield et al 2015). Therefore this research looks forward to fill such a gap.

2.5   The state of maternal Nutrition

2.5.1   Globally

Maternal and child under-nutrition is highly rampant in low-income and middle-income countries (LIMIC), translating into significant increases in mortality and overall disease burden (Black et al 2008). Pregnant and lactating women as well as children are among the most nutritionally vulnerable groups. It is estimated that more than 3.5 million mothers and children under five years die each year due to the underlying causes of under-nutrition while millions more are permanently inflicted by the physical and mental effects of poor diets in their earliest periods of life (The Manoff Group, 2011). More so Bhutta et al. (2013) estimates that 800 000 neonatal deaths occur annually due to maternal under-nutrition and micronutrient deficiencies are estimated to underlie nearly 3·1 million child deaths annually. WHO estimates that 7 million women of child bearing age have IDA while 4 million of them have VAD. But anemia has been indicated to be a predictor of maternal mortality (Stevens et al, 2013) yet VAD on the other hand has been shown to exacerbate anemia. Additionally also, evidence indicates that presence of one or more micronutrient deficiencies in a population mean that other micronutrient deficiencies also exist because the origin

of these deficiencies is a deficient diet lacking sufficient amounts of micronutrients altogether (Ververs, 2013).

2.5.2   In Africa

Although they are known to have physiologically-higher nutrient needs, African women often consume inadequate amounts of animal proteins and micronutrient rich foods like fruits and vegetables (Haileslassie et al 2013). Inadequate intake of micronutrients increases the risk of micronutrient deficiencies whereas low intake of protein result into chronic protein deficiencies. Evidence by Lartey (2008) indicates that between 5 and 20% of African women have a low BMI as a result of chronic hunger. Across the continent the prevalence of anaemia ranges from 21 to 80%, with similarly high values for both vitamin A and Zinc deficiency levels.

In Sub-Saharan Africa, many factors interrelate to influence the state of maternal nutrition: environmental and economic conditions insert extra burdens on the nutritional status; persistent poverty influences the quality of the diet (Mucha, 2012); heavy workload of women increases their nutritional needs (FAO, 2012) whereas unplanned reproductive cycles often leave African women with drained body nutrient stores. These factors create an ideal environment for malnutrition to thrive (Lartey, 2008). Worse more, the impact of all these factors on the nutrition of African women are complicated by limited access to basic resources like water and fuel. The implication indicates that mere presence of marginal malnutrition therefore can predispose an African woman to morbidity and mortality. Really, without comprehensive research to address these factors, the capacity of many women in Africa to meet their vigorous demands as mothers and productive workers would be jeopardized.

2.5.3   In Uganda

Uganda is currently faced with the double burden of maternal under- and over-nutrition. Nationally, over 1200 mothers die every year due to malnutrition (UNICEF, 2012 & MoHa, 2010). According to FANTA II (2010), maternal nutrition is so rampant in Uganda that over 12% of women between 15 – 49 years are undernourished. Aneamia affects 49% of women between 15-49 years and without intervention, 15,000 mothers were likely to die as a result of anaemia-related causes between 2006 and 2015. But a third of these deaths could be prevented if iron supplementation coverage is doubled among pregnant women. Additionally, 18.3% of pregnant women and 17.9% of lactating mothers have VAD. Also LBW is so prevalent that in 2009 alone, over 16,000 LBW children born as a result of maternal under-nutrition died.

2.6   Geo-economic factors influencing maternal nutrition

Basically, maternal nutrition follows a geo-economic trend: geographical characteristics of an area determine which food is available; environment determines feeding behaviours and lifestyle; economic factors determine dietary quantity and quality (Darmon & Drewnowski, 2008). While politics influence the state of maternal nutrition in terms of policies, laws and trade agreements that determine food availability and trends (Alonso, 2015 and Rodriguez et al 2004).

2.6.1   Environmental influences

People live and function in multiple environments. Environment is a key determinant of feeding habits and lifestyle (Darmon & Drewnowski, 2008 and Butland et al, 2007). Despite the major gaps surrounding the effect of environment on dietary intake and lifestyle in general, a major progress had been gradually registered to understand some aspects of this complex relationship (Popkin et al, 2005). For instance Giskes et al (2010) used the term obesogenic environment to describe an environment in which surrounding opportunities or conditions of life combined to

promote weight gain in individuals. However, it is not clear whether this can also apply to those who are already experiencing undernourishment. Other studies instead just indicated environmental degradation to lead to malnutrition, infectious disease, and contamination (Blössner and Mercedes de Onis, 2005). But considering what Rodriguez (2004) stipulated, maternal nutrition therefore becomes an environmental product because foods that are commonly available and easily grown within a specific region frequently become a part of the local cuisine. An example of women in industrial societies and urban communities who heavily rely on processed foods have been used to illustrate high prevalence of diabetes and heart diseases in urban communities compared to rural setting (Glanz et al 2007). For this reason therefore, addressing maternal malnutrition must adapt to environmental and socio-economic changes.

Climate change is another environmental factor influencing food and nutrition security as people are no longer able to predict the optimum time when to plant (DARA, 2012). Thus, many farmers have increasingly started growing more reliable drought resistant or early maturing food crops such as cassava, sesame and beans. This practice has enhanced increased production of food crops. But these food crops significantly nutritious in order to be recommendable during pregnancy and lactation. In this regard, Black et al (2008) insinuated that in developing countries especially in sub-Saharan Africa, foods consumed by pregnant and lactating mothers often lack sufficient micronutrients. Yet Lartey (2008) on the other hand retaliated that environmental and economic factors inserts extra burdens on nutritional status. Another challenge affecting nutrition security is the practice of selling foods due to reduced production of cash crops as DARA (2012).

Reduced food production resulting from effects of climate change has led people to resort to eating one meal a day. This situation is deadly for pregnant and breastfeeding mothers because failure to have extra meals a day for these women has been shown to exacerbate maternal mortality and

morbidity (Caulfield et al 2015, Black et al 2013, Bhutta et al 2013 and Manoff Group 2011). The burden caused by climate change on maternal nutrition is beyond what is always anticipated. For instance, an outbreak of famine in a community impact much more on women than the rest since women play a pivotal role in food production and rural economies (FAO, 2010). Epidemiological statistics by WHO have also shown climate change to be one of the leading causes of disease outbreaks most especially malaria and hookworms which are the leading cause of maternal anemia (Pruss-Ustin & Corvalan, 2006). Malaria and hookworms are significant diseases in prevention of maternal malnutrition (McClure et al, 2014).

Housing conditions of mothers has been shown by WHO (2007) to be a key determinant of health which in turn affects maternal nutrition. Additionally, USAID (2015) highlighted the need to recognize the inseparable complex relationship between WASH and nutrition. Use of safe water, sanitation facilities, and good hygiene was shown to positively affect nutritional outcomes. Lack of sanitation, in particular was strongly correlated with acute malnutrition and stunting.

Geographical characteristics of an area are other factors related to environment. People live and work in multiple geographical areas. Natural geographical features affect nutrition of women in a number of ways: it is shown to influence access to food and health services as well as their well being; family or socio-cultural environment in terms of food exposures to pregnant and lactating women and neighborhood environment most especially in terms of hygiene and sanitation (Ball et al, 2006).

2.6.2 Economic influence

Evidence suggested that employment status of women strongly influences their feeding habits thus reflects their nutrition status (Johannsen et al, 2006). Women have the potential to improve their

nutritional status, as well as that of their households and communities. However, they are far less privileged in terms of economic status and the power to make decisions in the household and community. These have a profound effect on the feeding habits according to International Food Policy Research Institute (IFPRI, 2013). Also economic status of someone determines what to purchase. Food prices are most times determined by the economic status although food availability and demand can also influence it. Evidence of association between economic status and maternal nutrition has been widely discussed by Mucha et al (2012) – low economic status in addition to less education and limited decision making power of women in the household and community significantly contribute to poor maternal nutrition. Therefore, improving women's access to resources, independent making decisions as well as level of education are critical for maternal nutrition.

2.7   Socio-cultural factors influencing maternal nutrition

Socio-cultural factors were shown by Akhter & Sumi (2010) to broadly consist of the social system and the culture of the people. Borrowing from an abundance of evidences by WHO (2013) and Otoo et al (2015), socio-cultural factors influence the maternal nutrition as they prohibit women from seeking antenatal/postnatal services and eating some nutritious foods (WHO, 2015 & Otoo et al, 2015). More so, United Nations High Commission for Refugees (UNHCR, 2006) maintains that every society in the world has unique socio-cultural practices and beliefs. Similarly, Alonso (2015) castigated that socio-cultural influences are held by people for generations which in turn shape maternal nutrition practiced in that community. But according to Food and Agricultural Organisation (FAO, 2012), they can be a cause and at same time an effect of hunger and malnutrition. These influences are always complex and specific to sex, age and sometimes to racial groups. Therefore to address the state of maternal nutrition of any given area, there is need to

understand how socio-cultural influences define women and their way of life. Notable however, appreciating the previous efforts and the abundance of significant literature documented on the socio-cultural influence on maternal nutrition, the there is need also to understand the following:

However, every pregnant or lactating woman as an individual also have unique characteristics which determine her food preferences and lifestyle which are further impacted on by her level of nutritional knowledge. Additionally, food preferences develop over time and dictated by individual experiences like motivation to eat, exposure to food, family traditions and rituals as well as personal values attached to food preferred (Rodriguez, 2004). Socio-cultural factors in this study were defined to include all elements of the social system and the culture of people that influence positively or negatively the state of maternal nutrition:

2.7.1 Food preferences

Woman as individuals have unique characteristics which determine their food preferences or restrictions and are influenced by their level of knowledge (Rodriguez, 2004). Nutritional practices such as this play a significant role in maintain the health status of individuals. These nutritional practices and patterns are developed by people's tendencies to settle into fixed habits (Lakshmi, 2013). Across the globe, all women are confronted with many maternal nutrition choices during pregnancy and lactation. Food preferences are developed over time and are said to influence feeding habits. They are dictated by individual experiences like motivation to eat, exposure to food, family traditions and rituals, advertising and personal values and further complicated by their level of knowledge (Rodriguez, 2004). However, in a study to explore traditional practices associated with pregnancy and child birth, Otoo et al (2015) indicates that wrong choices resulting from cultural practices, beliefs and taboos are often implicated in determining care for pregnant women which is an important determinant of maternal mortality.

2.7.2 Lifestyle

Lifestyle is a key determinant of feeding habits - defines what people eat and how they eat. It refers to the ways individual, family circles and societies live and which behavior they manifest in coping with their physical, psychological, social and economic environments on day-to-day basis (Trovato, 2012). It is expressed by daily work and leisure profiles, including activities, interests, opinions, values and allocation of incomes (Pomerleau, 1975). Form psychologist stand-point, lifestyle refers to way people see themselves and believe they are seen by others including self esteem and self efficacy. Pregnant and breastfeeding women have been shown to practice a number of lifestyle behaviours ranging from sedentary lifestyles to heavy drinking as well as smoking tobacco and illicit drugs (Caulifield et al 2015 and Trovato, 2012). However, maintaining active physical activity has been shown to yield health benefits especially during pregnancy and lactation. Smoking of tobacco and illegal drugs during pregnancy has been linked to poor birth outcomes. Moreover, over snacking on highly processed and caffeinated drinks causes NCDs. Trovato (2012) has indicated that lifestyle is a composite of motivations, needs, and wants and is influenced by factors such as culture, family, reference groups, and social class.

2.7.3   Gender and empowerment influences

Gender refers to socially constructed roles, behaviors, activities, and attributes that a given society considers appropriate for men and women (Mucha, 2012). It is agreed in development circles that gender and nutrition are cross-cutting issues. Hence United Nations Development Program (UNDP, 2011) affirmed the mutual relationship between the two issues giving rise to various efforts that seek to mainstream gender into nutrition policy and programming. However, FAO (2012) reveals that gender inequality can be a cause and at the same time an effect of hunger and

malnutrition; higher levels of under-nutrition has been associated with higher levels of gender inequality.

In many countries, low status of women in society has been regarded as the primary cause of hunger and malnutrition. More so poor nutrition in society is a reflection of women lacking education, power to make decisions and economically deprived. Gender roles and injustices are a critical consideration in planning and implementing programs to improve maternal nutrition (Mucha, 2012). Similarly, lack of empowerment for women has been also regarded widely as the reason keeping them economically dependent on men by Asian Development Bank (2013). In Uganda, gender inequality is widespread and implicated to be the primary cause of persistent food insecurity, malnutrition and morbidity by World Bank (2005). While FANTA II project (2010) highlights that the ability to ensure optimum nutrition remains a challenge in Uganda because very few women have realised their rights.

However, studies have shown that integrating gender and empowerment of women in context of nutrition is a sustainable approach in mitigating hunger and malnutrition (FAO, 2012; DARA, 2012 and Ruel et al 2013). Notable though, women's empowerment dimensions have not been rigorously measured and are at times merely assumed according to International Food Policy Research Institute (IFPRI, 2013). In respect to this, Mucha (2012) revealed empowering women in society is an effective approach improving maternal and child feeding practices. This is because women are responsible for household food production, preparation and influencing decisions on food distribution and consumption. So women empowerment yields improved health and nutrition status of the entire family. Empowering women means expanding their ability to make strategic decisions especially where this ability had been previously denied to them (Ransom and Elder, 2016). Alternatively, AMREF Kenya (2014) highlights that to achieve behaviour change,

especially one that is entrenched within a community, requires empowering communities to promote the change themselves.

Using women or and children alone in the fight against malnutrition will not solve the global public health problem of malnutrition. Instead fighting malnutrition will require societies to confront this issue in its full dimension. Nutrition interventions targeting women as a vulnerable population have been indicated to be sufficiently gender sensitive by FAO (2012). Thus UNICEF calls for application of the principle of "Do no harm." Acknowledged as the fact that women are already overburdened with household and reproductive tasks (e.g. childcare, food preparation, water and firewood collection, etc.), and therefore should not be given additional tasks. So, fighting malnutrition in women alone (and thus excluding men), misses out a point. Therefore nutrition interventions should consider gender among other social factors. As Busoga continues to swim in a sea of poverty (UBOS, 2012), nutrition interventions often advanced have tended to overlook gender and empowerment dimensions. But addressing household nutrition without integrating gender and empowerment of women is like planning to prepare porridge without a stirrer. This study finds it appropriate to integrate gender and empowerment of women addressing maternal nutrition challenges since it is one of the strategic directions of scaling up nutrition intervention advocated by UNAP (2011-2016) and beyond.

2.7.4   Cultural and traditional influences

Every social group in the world has unique culture and traditions some of which are beneficial while others are not (UNHCR, 2006 and Ezeama & Ezeamar, 2014). At the same time they provide guidelines regarding acceptable foods, food combinations, eating patterns, and eating behaviors for a community. Compliance to follow guidelines creates a sense of identity and belonging for the individual. For instance a study by Alonso (2015) reveals that culture, religion and tradition

shape local diets, food preferences, intrahousehold food distribution patterns, child feeding practices, food processing and preparation techniques and health and sanitation practices. However, though their influence is localized and context-specific while the knowledge in them can be utilized to improve food and nutrition security as well as public health, evidence suggests that they are under-researched and underutilized. Inconsistencies between local and biomedical views on food and health restrict the effectiveness of information campaigns and public health care services. Based on this, culture, religion and traditional knowledge deserve a more prominent place in determining the state of maternal nutrition.

2.7.5   Religious influences

Many religions in the world have rules and codes of conduct regarding food which affect followers' food choices and behaviors (Kwon, 2015). For example, in some religions specific foods are prohibited, such as pork among Jewish and Muslim adherents. But pork is a protein-rich food with high amounts of nutrients like iron which is highly recommended for consumption during pregnancy and lactation. Within Christianity, the Seventh-day Adventists discourage "stimulating" beverages such as alcohol, which is not forbidden among Catholics (McWilliams, 2007).

2.7.6   Provider related influences

Health sector play a crucial role in addressing maternal nutrition through contacts with women during antenatal, delivery, and postnatal care; child health visits; and family planning services (Huffman et al, 2011). At all the contact points, health workers should monitor to ensure that pregnant and lactating women gain weight appropriately and at the same time get enough rest. This should be also in addition to making sure that these women are provided with at least one extra serving of staple food per day and also ensuring that they consume quality diets of vitamin

and mineral rich foods like fruits and dark green vegetables, regular intake of micronutrient supplements during pregnancy and the first three months of delivery, prevention and treatment of diseases like malaria and hookworm infections in endemic areas as well as ensuring child spacing of three years or longer (Manoff Group, 2011). But evidence showed that health workers don't really pay the desired attention to maternal nutrition (Duffy et al, 2015) yet Avula et al (2013) maintains that health needs and demands are met by health workers. In East Africa, the bulk of nutrition services are provided by health workers especially in the absence of nutritionists and dietitian (Tharaney et al 2012). More so, these health workers come from different professional background and in an attempt to satisfy their professional backgrounds they neglect maternal nutrition (Yourchuck et al, 2014).

Borrowing a leaf from FANTA II (2012), good nutrition care of women should always start with nutrition assessment which is the first critical step in improving and maintaining nutritional status. At the health facility level, it is usually part of broader medical assessment done by health workers whereas at community level, it identifies mothers who are malnourished or at risk of malnutrition caused by food insecurity and poor water, sanitation, and hygiene (WASH) so that they can be referred for a more in-depth assessment and support. It can also be used to identify medical complications that affect nutritional status, detect feeding habits that make it difficult to improve health or that increase the risk of diseases, inform nutrition messages and counseling as well as providing a concrete framework for an individual nutrition care plan which specifies nutrition goals and interventions, feasible changes in behavior and practices to meet those goals. However, despite the fact that health workers are in a powerful position to deliver effective nutrition services such as those mentioned above that are geared towards changing the undesired community practices and beliefs that affect the care and feeding of women have on many occasions ignored

maternal nutrition during delivery health services (Duffy et al, 2015 and USAID's IYCN, 2011) though their role is critical for the implementation of appropriate maternal nutrition services (Shrimpton et al 2013)

2.8   Gaps in literature

The researcher noted the following knowledge gaps and research priorities related to maternal nutrition in the literature reviewed:

1. Though nutritional status of an individual is a complex interaction between leading and underlying factors (Black et al, 2008), it is still very difficult to determine the specific underlying causes of maternal malnutrition (FANTA II, 2010).

2. Generally, although all women seem to have similar nutritional needs, their feeding habits differ due to a number of factors some of which were unique to their locality (Caulfield et al, 2015 and The United Nations University Press, 1982). More so, the nutritional needs highlighted by several studies in the literature reviewed bear little attention to the needs of most mothers in poor countries.

3. Least but not last despite poor micronutrient status of women being a global problem particularly among poor women, evidence indicates that there is very limited information on this issue. More so, comparable data on dietary intakes, dietary patterns and diet quality for women across countries is also scarce and fragmented (Arimond et al, 2011).

For that reason, the current research attempted to address those gaps indicated above by following the specific objectives of the study.

CHAPTER THREE: METHODOLOGY

3.0 Introduction

Assessing and analyzing factors that influence the state of maternal nutrition require a variety of methods and techniques. This chapter therefore exposes the methods and techniques the researcher utilized to conduct and collect the necessary data for the study. These techniques included study design, sampling design, population sample, and tools used in collecting data, measurement of variables and data analyses.

3.1 Study area

The study was carried out in Jinja district, South-Eastern Uganda. The district is surrounded by both Lake Victoria and River Nile which are sought to influence production of vegetables and a variety of other food crops. However sugar cane is the main cash crop grown in this area. The original occupants of the study area are the Basoga people but other tribes also exist. The district has three counties as already indicated in chapter one, section 1.2; Jinja municipality, Kagoma and

Butembe. Currently, these counties are further split into 11sub-counties, 69 parishes and 617 villages.

3.2   Study design

Cross-sectional descriptive study design was used to collect both qualitative and quantitative data. This design was preferred because it was relatively cheaper and had the ability to collect diverse data within a short period the researcher had. The study mainly used quantitative methods and considered indicators as described per research questions. Other relevant information to the study was obtained from in-depth interview with in-charges of antenatal or postnatal clinics. This applied qualitative methods to provide textual descriptions of how health workers experience delivery of maternal nutrition services. This was intended to provide information about provider-related perspective of maternal nutrition in terms of the ideal maternal nutrition care focusing on nutrition status assessments, taking of dietary history, appropriate micronutrient supplementation, disease prevention and treatment as well as supportive lifestyle and care of the respondents. This was in addition to establishing the role played by interaction of the intangible factors such as socio-demographic, geo-economic and socio-cultural factors like gender, religion tradition etc. whose role is significant for research (Mondal & Shitan, 2014). When used with quantitative methods, qualitative research helps us to interpret and better understand the reality of a given situation and the implications of quantitative data (Creswell, 2009).

3.3   Target population, study population and study unit

3.3.1   Target population

This consisted of women of childbearing age (15-49 years) in their homes or at antenatal clinics of health facilities in Jinja district.

3.3.2   Study population

Since a study population is the sub population taken from the target population for doing a study (Day, 2008), therefore pregnant and lactating mothers became the study population since they were the main participants of the study.

3.3.3   Study Unit

The study unit consisted of a single mother who was either pregnant or breastfeeding in Jinja district at the time of the study.

3.3.4   Inclusion criteria

Participants eligible for this study were either pregnant or breastfeeding women between the age of 15-49 years and a resident of Jinja district at least for the past 6 months. But the study only included participants who went on to give informed consent.

3.3.4   Exclusion criteria

Pregnant or breastfeeding women below or above the age bracket of 15-49 years were not considered. Pregnant or breastfeeding women who were visitors or those who had not been residents of Jinja district for the past 6 months were excluded. Wet nursing mothers and breast feeding women for children above 2 years were also excluded in this study. Participants who failed to give verbal informed consent were automatically excluded from the study.

3.4   Sampling Plan and Sample Size

3.4.1   Sampling Plan

The study applied a multistage sampling. In the first step, stratified sampling was used to sample 10 government health facilities out of 15 offering antenatal and postnatal services. The health facilities were put into 4 strata as III, IV, V and VI based on the Ministry of health classification

of health facilities. III, IV, V and VI refer to health centers III, IV, V and referral hospital respectively. Each health facility in each stratum was assigned a random number. The numbers were written on a piece of paper, folded and mixed up by stratum for sampling. Four health facilities in each stratum were sampled using simple random sampling. V – District hospital and VI – Regional referral hospital had only one health facility. These had one chance of being sampled. In the second step, census method was used to collect data from every pregnant or lactating mother who was found at ANC and postnatal clinics. This were selected from the samples of health facilities (III, IV, V and the referral hospital-VI) as designated in Jinja district's three counties; Kagoma, Butembe and Jinja municipality. The respondents were then physically followed up to their homes or using phone calls as deemed appropriate. Census method was used because it ensures high degree of accuracy and suitable for heterogeneous units (Farooq, 2013). For qualitative data, in-charges of antenatal or postnatal clinics were purposively sampled for in-depth interviews. The sample unit was then determined for the respondents who were then asked to volunteer to participate in the study.

3.4.2 Sample size

The total number of women in Jinja district was 240,647 (UBOS, 2014). The number of women attending antenatal and postnatal care services in Jinja was 21,407 according to Jinja District Planning Unit (2009). So sample size was calculated using the Fishers et al (1991) formula as shown below;-

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

      Where:

n: Is the desired sample size

Z: The value corresponding to the normal deviate (confidence limit) taken as 1.96 at

95% confidence level

p: Proportion of pregnant and lactating mothers in the study population

q: Proportion of women who are not pregnant or lactating women in the population

(1-p from infinite population)

d: Is the acceptable degree of accuracy (SE) desired (0.05)

$$n = \frac{(1.96)^2 \, X \, 0.089 \, X \, 0.911}{(0.05)^2} = 124 \text{ Participants}$$

3.5   Study Variables

3.5.1   Dependent variables

Table 1:3: Illustrates Objective 1: To determine the proportion of pregnant and lactating mothers with good nutrition status in Jinja district.

Research question	Variables	Indicators
What is the proportion of pregnant and breastfeeding women with good nutrition status in Jinja district?	• Nutritional status	• Mid Upper Arm Circumference (MUAC) • Hemoglobin (Hb) level to categorize Anemia/IDA of respondents. • Presence of night blindness as an indicator of Vitamin A Deficiency

Table 2:3: Illustrates Objective 2: Describing feeding habits of pregnant and lactating mothers

Research question	Variables	Indicators
Describing feeding habits of pregnant and lactating women in Jinja district: **i). What do they eat?** **ii). How do they eat it?**	• Feeding habits	• Dietary diversity of mothers using Women's Dietary Diversity Score (WDDS) and • Food Frequency consumed per mother (Marnitez et al, 2013) • Descriptions to be examined per demographic, geo-economic & socio-cultural characteristics

3.5.2   Independent variables

3.5.2.1 Objective 3: Assessing geo-economic factors influencing state of maternal nutrition

The study looked at: economic factors like household income levels, occupation of women, availability of other resources in determining the feeding habits; geographical/environment factors on feeding habits in terms of Food security – food production, food availability and accessibility, Sanitation levels – water management water supply or access to clean water, water waste management, presence of latrine/toilet, presence of drying rack, hang line for drying clothes; physical barriers like geographical characteristics (water bodies, forests, land forms etc, Housing condition; as well as Political influences like policies or bylaws on food availability and trends.

3.5.2.2   Objective 4: Establishing socio-cultural factors influencing the state of maternal nutrition

These consisted of Individual factors like Food preferences, Lifestyle, Physical activity, Nutritional knowledge and Health status and Social factors like Gender influences, Family customs, Religious influences, Cultural influences, Peer/work influences and Provider related influences that determine acceptable foods, food combinations, eating patterns, and feeding habits behaviors whereas social influences in such a way social group influences what each member eats or values in a group.

3.6   Data collection methods

Data were collected using both qualitative and quantitative approaches. A strategy for keeping data organized was created before collecting data. In this case, a questionnaire and in-depth interviewer guide was created to collect data. At the same time a code was assigned to the data collection event. The participants were recruited according to the recruitment strategy outlined in the sampling and study population. Then appointments were made with participants obtained at antenatal clinics for follow-up in their homes.

3.6.1   Questionnaire

Since the study applied a mixed study methods; quantitative and qualitative, the questionnaire used therefore contained both close- and open-ended questions. The close-ended questions were to ensure explicit options for the respondents to choose from which were very important for quantitative data collection while open-ended questions allowed respondents to give their opinions without restrictions. This was very important qualitative data as Bleuel (2015) put it. The questionnaire was chosen because the researcher found it easy to administer, relatively cheaper and versatile to collect both quantitative and qualitative data. The main objective of using a

questionnaire was to maximise response rate in order to obtain accurate relevant data for the study. To maximise the response rate, the researcher considered carefully how to administer the questionnaire, established rapport and explained the purpose of the study to those who were to respond. Accurate data was enhanced by planning what to ask, how to ask, the order to ask them as put forward by Stewart et al (2009). Deciding what to ask depended on dependent variables and independent variables. Other factors related to both dependent and independent factors which might distort the results like confounding variables. The questionnaire was interviewer administered although in cases where the mothers were educated and requested for time, we left them to fill it and get it to us later.

3.6.2   Observation checklists

This was designed to identify opportunistic observations on current feeding habits during the course of interview. The checklist was to enable identify barriers or facilitators of those current feeding habits and observing other aspects like food preparations, hygiene and sanitation practices among others.

3.6.3   In-depth interview guide

A series of in-depth interviews were undertaken with in-charges of antenatal/postnatal clinics. This helped in understanding the capacity and experience of health workers in offering maternal nutrition services to pregnant and lactating mothers. The interview provided a deeper discussion regarding key research issues and helped to develop the framework for the research. The interviewee was the expert and the interviewer the student. Questions were asked in neutral manner with follow up and probes.

3.6.4   Tools

A semi-structured questionnaire was used to capture both quantitative data and qualitative information on socio-demographics; nutritional status using anthropometry, clinical and biochemical assessment; feeding habits using both dietary diversity score and food frequency questionnaire as indicated in Appendix II. The questionnaire was also utilized in assessing various factors influencing maternal nutrition like geo-economic and socio-cultural factors. Screening of participants for inclusion or exclusion was done using three specific questions i.e. one on whether the respondent was currently pregnant or not, breastfeeding or not and the period she has been in Jinja. Those who said yes were included and those who said no or don't sure were excluded from the study.

3.6.6   Pretesting the tools

Three research assistants were trained for two days on how to administer the tools before pretesting. Pretesting of tools was done after securing permission from Jinja District Local Government authorities to conduct the study. The aim of pretesting of the tools was to test for their validity, content, reliability and consistency as well as helping the research assistants to familiarize with using the tools. Pretesting was done on the third day of the training in a randomly selected place in the study area. Debrief meeting was held on the fourth day address feedback from the pretest, questions which were found not to be properly constructed or had inconsistencies as well as containing invalid information were reviewed and corrected.

3.7 Measurements

3.7.1 Assessment of nutritional status of pregnant and lactating women

Since is no single golden standard for assessing nutritional status, the study employed the following parameters to constitute a representative nutritional status of the pregnant and lactating women in Jinja district:

3.7.1.1 Anthropometry

Anthropometry is the measure of the human body proportions particularly when chronic imbalances such as protein and energy occurs (WHO, 1995). To date, no consensus has been agreed on a single anthropometric measurement to determine nutritional status of pregnant women (Ververs, 2013). For instance, the BMI which is widely used on adults is not recommended for pregnant women and adults with oedema due to bias caused in weight gain which is not related to nutritional status (Webb & Bhatia, 2005). However, several studies have recommended the use MUAC because; it is simple, does not require prior knowledge of gestational age and narrow range of cut-off values as well as its association with LBW (Ververs, 2013; Tang et al, 2013).

MUAC is the circumference of the left upper arm, measured at the mid-point between the tip of the shoulder and the tip of the elbow (Tang, 2016). It uses specific tapes for measuring nutritional status of individuals. The cut-offs for MUAC tapes are arranged in three colours: Red – Severe malnutrition; Yellow – Moderate malnutrition and Green – normal. However, the study used UNICEF MUAC tapes (S0000249) and followed their cut-off points as follows:

Table 3:3: MUAC cut-offs for pregnant women according UNICEF

Colour of MUAC	Cut-offs	Category nutritional status
Red	0 – 21cm	Severe
Yellow	21 – 23cm	Moderate

Green	From 23cm	Normal

3.7.1.2 Assessing nutritional status according to micronutrient deficiencies

Nutritional status according to micronutrient deficiencies often present as diseases associated with consumption of diets poor in micronutrients (Manoff, Group, 2011). Pregnant and lactating women suffer from multiple micronutrient deficiencies due to poor dietary intake. This research therefore considered only VAD and IDA since research evidence indicates them to be widely prevalent especially during pregnancy and lactation while their presence means that other micronutrient deficiencies also exit in the population (Ververs, 2013).

Biochemical assessment of IDA: Biochemical assessment measures the level of nutrients in the blood, urine or feces. However, for this research it was utilized to determine anemia for estimating iron status of pregnant and lactating women. The Hemoglobin (Hb) levels of mothers were obtained from mothers' passports, books or as indicated in the antenatal or postnatal registers for their current pregnancy or lactation. Hb level obtained from the records were then categorized according to WHO grading of anemia (normal=>11g/dl, mild=10-10.9g/dl, moderate=7-9.9g/dl and severe=<7g/dl).

Clinical assessment of VAD: Clinical assessment refers to obtaining an individuals' medical history by considering signs and symptoms. Vitamin A is a fat soluble vitamin that has a critical role in maintaining healthy vision, neurological function and healthy skin. A deficiency of vitamin A leads to night blindness and can eventually cause thickening of the cornea and blindness. Clinical signs of night blindness are the most widely used sign of VAD (Webb & Bhatia, 2005). Night blindness during pregnancy and lactation is highly associated with malnutrition, anemia and

increased morbidity in women. To determine the prevalence of night blindness among pregnant and lactating women, a question on night blindness history was used.

3.7.1.3   Assessment of dietary intake and adequacy

The study used both the Dietary Diversity Score- a type of 24 hour recall and Food Frequency Questionnaires (FFQ).

Dietary Diversity Questionnaire (DDQ): Dietary diversity is a qualitative measure of food consumption that reflects household access to a variety of foods and an alternative measure of nutrient adequacy of the diet of individuals (Kennedy et al, 2010). It operates on the principle of 24 hour recall. It can be used at household and individual level. This tool was chosen because studies indicate that increased household dietary diversity reflects economic ability of households to access a variety of foods (Hoddinot and Yohannes, 2002) while individual dietary diversity relates to increased nutrition adequacy of the diets (Arimond *et al.,* 2010). It is rapid, user-friendly and easily administered at low-cost tool and at the same time scoring and analysis of data is straightforward.

The proposed number of food groups to be included in the DDQ was based on Women Dietary diversity Score (WDDS) as put forward by (FAO, 2010) in its guidelines for measuring household and individual dietary Diversity. These food groups are nine in number and include: Starchy staples; Dark green leafy vegetable (DGLV); Other Vitamin A rich fruits and vegetables; Organ meat; Meat and fish; Eggs; Legumes, nuts and seeds as well as Milk and milk products. Therefore the potential score will be from zero to nine (0-9). However, since WDDS puts more emphasis on micronutrients than economic access to food, assessing pregnant or lactating women's dietary diversity further put much more focus on Vitamin A rich food sources (Plant based and animal

based) and Iron rich food sources (Animal based). This helped to understand mothers consuming both Vitamin A and Iron rich foods or those just consuming only one type of micronutrient foods.

Food frequency questionnaire (FFQ): FFQ is a checklist of foods and beverages designed with options relating to frequency of food consumption in a specified time (e.g. per day, per week, per month or per year). It is used to collect dietary data from a large group of individuals (100 individuals or more) and is normally self-administered, although at times interviewer administered and telephone interview is another possible modification (Marnitez et al, 2013). FFQ collects data about intake within a specified timeframe (e.g. in the past 1 year) and designed to capture regular dietary intake.

Determination of food frequency consumption per mother: Since no single food has got all the required nutrients (Wolchover, 2012), this study determined food frequency consumption per mother by grading it as low (when a mother was consuming three or less food groups), average (when four to six food groups were consumed) and high (when more than six food groups were consumed).

3.7.2 Determination of sanitation levels and housing conditions

Components sanitation or housing conditions was observed and then ranked; very good =5, good = 4, fair = 3, bad = 2 and very bad = 1. The ranks was added together to obtain the average. The average rank was then used to calculate the percentages for the overall raking of the condition of sanitation or housing (0 – 20% = very bad, 21 – 40% = bad, 41 – 60% = fair, 61 – 80% = good and 81 – 100% = very good).

3.7.4 Determination of nutrition knowledge of pregnant and lactating women

A total of nine questions were used for scoring to develop maternal nutritional knowledge index. The aspects of maternal nutrition examined included extra serving, weight gain, feeding practices, food groups and issues of hygiene and sanitation. A response was considered valid if it provided a correct answer. Two points were given to a valid response, one for a trial and zero for invalid response. A total score was calculated out of 18 points and used as maternal nutrition knowledge indicator. The respondents overall knowledge on maternal nutrition was then be rated on scale of 0-18 points and the respondents graded using 3-cut off points as follows; 1=Low knowledge (0-6 points) 2=Average knowledge (7-13 points) 3=High knowledge (14-18 points).

3.8 Data sources

The researcher used both primary and secondary sources. Primary data was collected using the semi-structured and structured questionnaires, observation checklist and interviews while secondary data was collected by reviewing already existing data in the records.

3.8.1 Document review to collect data on Hb level of mothers

According to Lincoln and Guba (1985) in Furman (2012), document review generates valuable information since they are readily available, temporally stable, rich in context, legally unassailable, and emotionally nonreactive. For this research, the documents that were reviewed include medical records at ANC and postnatal clinics like registers and individual mother's antenatal or postnatal records like the mother's passports or books. The purpose of reviewing documents was to the current nutritional status records especially their Hb levels. Other scenarios like the health status of the mother when Hb level was measured was also included. This helped the researcher to understand level of Hb at the particular time when it was measured. Record review was also used to validate participant iron status, other actions and perceptions.

3.9   Data analysis

The filled questionnaires were checked for completeness and then data was entered into the computer. The fields were checked and validated before analysis. Quantitative data from questionnaires were coded, entered and analyzed using the SPSS for Windows version 20.0. Descriptive statistics was then performed into frequency tables, charts, graphs and percentages. Multivariate analysis using multiple linear regression test were computed and relationships made between state of maternal nutrition and socio-demographics predictors such as age, parity, marital status, sex of the household head, location etc. The influence of geo-economic and socio-cultural factors was also established. Qualitative data from in-depth interviews were analyzed using thematic analysis which was used to examine data within themes and therefore used to backup quantitative data. The themes were coded within the raw data by recognizing important moments in the data and encoding it prior to interpretation. The interpretation of these codes was included by comparing theme frequencies, identifying theme co-occurrence, and graphically displaying relationships between different themes (Greg & Namey, 2012).

3.10   Plan for dissemination of research findings

Research is termed incomplete without dissemination of its findings. The researcher therefore intends to present the study findings in discussions during the national and district workshops on health and nutrition. The researcher also intends to disseminate the findings of this research to the policy makers and masses through newspapers, TV and radio talk shows.

Feedback refers also to a downward "accountability", to create and assert rights to knowledge about decisions made by others, rather than treating "feedback" almost as an optional item. (Rick Davies, 2004). Placing feedback in wider forums such as government agencies, non-government

agencies and community-based organizations working on maternal and child health and nutrition as well as those on livelihood produce a range of benefits.

The researcher being a student must present the study findings to the instated board on research of the Uganda Martyrs University. The researcher has to defend before the research board and students.

3.11   Ethical consideration

Since the study involved interviewing human subjects the researcher made every effort to address ethical considerations during the planning and implementation of this study. This determined is what acceptable and unacceptable behaviour in research. The researcher observed the three ethical principles cited in Belmont report of 1979 as put forward by Gill et al (2008) that provides research with regulations and guidelines; autonomy **-** the right of participants to determine which activities they would or would not participate in, beneficence - the obligation of the researcher to maximize benefits for the participants while minimizing risk of harm to them and justice which demanded equitable selection of participants such as minors.

3.11.1 Ethical approval

Ethical approval to conduct this research was obtained from research and ethics committee of Uganda Martyrs University through Faculty of Health Sciences, Uganda Martyrs University. After approving the study, a letter of introduction was then issued. This letter of introduction was attached to a brief study protocol and forwarded to Chief Administrative Officer, Jinja District Local Government for permission. The letter of permission from the Chief Administrative Officer then introduced me to the Director of Health services who in turn wrote letters introducing me to the health facilities.

3.11.2   Interviewing of minors

Right from the design, the study population (15-49) included participants regarded as minors by the constitution of Uganda i.e. those below 18 years. So for the researcher to full adhere to the principle of justice mention above in section 3.11.1, it required him address the fundamental concerns governing ethical issues such as vulnerability, consent and confidentiality (Gill et al, 2008). Therefore, the researcher did not directly collect all the data from the minor but instead adult's (mainly the mother or caretaker) opinion on the phenomenon studied was sought. This means that interviews to a minor was done in the presence of her mother or caretaker. This was according to evidence from a study by Scot (2000) who stipulates that there is a tendency to accredit adults with greater knowledge and experience than children, even in matters that affect children directly.

3.11.3   Informed consent

The study provided a written informed consent form to the participants before each interview. The purpose was to explain to potential participants the objective of the study and make them understand that: Data collected was for research purposes only; participation was voluntary and not to be coerced; participation were not intended to assess daily work or activities and how they were to benefits from the study before they were offered the consent form to sign.

3.11.3 Confidentiality

A number of steps were undertaken to protect the participants' confidentiality: Personal identifiers were not collected from the participants i.e. the study used codes instead of names of participants on the questionnaires; the study ensured that interviews were conducted in confidential setting i.e. one-on-one; details of participants no to be released even to the research team unless the clients agrees to do so.

3.11.4   No harm to the participants

The researcher had the obligation to assure participants that, there were no foreseeable risks as a result of participation. However, one might feel uncomfortable from a prick to draw blood samples for anemia screening.

3.11.5   Incentive

The research team labored to assure participants that there were no incentives for on to participate in the study. However, at the end of the study the participant got a chance of learning their nutritional status and as well as whether they were anemic or not.

3.12   Research limitation

In most health facilities, procedures like testing for anemia/Hb analysis were not being done because of inadequate resources so the researcher had to incur expenses to facilitate them to organize for Hb analysis for pregnant and lactating mothers. This was costly, time consuming and changed the plan of data collection as the researcher had to wait until it was fulfilled.

This study was unable to conclude on over-nutrition because the anthropometric method of MUAC commonly recommended for pregnant women by various studies does not cater for assessing of over-nutrition. So, only under-nutrition was concluded on.

Some foods reported by participants might not actually be the food eaten all year round. But because of time constraints, it was complicated for the researcher to investigate seasonality, periods of greatest food shortages and plenty especially in rural areas.

Because of content scope of the study, the influences of nutritional knowledge, level of education and economic status of husbands or household heads on the state of maternal nutrition in Jinja

district were not well assessed. Yet the researcher realised these might also be contributing to the state of maternal nutrition.

CHAPTER FOUR:

PRESENTATION, ANALYSIS AND INTERPRETATION OF RESULTS

4.0 Introduction

This chapter presents the analysis and interpretation of the research findings based on the objectives of the study. These are: determining the proportion of pregnant and lactating mothers with good nutritional status; describing the feeding habits of pregnant and lactating mothers; assessing the geo-economic factors influencing maternal nutrition; and then establish the socio-cultural factors influencing maternal nutrition in Jinja district.

4.1 Socio-Demographic Characteristics

The researcher reached out to a total of 124 participants; 72 were pregnant, 48 lactating and 4 were both pregnant and lactating at the same time. These participants were between age brackets of 15-49 years. The participants were drawn from 4 health centers (HC) III, 4 HCIV, one general hospital and one referral hospital using census method of sampling. The tables and figures below provide the summary of socio-demographic characteristics of the study participants.

Figure 1:4: Shows location of participants in percentages
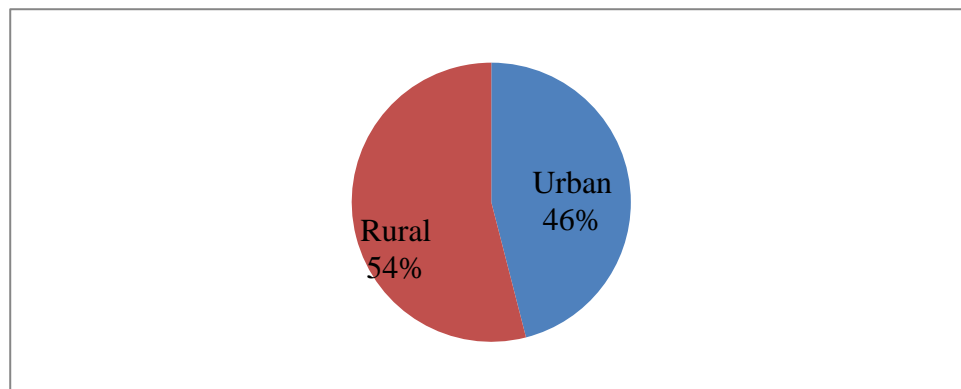
Source: Primary data

Rural ranked high with 54% participants because rural based population was more than urban based population in Jinja.

Figure 2:4: Indicates age groups of the study participants
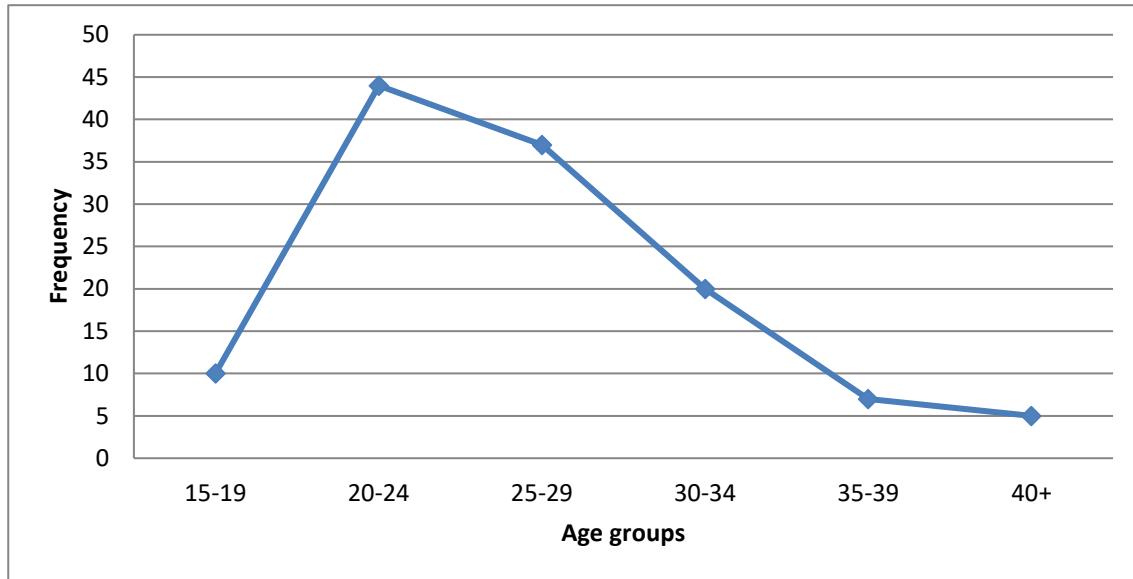
Source: Primary data

The graph above indicates age groups of the participants. Low involvement of age group 15-19 years was because the majority of participants in this age group were singles and still in parents' homes and became mothers by coincidence though few ended up in marriage. In relation to this, one mother of a participant found at Butagaya health center said;

> *I have pain inside my heart; how can you leave all my money at school and become pregnant. I wish I used it in a more realistic business.*

Many participants in age groups 15 -19 years were also observed to be emotionally stressed meaning that they were not ready for the ready to be mothers. But the event of sharp rise in the number of participants between 15 – 19 years and 20 – 24 years was a clear indication of the rate at which participants were becoming mothers. The data shows a peak f at 20 – 24 years which means that by this age, the majority of women were either pregnant or lactating hence the reason for the responses (35.8%). However, the majority of participants were between the age groups of 20 – 24 and 25 – 29 years because these were most appropriate age for marriage and reproduction.

The sloping down from 25 – 29 years to 40+ years was an indication of an on-set of family planning and then menopause starting at 40 years.

Figure 3:4: Shows percentage of the sex of household head in participants' homes

Female
14%
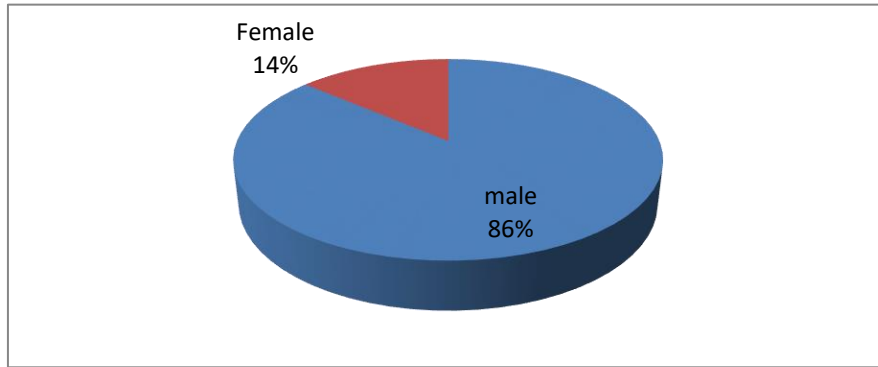
male
86%

Source: Primary data

The findings brought it out that most of the participants were under household headship of males because 86% response indicated so. This confirmed that they were either married or living in a male supported households.

Figure 4:4: Indicates percentage parity of participants

53.3

Percentage

16.9

16.9

12.9

None   1 to 2   3 to4   5+
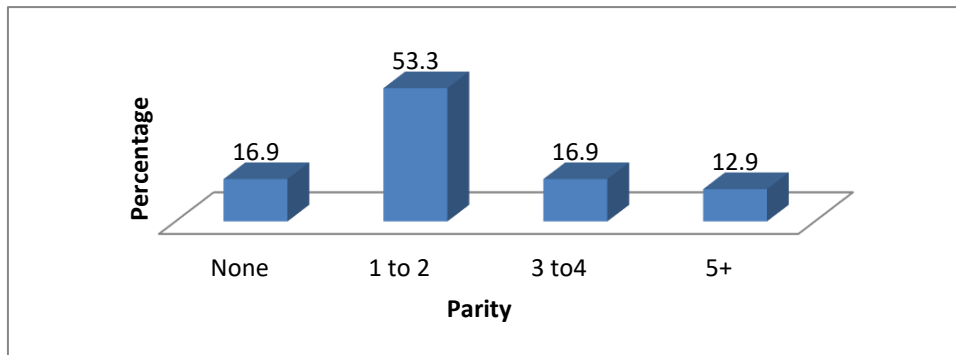
Parity

Source: Primary data

Parity shows similarity with age groups of participants illustrated in **Figure 2:4**. The peak of parity of participants was at 1 to 2 children corresponds to the age group of 20 – 24 years. The decline in percentage parity was seen as parity tends towards 5+ children. The reasons are similar to that

given for age groups. These are the most reproductive ages for women reported in Uganda according to UDHS (2011).

Table 1:4: Presents marital status of participants

Marital status	Frequency	Valid percentages
Married monogamy	82	66.1
Single	18	14.5
Married polygamy	17	13.7
Separated/divorced	5	4.0
Widowed	2	1.6

Source: Primary data

Married monogamy scored highest with 66.1% of participants followed by single mothers, married polygamy, separated/divorce and then widowed. The trend was in that order because most women were positive about their marriages and monogamous marriage in particular.

Figure 5:4: Shows ranking of participants according to their level of education
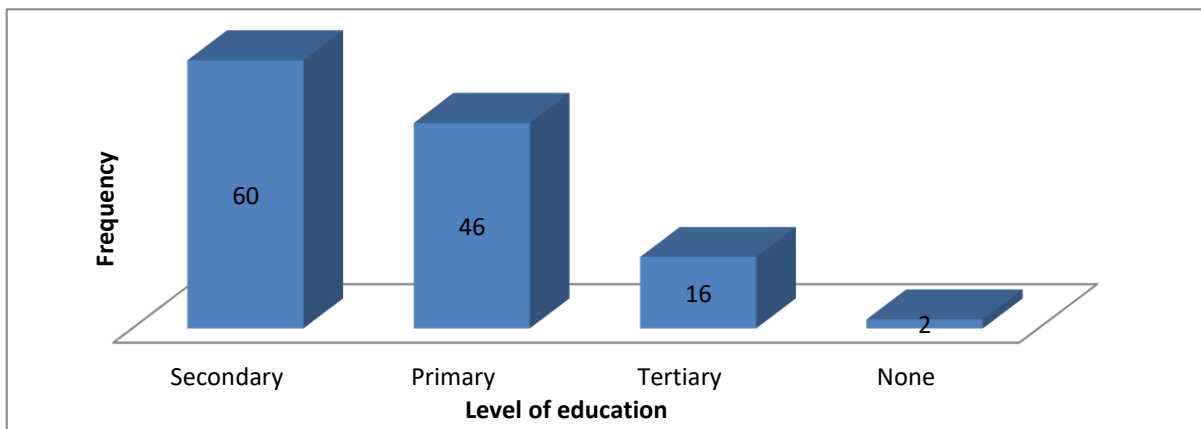
Source: Primary data

The findings indicated in Figure 4:4: indicates that most of the participants (60%) attained secondary as their highest level of education followed by those who attained primary (46%)

Table 2:4: Shows education level of participants

Religion	Frequency	Valid Percentage
Anglican	37	29.8
Pentecostal	30	24.2
Catholic	28	22.6
Muslims	27	21.8
Others	2	1.6

Source: Primary data

The participants in the study were majorly distributed in the four major religious sects with Anglican slightly contributing more participants to the study.

Table 3:4: Shows ranking of participants according to tribe/ethnicity

Ethnicity/tribe		
Basoga	71	57.3
Baganda	19	15.3
Banyankole	7	5.6
Tsamia	5	4.0
Itesots	5	4.0
Bagisu	4	3.2
Bagwere	4	3.2
Acholi	3	2.4
Luo	3	2.4
Batooro	2	1.6

| Tanzanian | 1 | 0.8 |

The Basoga were the dominant tribe with 57.3% because the study was carried out in their land. Their Baganda followed up with 15.3% as they are neighbours to the Basoga. However, other tribes like Banyankole, Basamia, Bagishu, Itesots, Bagwere, Acholi, Batooro and a Tanzanian also participated in the study.

Figure 6:4: Demonstrates the employment status of participants
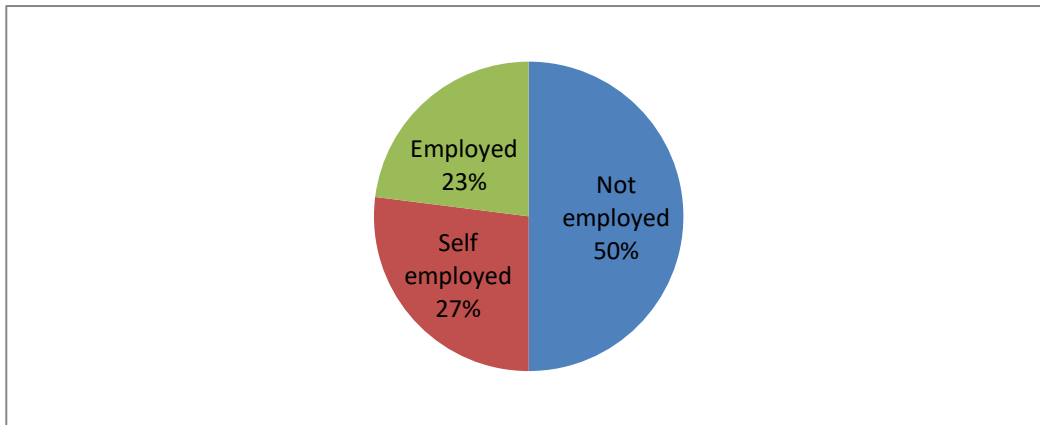
The majority of the participants (50%) reported that they were not employed while the rest were economically active (either employed or doing business). This was visible in terms of appearance, the items they carried to health centers and at their homes.

4.2 Proportion of participants with good nutritional status

Normally, nutritional status is evaluated based on anthropometry, clinical, biochemical and dietary assessment. However, MUAC for anthropometry, Hb level for biochemical and presence of night blindness as a clinical assessment were used to determine nutritional status while dietary assessment was simultaneously looked at to explain the differences.

Figure 7:4: Illustrates proportion of participants across the categories of nutritional status
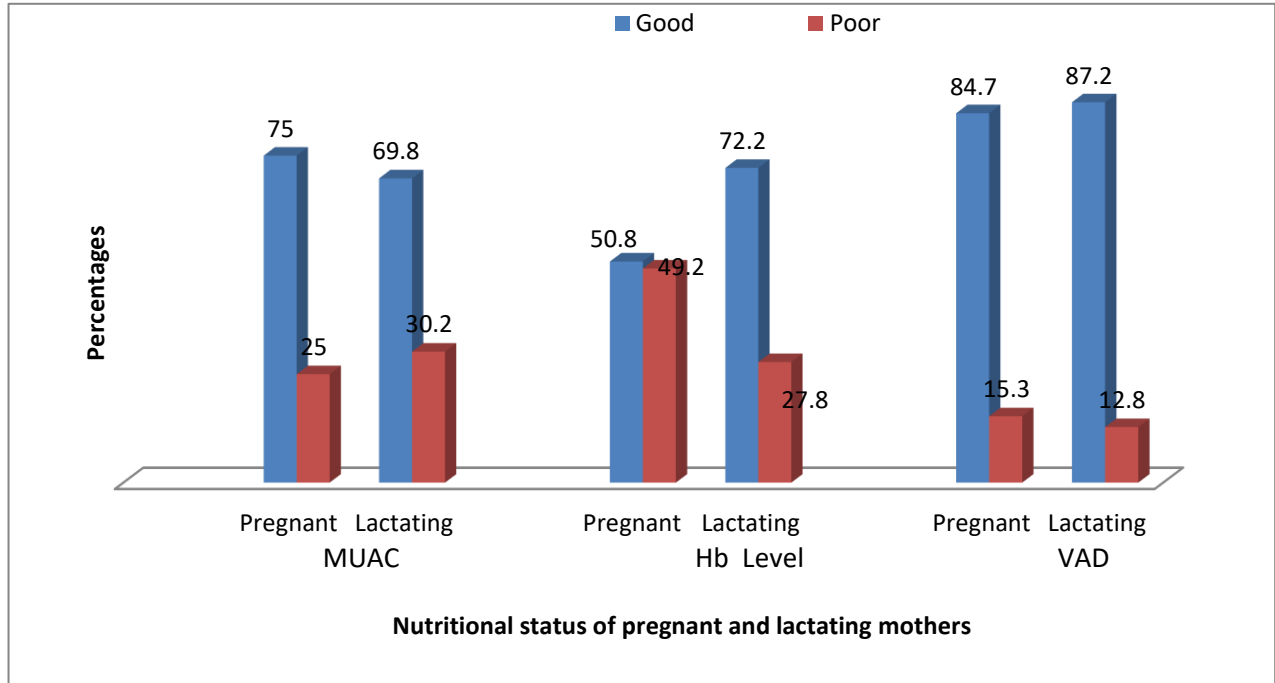
Source: Primary data

The data in **Figure 7:4** above demonstrates a poor state of maternal nutrition for Jinja district. The data also show clear variations in the categories of nutritional status of participants according to the three indicators used. However, the poorest state of maternal nutrition was exposed by nutritional assessments based on Hb level where only 50.8% had good nutrition while 49.2% were anemic. Since 50% of anemia prevalence is due to iron deficiency (Stevens et al, 2013), it means that 24.6% of pregnant women and only 13.9% of their lactating counterparts had IDA. Though anemia has so many causes, nutritionally, it is caused by diets low in vitamin and minerals. Therefore inadequate consumption of diverse diet is often implicated in addition to poor intake of micronutrient supplements.

Wasting according to MUAC among the participants exposed a different trend with lactating mothers being badly off compared to pregnant women. Lactating mothers had poorer nutritional status compared to pregnant women. Physiological changes such as weight gain during pregnancy

might be the cause for the difference in variation in nutritional status between the pregnant and lactating women. But generally, wasting was another challenge exposed by this study. Wasting majorly presents when there are chronic imbalances such as protein and energy especially as a result of famine. Poor feeding habits like food avoidances and preferences have also been indicated to be a cause.

However, low proportion of participants with VAD (might be due to the fact that Uganda has been piloting breeding and dissemination of orange-fleshed sweet potatoes (OFSP) bio-fortified with vitamin A. An intervention carried out by the government in conjunction with USAID to improve household nutrition and agricultural livelihood through production and consumption of OFSP since 2007. Consumption of OFSP which was highly promoted on radios and through drama in of Jinja district might be responsible for the reduced proportion of VAD from 31% reported by FANTA II (2010) to be affecting pregnant and lactating women in Busoga sub-region in South-Eastern Uganda.

4.3.2   Influence of socio-demographic factors on nutritional status

To determine the relationship between nutritional status and socio-demographic characteristics, multivariate analysis was performed using Multiple Linear Regression (MLR) model and the outcome was shown as in Table 4 below.

Table 4:4: Shows Multiple Linear Regression analysis of nutritional status against socio-demographic factors

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.407a	.166	.094	.488

a. Predictors: (Constant), Employment status of participants, Tribe of the participant, Sex of the household head, Level of education, Religion of participant, Location of the participant, Number of children produced by participant, Age of the participant, Marital status of the participant

From **Table 4:4** above R Square (0.166) indicates that 16.6% of the variations in nutritional status were explained by the changes in the socio-demographic characteristics hence the model is a poor fit.

Table 5:4: Represents coefficients of the regression model

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.474	.377		9.210	.000
	Location of the participant	-.217	.097	-.211	-2.233	.028
	Number of children produced by participant	.106	.067	.191	1.592	.114
	Sex of the household head	-.528	.197	-.358	-2.681	.009
	Age of the participant	-.076	.051	-.180	-1.492	.139
	Marital status of the participant	.229	.068	.448	3.388	.001
	Level of education	-.070	.069	-.094	-1.011	.314
	Religion of participant	-.026	.042	-.056	-.614	.541
	Tribe of the participant	.020	.017	.112	1.217	.226
	Employment status of participants	-.020	.058	-.033	-.347	.729

a. Dependent Variable: Nutritional status of participant

The coefficient **Table 5:4** above presents the regression model where the predicting variables; location, sex of the household head and marital status of participants had P values 0.028, 0.009 and 0.001 respectively that were less than 0.05. This showed that nutrition status greatly depended on these demographic characteristics of location, sex of the household and marital status. However the other predictors: age, level of education, religion, tribe, employment status and children produced by the participant do not significantly affect the nutrition status.

4.3   Feeding habits of participants

Feeding habits of participants were obtained using Dietary Diversity Questionnaire (DDQ) derived from Food and Agriculture Organisation (FAO) of 2010. However, the study was focused on food

groups indicated in Women's Dietary Diversity Score (WDDS) and Food Frequency Questionnaire (FFQ). The aim of assessing for the feeding habits of participants were to describe what actually is their dietary intake and adequacy.

4.3.1 Dietary diversity

Figure 8:4: Dietary Diversity Score per food group eaten by participants
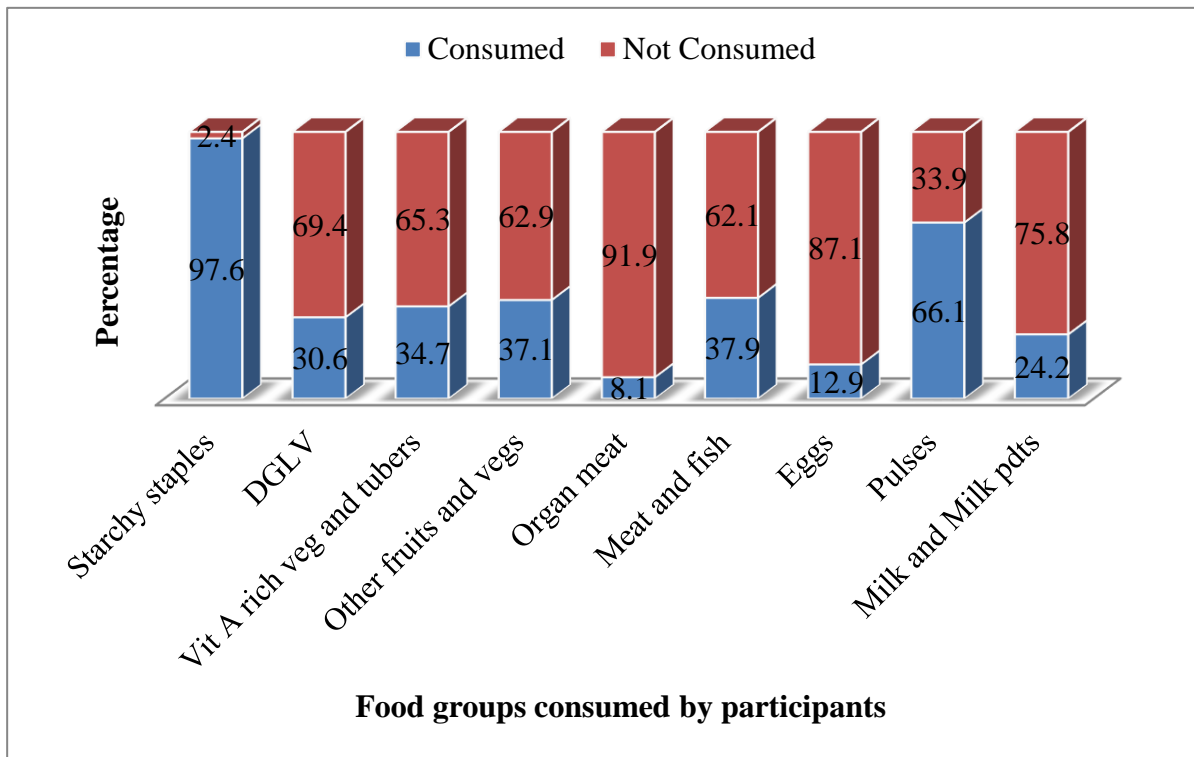
The study findings presented above in Figure 7:4 above demonstrates that very few participants were consuming micronutrient rich foods like organ meat (8.1%), eggs (12.9%), DGLV (30.6%) and vitamin rich fruits, tubers & vegetables (34.7%) compared to low micronutrient food groups such as starchy staples (97.6%) and pulses (66.1%). Critical analysis DDS further indicated that though micronutrient rich foods were least consumed by the participants, animal based micronutrient foods were much more neglected compared to plant micronutrient rich food.

4.3.1.2   Consumption of micronutrient rich foods

Iron rich food mainly originate from animal sources (heme iron which is highly bioavailable) like organ meats, meat and fish etc while vitamin A rich foods are both plant based like DGLV and animal based e.g. eggs. Plant based vitamin A foods were readily accessed as it was available in their gardens and also relatively cheaper compared to iron rich foods.

Table 6:4: Presents consumption of micronutrient foods by participants

Micronutrient rich foods	Percentage of participants	
	Consuming	Not consuming
Iron rich foods	36	64
Vitamin A rich foods	65	35

Source: Primary data

The data showed that the majority of participants (64%) were not consuming iron rich foods. This was because iron rich foods come from animal sources yet few owned these animals. These foods were also expensive compared to their income levels. Only 36% of them were affording these foods. However, the majority (65%) were consuming vitamin A rich foods because some of these foods were cheaper and readily accessed by the participants.

4.3.1.3   Influence of geo-economic factors on consumption of micronutrient rich foods

Table 7:4: Demonstrates Multiple Linear Regression analysis of consumption of vitamin A rich foods against geo-economic factors

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.804[a]	.647	.212	1.132

a. Predictors: (Constant), Eating away from home by respondent, Lack of food in area but plenty in other areas , Freq meal skipping coz of lack of money, Items used by respondents to cook, Main source of income, Poor Feeding of women attributed to poor political, Main use of the food crops, Animals reared by respondent, Main use for animals reared, Contribution to HH food security, Variety Of Foods missed, Housing conditions of respondents, Meal skipping due to lack of money, Sanitation Conditions of respondents, Annual income of respondent, Freq of missing variety of foods coz of lack of money.

In Table 7:4: above, R Square (0.647) shows that 64.7% of the variations in the consumption of vitamin A rich foods were explained by the changes in geo-economic factors hence the model is a good fit.

Table 8:4: Shows confidents of the regression model

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.778	3.093		.251	.805
	Main source of income	-.052	.209	-.049	-.247	.809
	Main use of the food crops	.375	.134	.740	2.799	.015
	Animals reared by respondent	-.116	.392	-.070	-.296	.772
	Main use for animals reared	.230	.370	.190	.620	.546
	Annual income of respondent	.639	.262	1.074	2.438	.030
	Housing conditions of respondents	.856	.864	.413	.990	.340
	Sanitation Conitions of respondents	.420	.833	.243	.504	.623
	Meal skipping due to lack of money	-.999	.990	-.365	-1.009	.331
	Freq meal skipping coz of lack of money	-.497	.903	-.284	-.550	.592
	Variety Of Foods missed	-.471	1.591	-.150	-.296	.772
	Freq of missing variety of foods coz of lack of money	.035	.711	.026	.049	.962
	Lack of food in area but plenty in other areas	-1.042	.448	-.629	-2.327	.037
	Contribution to HH food security	-.140	.366	-.093	-.383	.708
	Poor Feeding of women attributed to poor political	.042	.406	.023	.103	.920
	Items used by respondents to cook	-.449	.339	-.350	-1.324	.208

Eating away from home by respondent	.998	.593	.390	1.685	.116

a. Dependent Variable: No. of participants consuming Vitamin A rich foods

The coefficient **Table 8:4**: shown above reveals that the regression model where the predicting variables; main use of food crops, annual income of participants and lack of food in the area but plenty in other areas (geographical distribution of foods) had P values 0.015, 0.03 and 0.037 respectively that were less than 0.05 hence demonstrating that consumption of vitamin A rich foods greatly depended on these geo-economic factors. However, the remaining geo-economic factors such as main source of income, housing status, sanitation levels, variety foods missed among others did not significantly affect the consumption of vitamin A rich foods.

Table 9:4: Shows Multiple Linear Regression analysis of consumption of iron rich foods against geo-economic factors.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.808a	.654	.163	.372

a. Predictors: (Constant), Pregnant or Lactating status of respondent, Annual income of respondent, Poor Feeding of women attributed to poor political, Variety Of Foods missed, Animals reared by respondent, Main use of the food crops, Eating away from home by respondent, Main source of income, Items used by respondents to cook, Contribution to HH food security, Lack of food in area but plenty in other areas , Frequency meal skipping coz of lack of money, Main use for animals reared, Housing conditions of respondents, Meal skipping due to lack of money, Sanitation Conditions of respondents, Freq of missing variety of foods because of lack of money

In the **Table 9:4**: above R square (0.654) means that 65.4% of the variations in consumption of iron rich foods are explained by the changes in the geo-economic factors hence the model is a good fit.

Table 10:4: Represents the regression coefficient model

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.696	1.019		1.664	.122
	Main source of income	-.091	.069	-.274	-1.326	.210
	Main use of the food crops	-.049	.044	-.301	-1.102	.292
	Animals reared by respondent	-.126	.129	-.239	-.976	.348
	Main use for animals reared	-.215	.122	-.558	-1.763	.103
	Annual income of respondent	-.086	.088	-.452	-.971	.351
	Housing conditions of respondents	.403	.293	.609	1.374	.194
	Sanitation Conditions of respondents	-.143	.275	-.260	-.519	.613
	Meal skipping due to lack of money	.465	.326	.532	1.427	.179
	Freq meal skipping coz of lack of money	-.029	.299	-.052	-.097	.924
	Variety Of Foods missed	-.003	.526	-.003	-.005	.996
	Freq of missing variety of foods coz of lack of money	.113	.236	.270	.481	.639
	Lack of food in area but plenty in other areas	-.086	.165	-.162	-.518	.614
	Contribution to HH food security	.101	.120	.210	.839	.418
	Poor Feeding of women attributed to poor political	.089	.135	.155	.658	.523
	Items used by respondents to cook	.025	.115	.061	.216	.833
	Eating away from home by respondent	.016	.210	.020	.076	.941
	Pregnant or Lactating status of respondent	-.041	.140	-.063	-.290	.777

The coefficients **Table 10:4** above presents the regression model where all predicting factors were significant enough to affect consumption of iron rich.

4.3.1.4: Influence of socio-cultural factors on consumption of vitamin A rich foods

Table 11:4: Represents Multiple Linear Regression Analysis of consumption of vitamin A rich foods against individual influences of participants

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.962a	.926	.677	.762

a. Predictors: (Constant), Hookworms suffered from in the last month, Nutrition knowledge of respondents, Physical activities respondent engages in, Respondents favourite drinks, Respondents favourite food, Condition affecting appetite of respondents, Foods Usually eaten away from home, Food preparation preference, Name of nutrition condition that requires care, respondent has suffered from malaria last month

In the **Table 11:4**: above R square (0.962) means that 96.2% of the variations in consumption of vitamin A rich foods are explained by the changes in the individual factors of participants hence the model is an excellence fit.

Table 12:4: Illustrates regression coefficients model

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-.866	6.078		-.142	.896
	Foods Usually eaten away from home	-1.231	1.167	-.430	-1.055	.369
	Food preparation preference	.931	.655	.534	1.423	.250
	Physical activities respondent engages in	-.014	.277	-.018	-.051	.963
	Respondents favourite food	-.445	.896	-.165	-.497	.654
	Respondents favourite drinks	.638	.822	.202	.777	.494

	B	Std. Error	Beta	t	Sig.
Nutrition knowledge of respondents	1.514	.489	.603	3.093	.054
Condn affecting appetite of respondents	.050	.689	.019	.073	.946
Name of nutition condn that requires care	-.049	.467	-.032	-.105	.923
respondent has suffered from malaria last mnth	.026	1.283	.010	.020	.985
Hookworms suffered from in the last month	.076	.330	.108	.232	.832

a. Dependent Variable: No. of participants consuming Vit A rich foods

The coefficients **Table 12:4** above presents the regression model where no individual factors of participants were significant influence consumption of vitamin A rich.

Table 13:4 : Indicates Multiple Linear Regression analysis of consumption of vitamin A rich foods against social influences of participants

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.415ª	.172	.088	1.237

a. Predictors: (Constant), micronutrient supplements supplied by health facilities/orgs, Religious influence on food, Most privileged to be served quality food home, Reduction on household work while pregnant, Food that respondents culture & family prohibits, Health worker role in improving nutrition, Presence of organizations that offer maternal nutrition, Influence by friends on eating habits, Decision maker on food eaten in a home, Food that respondents culture/family encourages, Motivation of respondents by nutrition services provided

From **Table 13:4:** above R Square (0.1) indicates that 17.0% of the variations consumption of vitamin A rich foods are explained by the changes in the social factors of participants hence the model is a poor fit.

Table 14:4: Represents regression coefficient model

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.695	.882		1.921	.057
	Influence by friends on eating habits	.006	.255	.002	.023	.981
	Food that respondents culture & family prohibits	.111	.186	.064	.598	.551
	Food that respondents culture/family encourages	.245	.174	.152	1.411	.161
	Decision maker on food eaten in a home	-.166	.173	-.102	-.961	.339
	Most privileged to be served quality food home	.177	.121	.157	1.462	.147
	Reduction on household workload while pregnant	-.747	.251	-.267	-2.979	.004
	Religious influence on food	.063	.152	.038	.415	.679
	Health worker role in improving nutrition	.522	.370	.223	1.411	.161
	Motivation of respondents by nutrition services provided	-.138	.367	-.059	-.376	.708
	Presence of organizations that offer maternal nutrition	.274	.273	.092	1.003	.318
	micronutrient supps supplied by health facilities/orgs	.071	.266	.025	.269	.789

a. Dependent Variable: No. of participants consuming Vit A rich foods

The **Table 14:4** above of coefficients presents the regression model where only reduction of household workload during pregnancy or lactation significantly affects the consumption of vitamin A rich foods while the predictors like peer influence, Food that respondent's culture & family prohibits etc don't significantly affect the consumption of vitamin A rich foods.

4.3.1.5 Influence of socio-cultural factors on consumption of iron rich foods

Table 15:4: Shows Multiple Linear Regression analysis of consumption of iron foods against individual influences of participants

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.306[a]	.094	.001	.479

a. Predictors: (Constant), micronutrient supplements supplied by health facilities/orgs, Religious influence on food, Most privileged to be served quality food home, Reduction on household work while pregnant, Food that respondents culture & family prohibits, Health worker role in improving nutrition, Presence of organizations that offer maternal nutrition, Influence by friends on eating habits, Decision maker on food eaten in a home, Food that respondents culture/family encourages, Motivation of respondents by nutrition services provided

From **Table 15:4** above R Square (0.306) indicates that 30.6% of the variations in consumption of iron rich foods are explained by the changes in the individual factors of hence the model is a poor fit.

Table 16:4 Indicates coefficients of the regression model

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.487	2.554		.974	.402
	Foods Usually eaten away from home	-.699	.490	-.631	-1.426	.249
	Food preparation preference	-.338	.275	-.502	-1.229	.307
	Physical activities respondent engages in	.312	.116	1.011	2.683	.075
	Respondents favourite food	.270	.376	.258	.716	.526
	Respondents favourite drinks	.708	.345	.581	2.050	.133
	Nutrition knowledge of respondents	-.498	.206	-.513	-2.421	.094

	Unstandardized Coefficients	Standardized Coefficients	t	Sig.
Condition affecting appetite of respondents	-.139	.289	-.139	-.482	.663
Name of nutrition condition that requires care	.148	.196	.247	.756	.505
respondent has suffered from malaria last month	-.730	.539	-.723	-1.354	.269
Hookworms suffered from in the last month	.104	.139	.380	.749	.508

a. Dependent Variable: No. of participants consuming Iron rich foods

The **Table 16:4** of coefficients above presents the regression model where none of the individual characteristics/factors of participants were significant enough to affect the consumption of iron rich foods

Table 17:4: Illustrates Multiple Linear Regression analysis of the consumption of iron rich foods against social influences of participants

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.955[a]	.912	.619	.320

a. Predictors: (Constant), Hookworms suffered from in the last month, Nutrition knowledge of respondents, Physical activities respondent engages in, Respondents favourite drinks, Respondents favourite food, Condition affecting appetite of respondents, Foods Usually eaten away from home, Food preparation preference, Name of nutrition condition that requires care, respondent has suffered from malaria last month

From **Table 17:4** above, R Square (0.955) indicates that 95.5% of the variations in the consumption of iron rich foods are explained by the changes in the individual factors of participants hence the model is an excellent fit.

Table 18:4: Represents coefficient of the regression model

Coefficients^a

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.

	B	Std. Error	Beta		
(Constant)	1.319	.341		3.865	.000
Influence by friends on eating habits	.125	.099	.130	1.261	.210
Food that respondents culture & family prohibits	-.057	.072	-.088	-.791	.431
Food that respondents culture/family encourages	.096	.067	.161	1.431	.155
Decision maker on food eaten in a home	.018	.067	.030	.266	.791
Most privileged to be served quality food home	-.022	.047	-.052	-.459	.647
Reduction on household work while pregnant	-.101	.097	-.098	-1.039	.301
Religious influence on food	-.011	.059	-.018	-.181	.857
Health worker role in improving nutrition	.167	.143	.193	1.167	.246
Motivation of respondents by nutrition services provided	-.106	.142	-.123	-.746	.457
Presence of organizations that offer maternal nutrition	.186	.105	.169	1.762	.081
micronutrient supplements supplied by health facilities/orgs	-.116	.103	-.109	-1.125	.263

a. Dependent Variable: No. of participants consuming Iron rich foods

The coefficients **Table 18:4** above presents the regression model where none of the social factors were significant enough to predict the consumption of iron rich foods by the participants

4.3.2   Food Frequency Consumption per Mother

The study obtained food frequency consumption using food frequency questionnaire (FFQ). For each item on the FFQ, the participants were asked to estimate the frequency of consumption based on specified frequency categories which showed the number of times the food was usually consumed per day, week, month or year.

Table 6:4: Shows of frequency of food consumption per day, week or month in percentages by participants

Food group	Frequency of food consumption in percentages		
	Daily	Weekly	Monthly
Starchy staples	43.6	55.6	0.8
DGLV	17.8	58.9	23.4
Vit rich vegs, fruits & tubers	13.7	37.8	48.4
Other fruits & vegetables	8.9	29.8	61.3
Organ meat	4.0	24.4	71.1
Meat & fish	4.9	44.7	50.4
Eggs	12.2	34.8	52.8
Pulses	26.9	59.3	13.8
Milk & milk products	30.0	33.4	36.6

Source: Primary data

The data indicates that starchy staples were the most frequently consumed food group. This is because the majority of participants (43.6%) were consuming it daily followed by milk and milk products (30.0%) and pulses (26.9%). However, on daily basis, the following food groups were ranked the least frequently consumed: organ meat (4.0%); meat & fish (4.9%); other fruits & vegetables (8.9%); eggs (12.2%); vitamin rich fruits, tubers & vegetables (13.7%), as well as the DGLV (17.8%). These food groups; organ meat, meat & fish, DGLV, Vitamin rich fruits, tubers& vegetables are very rich in micronutrients. Therefore, this meant that micronutrient rich foods were the least frequently consumed food groups by the participants.

4.4   Other geo-economic factors influencing the state of maternal in Jinja district

Literature shows the state of maternal nutrition to follow a geo-economic trend (Alonso, 2015 and Rodriguez et al 2004). In this study, geo-economic factors included geographical/environmental, economic and political factors.

4.4.2   Environmental factors influencing the state of maternal nutrition

People live and function in a multiple of environments. The study assessed environmental/geographical factors housing and sanitation conditions as geographical characteristics influencing the state of maternal nutrition in Jinja district.

Housing conditions

Figure 9:4: Represents housing conditions of participants in Jinja district.
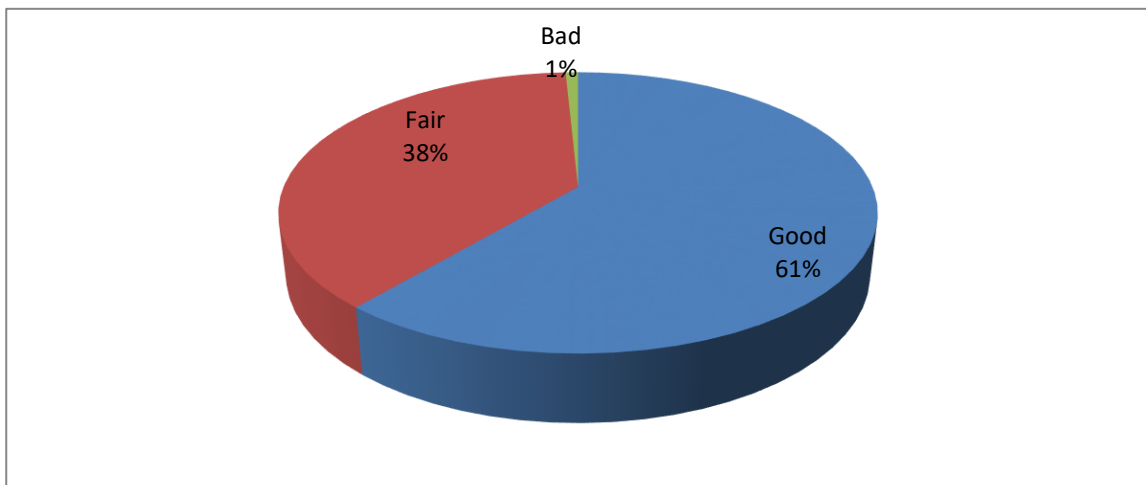
Source: Primary data

The study findings showed the majority of participants (61%) to have good housing conditions this was because the houses had good construction material, enough floor space compared to household size as well as appropriate lighting. The rest (38%) had fair housing conditions while 1% had bad ones.

Sanitation conditions of participants.

Figure 10:4: Shows sanitation levels of participants in Jinja district
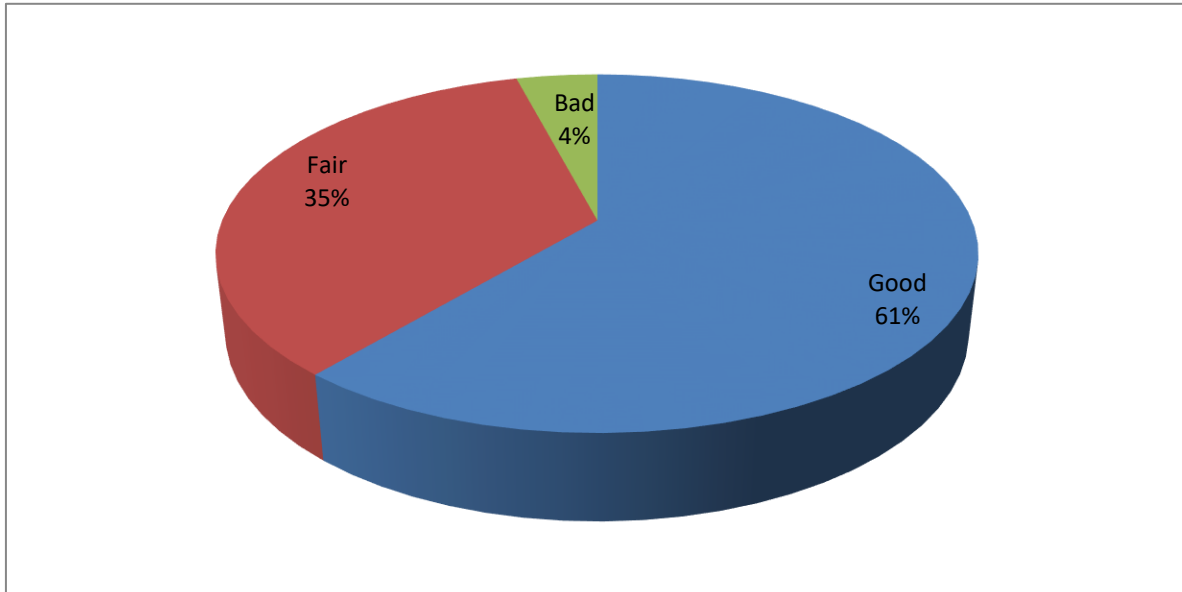
Source: Primary data

Figure 9:4 indicates that the majority of participants (61%) had good sanitation conditions because they had proper waste management in their homes, safe water supply, had a latrine or toilet and drying racks among other sanitation practices. However, 35% had fair sanitation conditions while 4% had bad ones.

Lack of food in the area

Figure 11:4: Indicates percentages of participants who lack food in their areas when available in other areas
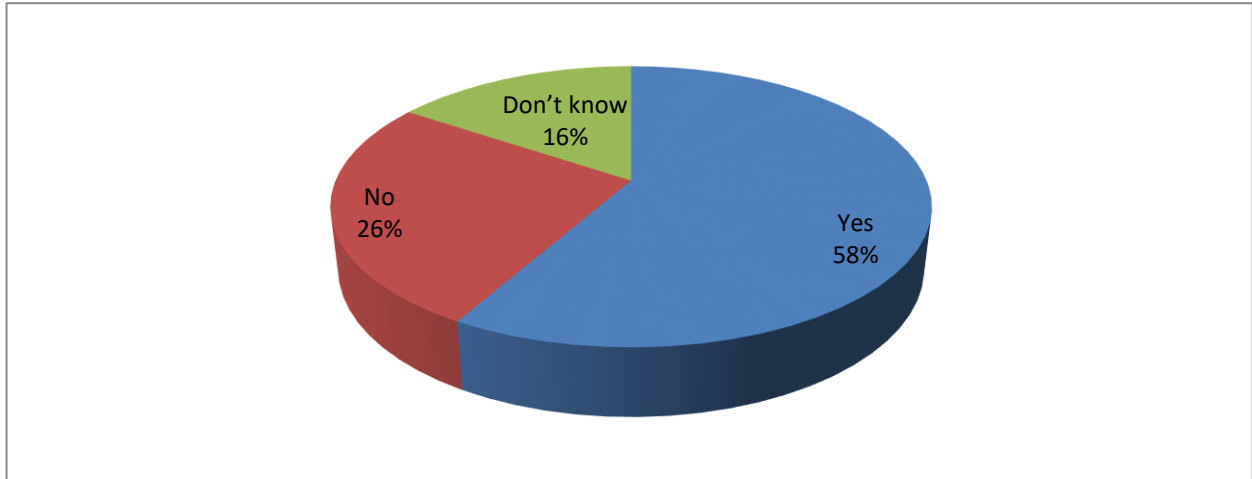
Source: Primary source

The majority of participants (58%) were lacking food in their areas because some food is not grown as; the participants said

4.4.1 Economic factors

According to literature reviewed, women were far less privileged in terms economic status and the power to make decisions. Therefore economic status showed a profound effect on their feeding habits. The study considered the influence of economic status indicators; occupation and income levels of participants on their feeding habits (meal skipping and variety of foods missed because of lack of money).

Occupation of participants

Figure 12:4: Shows occupation of participants

Main source of income
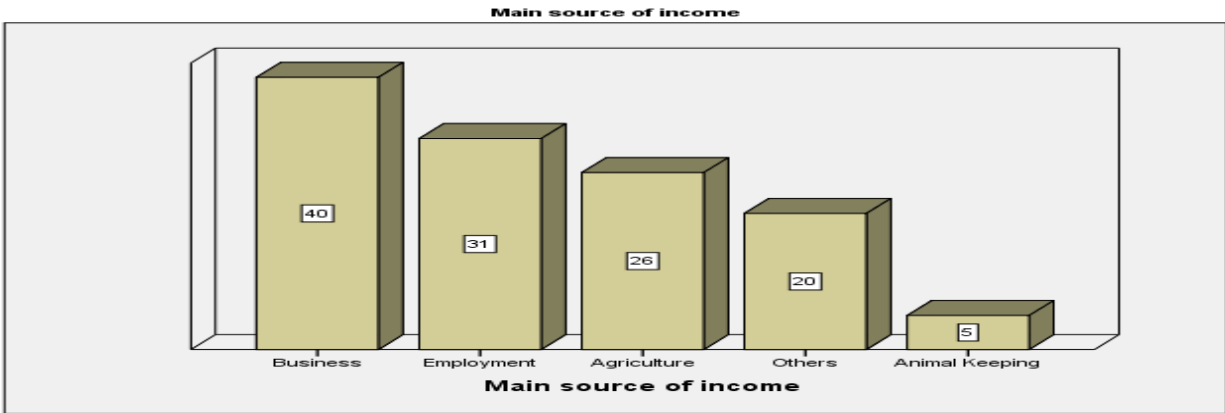
Source: Primary data

The study revealed in **Figure 12:4** above that the majority of participants were doing business as their main economic activity followed by employment. This means they duel majorly on purchased food in their households. Few were engaged in agriculture (26) and animal keeping (5) either due to lack of resources or they were using them as secondary activities. For example one participant from Bugembe town council stated:

> *Population increase has reduced land for agriculture. Plots of land have been sold for housing construction, so no more land for farming.*

But many of the participants instead related lack of land for food production to the booming sugarcane growing in the district. For instance, one participant found at Maga maga HC III complained that:

> *Men have either hired out land to sugarcane growers or used it themselves for sugarcane growing. You find that in most households there is a lot of famine because men have used the land for sugar cane growing. Women in their households now lack land for food production*

Economic influences on dietary diversity

Figure 13:4: Shows percentage of participants who skip meals due to lack of money

75
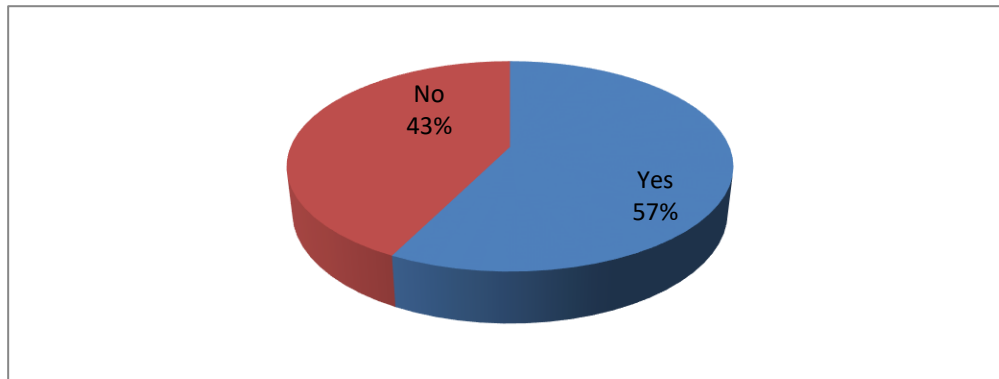
The pie-chart indicated above in **Figure 13:4** shows why participants were skipping meals. The majority (57%) were missing meals due to lack of money while the rest were not.

Frequency of meal skipping

Figure 14:4: Shows frequency of meal skipping due to lack of money

Freq meal skipping coz of lack of money

Source: Primary data

The study findings revealed that most participants (38.5%) who were skipping meals due to lack of money said this was rarely happening; 17.9% said it was happening every week while 5.1% of the participants said they were skipping meals daily.

Economic influences on variety of foods consumed.

76

Figure 15:4: Shows percentages of participants who miss consuming variety of foods due to lack of money.
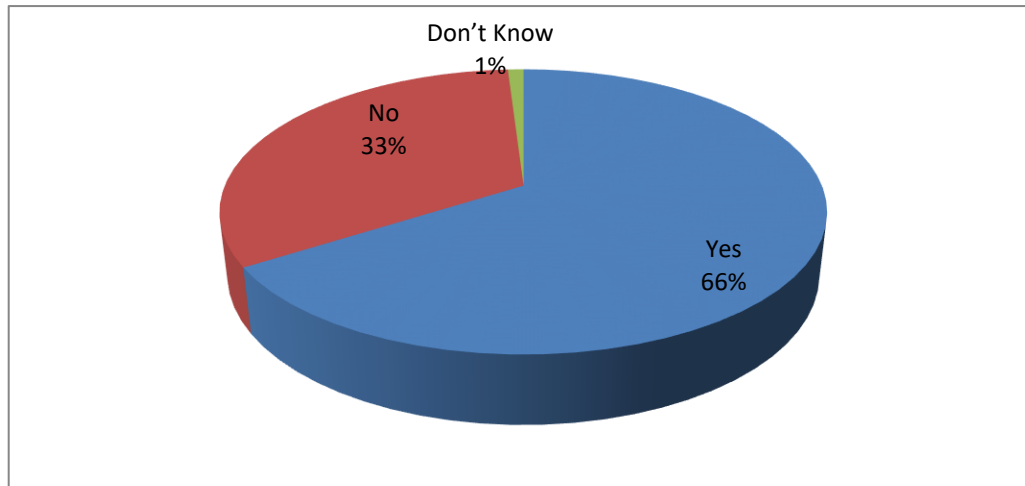
Source: Primary data

The study revealed that 66% of participants were missing to eat a variety of foods because of lack of money. Only 33% were affording to eat a variety of foods as they had the money to buy a diversity of foods. The rest (1%) did not know whether lack of money had an effect of accessing a variety of foods in their households as indicated in **Figure 15:4** above.

However, **Figure 16:4** below shows that the habit of missing a variety of foods occurred to participants both rarely and almost every week at 26.9%. Those who never experienced it were 26% while 19.3% were experiencing it daily. The rest of the participant did not know.

Frequency of missing to consume variety of foods due to lack of money

Figure 16:4: Shows the frequency of missing to eat a variety of foods among the participants.

Freq of missing variety of foods coz of lack of money

Source: Primary data
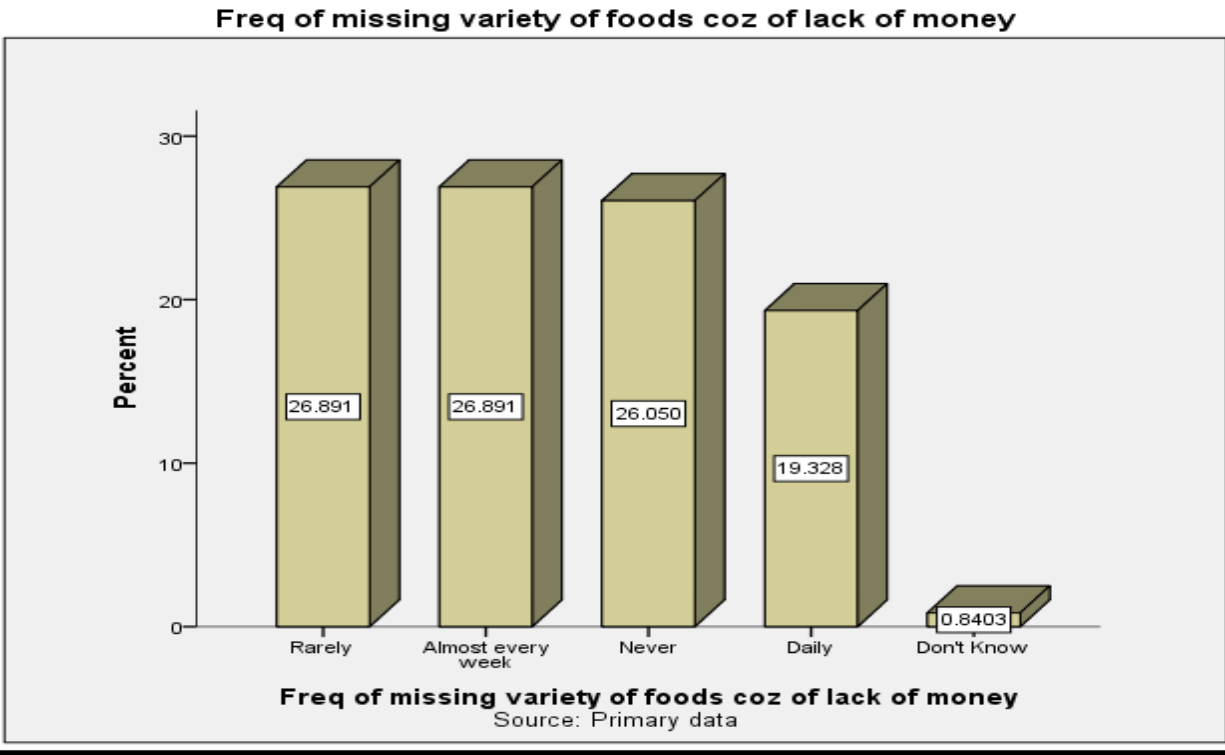
4.5 SOCIO-CULTURAL FACTORS

Socio-cultural environment broadly consists of both the social system and the culture of a people (Akhter & Sumi, 2014). Socio-cultural factors in this study were defined to include all elements of the social system and the culture of people that influence positively or negatively the state of maternal nutrition:

4.5.1 Lifestyle of the participants

Lifestyle is a key determinant of nutritional status of individuals. Every woman as an individual has unique characteristics which determine her food preferences and activity levels:

Food preferences

Food preferences are developed over time and are said to influence feeding habits. The study determined the food preferences of the participants which influenced their feeding habits.

Figure 17:4: Indicates participants' most favourite food groups
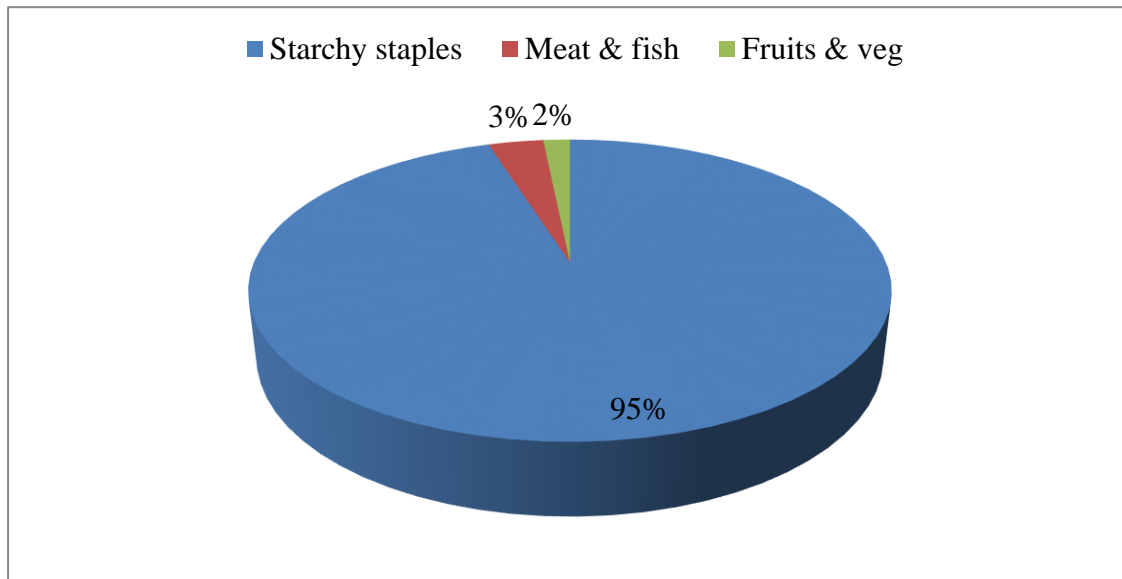
The data indicated in **Figure 17:4** reveals that most of the participants favoured consuming starchy staples which are energy giving foods. The rest favoured meat & fish food groups (3.3%) and fruits & vegetables (1.6) which are rich sources of micronutrients.

Physical activities

Figure 18:4: Presents physical activities of the participants

The study statistics presented in Figure 18:4 reveals that the majority of the participants were spending an active lifestyle whereas 20% were living a sedentary lifestyle. Participation in physical activities is recommended during pregnancy and lactation yet sedentary lifestyle is connected to coronary heart diseases.

Maternal nutritional knowledge among participants

The study scored maternal nutritional knowledge among participants graded as low (0-6 points), average (7-13 points) and high knowledge (14-18 points) using nine questions whose correct answer per question fetched two points for the participant. The rating of knowledge was based on general understanding reasons for things like extra serving, weight gain, feeding practices, balanced diet, dietary diversity and issues of hygiene and sanitation.

Figure 19:4: Illustrates maternal nutritional knowledge among participants

Nutrition knowledge of respondents

Source: Primary data
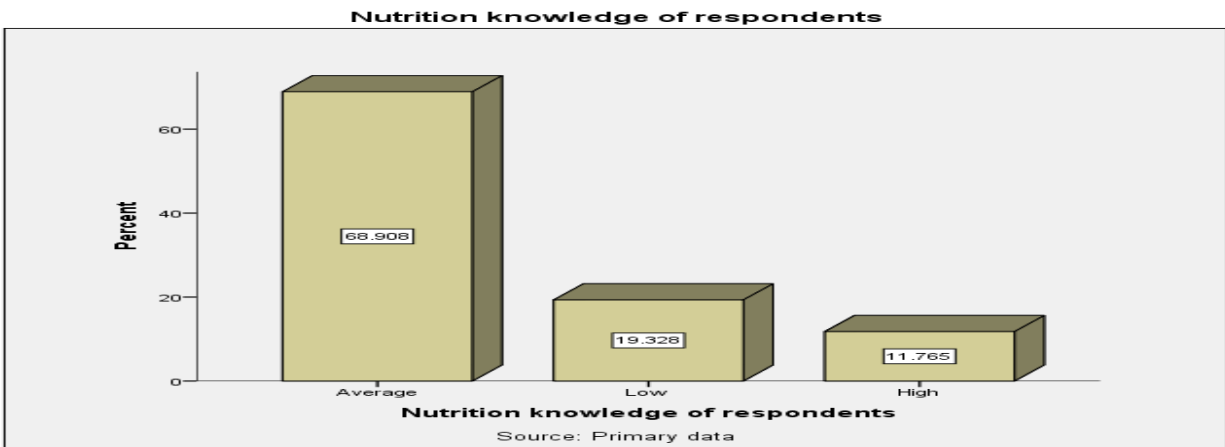
The study statistics presented in figure above shows that the majority of participants (68.9%) had average knowledge about maternal nutrition while 19.3% of them had low nutrition knowledge. Only 11.8% had high knowledge about maternal nutrition is in other words adequate knowledge. This means that 88% of participants lacked adequate knowledge about maternal nutrition

Diseases burden

The immediate causes of malnutrition continue to be high disease burden and poor dietary intake.

There are a number of diseases that significantly influence the prevalence of maternal malnutrition.

However, studies have indicated malaria to be among risk factors for maternal malnutrition.

Prevalence of malaria

Figure 20:4: Shows percentage of participants who had suffered from malaria in the past one month before the study.
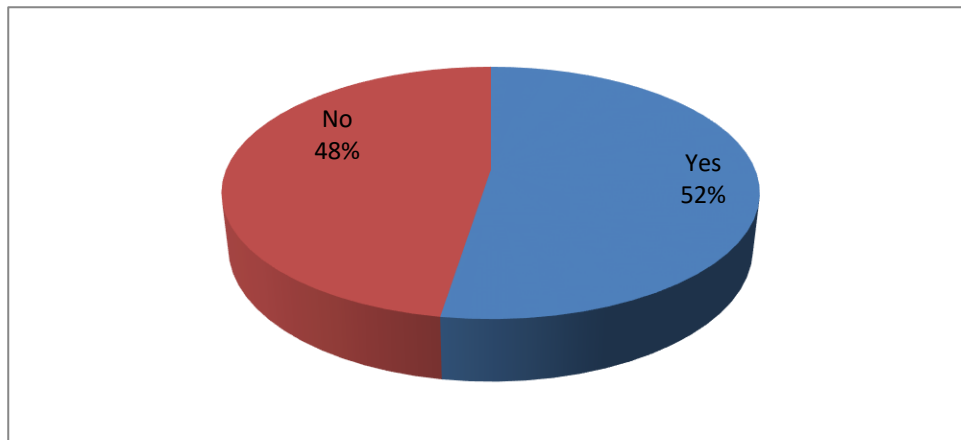
Source: Primary data

The study revealed that the majority of participants (52%) had suffered from malaria in the past 30 days. However, only 48% of the participants had not suffered from malaria in the same period. Malaria is a significant cause of anemia among pregnant and lactating women as well as young children.

Social factors

The study assessed social factors which influence maternal

Peer Influence

Figure 21:4: Demonstrates peer influence on feeding habits of the participants
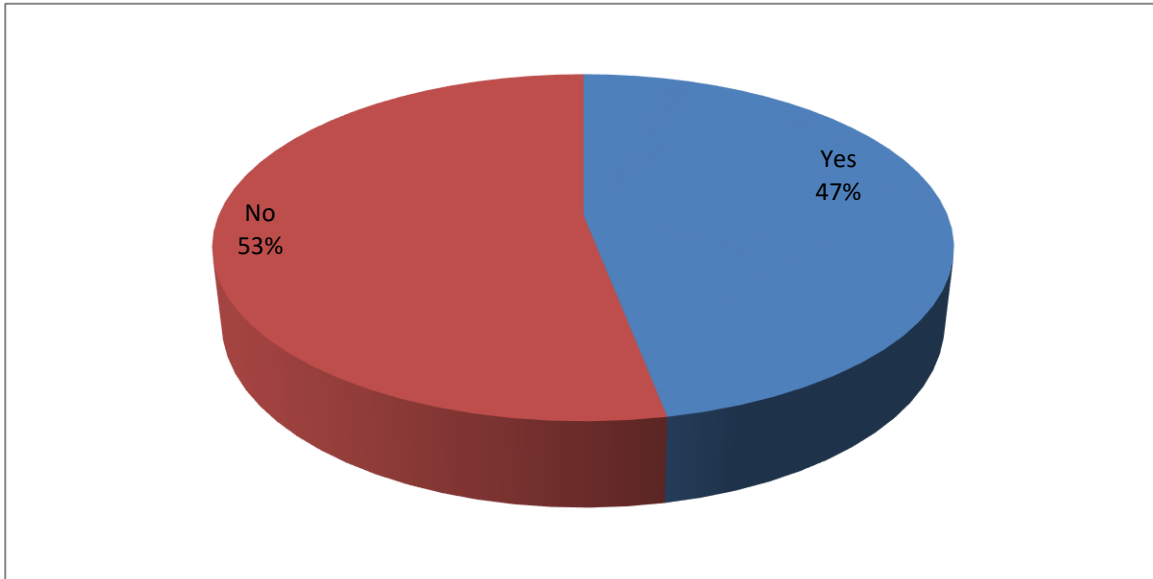
Illustrations from the study demonstrate that the majority of participants (52%) in the study said that their feeding habits were not influenced by their peers whereas the rest were said that their feeding habits were influence their friends.

Culture, gender and family customs

Every social group in the world has unique culture and traditions (Ezeama & Ezeamar, 2014). These provide guidelines regarding acceptable foods, food combinations, eating patterns, and eating behaviors for a community. Compliance to follow guidelines creates a sense of identity and belonging for the individual.

Figure 22:4: Presents percentages of participants who said that their culture prohibited them to eat certain foods when pregnant or lactating
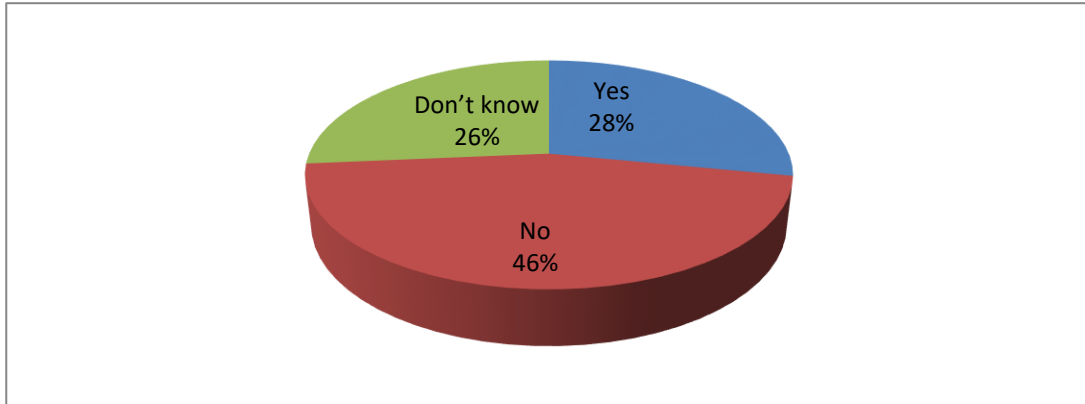
The study results presented in **figure 22:4** indicated that most of the participants (46%) said that their families or culture don't prohibit them from eating some food when pregnant or breastfeeding. However, 26% of the participants did not know whereas 28% said that their families or culture do prohibit them from eating certain foods when pregnant or breastfeeding. This is because of the misconceptions attached to certain foods for example daily eating will make the child grow so big for the mother to push hence leading caesarian section or even death. Another misconception is that when you eat elephant fish when you are pregnant, you give birth to a baby with pointed mouth. Also a pregnant mother should not eat anything on a day she goes for antenatal care and lastly pregnant should not eat raw salt because eating raw salt results into delivering a child with rough skin.

Figure 23:4: Indicates percentages of participants who say that their culture/family customs encourage them to eat when pregnant or breast feeding
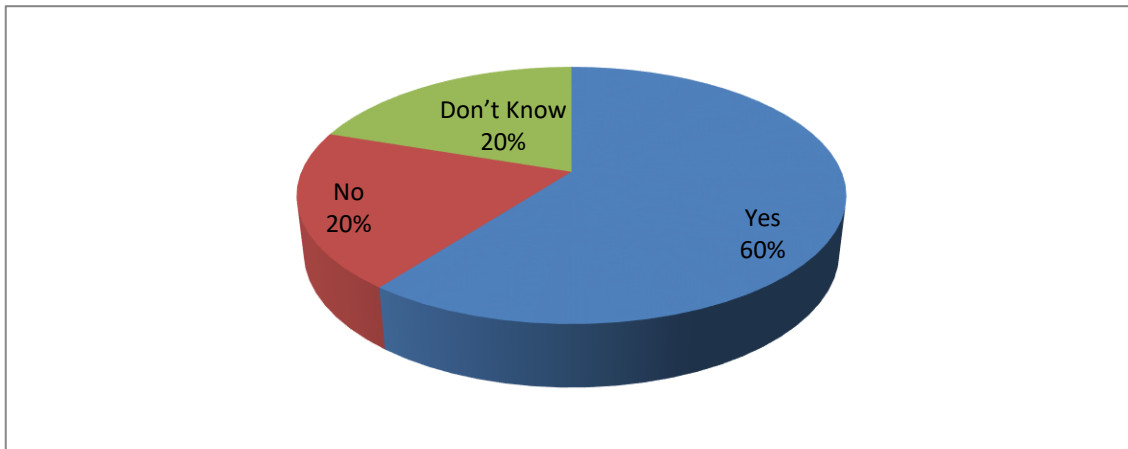
Source: Primary data

The findings presented in **figure 23:4** revealed that 60 % of participants had families or cultures which encourage them to eat proper diets during pregnancy and lactation. The foods their culture/family customs emphasized them to consume during pregnancy were eating a plenty of milk, boiled foods, less oil, rice soup, cassava flour, plenty of fruits and vegetables and beans soup for more blood. To emphasize the pillars of health promotion, health workers should build on this practices when designing maternal nutrition messages for mothers to ensure sustainability. However, 20% said their culture/family custom does not encourage them while the remaining 20% said they don't know.

Gender

This refers to socially and culturally defined roles, attributes, and privileges of females and males (Mucha, 2012). Women and men play substantial though different in maternal nutrition. Therefore the study assessed gender-based factors that were influencing maternal nutrition positively or negatively e.g. decision making and workload during pregnancy or lactation.

Figure 24:4: Indicates who makes decisions on which food is eaten in the participants' households

Decision maker on food eaten in a home
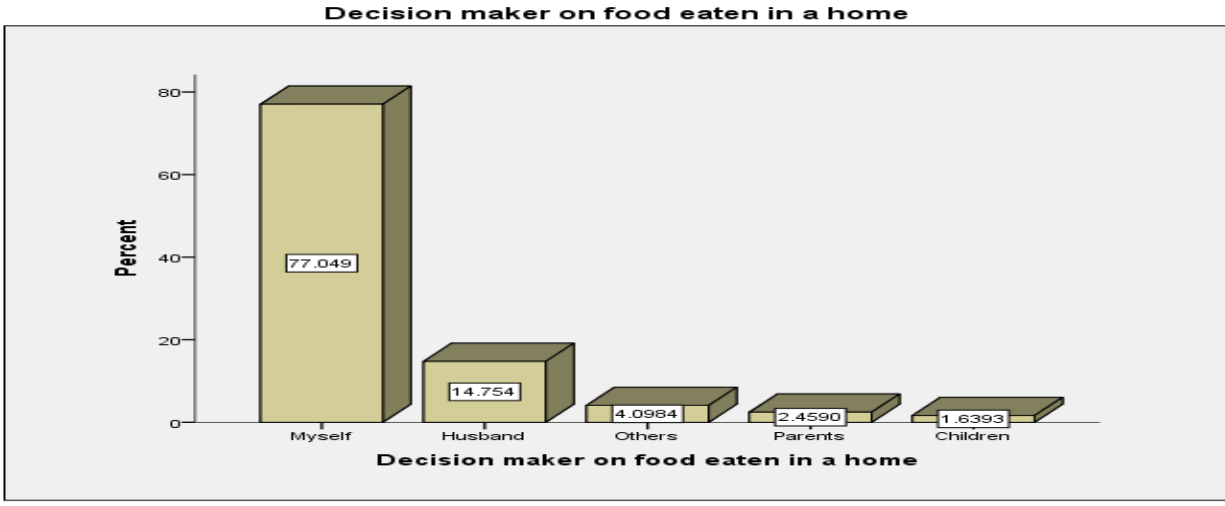
Source: Primary data

The study fidings revealed that 77% of participants were the main decision maker on foods eaten in a home. This because culturally, food preparation was a responsibility of women. Husbands became second with 14.8% while the rest decision maker included parents, children among others depending on household arrangements with regard to food.

Figure 25:4: Demonstrates who was the most privileged when quality foods were served in a home

Most priviledged to be served quality food home

Source: Primary data

Though the participants constituted the largest percentage on making decisions on foods prepared for consumption in a home, the privilege to be served quality food was given to husbands and children respectively. This undermines the nutrition of these women especially where quality foods are rarely served.

Provider related factors

Most pregnancies are rendered unplanned in Uganda yet the majority of women become pregnant when they are already undernourished and continue to underfeed as well as overworked during pregnancy and lactation (Government of Uganda 2011). In this way, the major obligation of health service providers was to emphasize the importance of good nutrition to mothers when they come for antenatal and postnatal services or during contact with the communities. To understand provider related factors affecting delivery of maternal nutrition, the study assessed for: the obligation of health workers and perception of participants on health workers.

Perception of participants on health workers who offer maternal nutrition services

Figure 26:4: Shows percentage of participants who find health workers very helpful in improving their nutrition
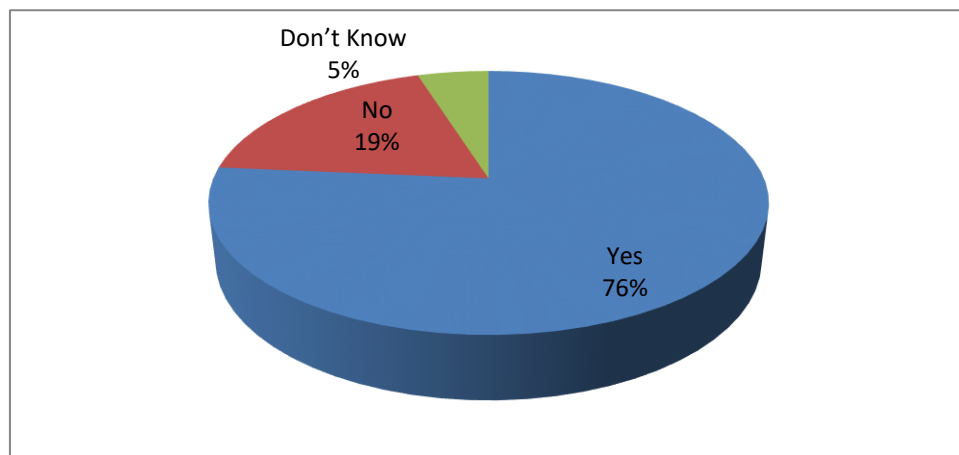
Source: Primary data

Though the majority of participants found health workers to be helpful in the way they provide their maternal nutrition services, 19% of them said they are not because health workers do harass them yet at times they don't assess receive what they expect from them.

Obligation of Health workers in addressing maternal nutrition

All in-charges interviewed knew how to assess nutrition status using MUAC but they lacked MUAC tapes the recommended for pregnant and lactating mothers. As if that is not enough the recommended cut-off points for the pregnant and lactating women were not clear to them.

In practice, dietary assessments give clues to nutritional status obtained by MUAC. However, almost all in-charges interviewed neglected this citing lack of cooperation from mothers due to lack of suitable diets and rampant poverty. Other challenges reported were lack demonstration material to use during counseling sessions.

With regard to monitoring weight gain, this is emphasized for every visit a mother pays to antennal or postnatal services but health workers faced the challenges of lack guidelines. They also highlighted lack of weighing techniques to ensure accuracy.

How they package their maternal nutrition messages were interesting as they educate mothers generally what they should eat but lacked proper tools for monitoring and evaluating the impact of their nutritional messages to the mothers. Balanced diet was the most used method of summarizing suitable diets for the mothers.

Malaria and hookworm burdens were the most understood and addressed concerns of maternal nutrition as almost all in-charges participate, provide and address them.

However, the major factors affecting maternal nutrition according to in-charges were rampant poverty resulting from polygamous marriages and food insecurity resulting from lack of land for food production since most of the available land was used to grow sugar cane.

CHAPTER FIVE: DISCUSSIONS, RECOMMENDATATIONS AND CONCLUSIONS

5.1   Discussions

This section illustrates implications of the meaningful results of the study. The discussions follows the five main sections of the study; socio-demographic characteristics, proportion of pregnant and lactating mothers having good nutritional status, feeding habits, geo-economic and socio-economic factors influencing the state of maternal nutrition in Jinja district.

5.1.1   Socio-demographic characteristics of the participants.

Socio-demographic factors such as location, age, sex of household head, number of children produced, religion, marital status, level of education, employment status as well as tribe of participants are significant to maternal nutrition as they influence knowledge, behaviour, practices, attitude as well as access to resources.

Location of participants: The rural population in Uganda was reported to be at 85% by UDHS, (2011) while African Development Bank (2012) highlighted urban growth to be at 3.5%. This justifies the differences between the previous statistics and the findings of this study of 54% rural and 46% urban participation. However, since Uganda is an agricultural country with rural population as the main food producers, reducing trend of rural population signifies that food production is declining yet food consumption is doubling. This is because food is consumed by both rural and urban population whereas food production is majorly by rural population. This confirms the significance of location of participants as far as food and nutrition security is concerned.

Age groups: Literature has it that there are advantages and disadvantages to giving birth at different ages: for instance the average woman between 20 - 24 years old has about a 20% chance each month of getting pregnant when getting pregnant when has unprotected intercourse (Mccathy, 2016). This explains why the findings showed participants' involvement in the study peaking at 20 - 24 years. Whereas fertility begins to decline at the age of 30, the change happens gradually over the next five years or so. Furthermore, the chance of becoming pregnant after clocking 40 years drops to 5% (Henig & Henig, 2012). This was the exact proportion of mothers who were involved in the study with 40+ years and was also responsible for the vivid slope down from 30 – 34 years onwards and the flattening of the curve.

Sex of household head: The sex of the household head is considered a significant and strong determining factor for women. The findings revealed that that most of the women who participated in the study were coming from male headed households (86.3%) a situation which confirmed that they were either married or living in male supported households. Evidence by UNDP (2011) indicates that male headed households constitute the largest proportion because it provides better welfare compared to female headed households.

Parity of participants: The number of children produced by a woman is a key determinant in maternal nutrition. Most of participants reported having 1 to 2 children corresponding to 20 – 24 years which is the age for active reproduction in Uganda according to UDHS (2011) hence the reason for the peak response of 53.3%.

Marital status of participants: A number of studies show significance of marital status to research but most of them indicate married couples to be associated with a higher probability of attaining wealth over a course of life (Grinstein-Weiss et al, 2004). Married monogamy was ranked

high (66.1%) because most women believed in it and were sanctioned by most of the religions while single, polygamy, divorce as well as widowed pregnancy or child care is a curse in society.

Level of education: The level of education was somehow encouraging with Secondary education having the highest proportion of participants (60%) participants followed by primary (46%) while only 2% reported to have not attended education. The trend in level of education might be explained by the fact that literacy rate has been improving from 67% in 2000 to 74% in 2007 (FAOSTAT, 2010). Universal Primary Education which increased primary enrollment of children. Level of education has been indicated as one of the social determinants of health and therefore nutrition parse.

Religion of participants: Uganda is majorly a Christian country as far religion is concerned constituting (84%) of the total population according to 2014 Census. However, Islam is also widely professed and the study area was located in an area with the highest number of Muslims in Uganda according to an international report on religious freedom (2009). This explains exactly the findings obtained in this study and therefore believers are implicated to follow religious proscriptions.

Ethnicity of participants: Jinja district is located in Busoga sub-region and so the Basoga speakers were expected to dominate just as the findings stipulates. However, Busoga is surrounded by other tribe such as Baganda, Bagisu, Bagwere, Tsamia, Banyole. Jinja district is a commercial area with free movements of people of different origins who are likely to bring in different practices and foods.

Employment status of the participants: Though significant poverty reduction has occurred across regions in Uganda, South Eastern region has however been the slowest in reducing income poverty mainly due to weather conditions, high dependency ratio and growing population

pressures as outlined in The Poverty Status Report of 2014. According to the Ministry of Finance, Planning and Economic Development (MFPED) discussion paper 11 of 2006, evidence showed that, more females were unemployed compared to the males. In the urban areas the unemployment rate for women was more than twice that of men. This was almost the same as that from the findings of this study were 50% of participants reported to be not employed while a mere 23% reported to be employed and the rest were self employed in small businesses such as in markets, factories among others. However, according Mucha (2012), low status of women not only is a key determinant of maternal and child nutrition but also result into a poor state of maternal nutrition. More so, FAO (2012) highlights maternal under-nutrition to be inextricable part of the viscous cycle of poverty exacerbated by low economic status of women.

5.1.2 Proportion of pregnant and lactating mothers with good nutritional status

Generally, there was a poor state of maternal nutrition in Jinja district. The variations were exposed by the different categories of nutrition status among pregnant and lactating mothers are explained as follows:

According to MUAC: Anthropometric status of a woman at the beginning of her pregnancy influences its outcome (Caulfield et al 2015), Increasingly, MUAC has became the most appropriate anthropometric indicator for the nutritional status of pregnant and lactating women (Tang et al, 2016 & Ververs et al 2013). The Uganda ministry of health guidelines on maternal nutrition (2010) categorizes MUAC of pregnant and lactating women below 23.3cm to be poor nutritional status. However, findings showed generally poor MUAC for the participants. On the other hand, lactating mothers had poorer nutritional status compared to their pregnant counterparts. This was attributed to poor nutritional care accelerated by physical demands of breastfeeding, stress from heavy workload alongside other factors. More so physiological changes such as weight

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gain during pregnancy might have accounted for the difference in variation in the MUAC. This means that there is need to strengthen nutrition of women even after pregnancy. Therefore interventions should rethink and widen the approach to address factors influencing the poor state maternal nutrition especially after pregnancy.

According to Hb level: Anaemia is a global public health problem with significant adverse consequences (Stevens et al, 2013 & WHO, 2015). But although it results from many causes, iron deficiency remains the most significant contributor of all anaemia cases accounting for 50% (Stevens et al, 2013). The global prevalence of anaemia among pregnant women stands at 42.6% worldwide (WHO, 2013). However, according to this study, the prevalence of anemia among pregnant women in Jinja district was 49.2% against the global prevalence of 42.6% (WHO, 2015). The difference in the prevalence of anaemia could have been brought about by low diversity of iron rich foods which these mothers use everyday. Anemia in pregnancy poses a 5-fold increase in overall risk of maternal death related to pregnancy.

According to presence of VAD: The relatively better nutritional status among pregnant and lactating mothers with regard to Vitamin A is linked to government's program of addressing VAD using vitamin A fortified orange sweet potatoes. Vitamin A rich bio-fortified orange sweet potatoes are highly promoted through radios and drama groups in Uganda especially in Eastern region. Furthermore, Jinja district is traditionally known for vegetable production especially in Budondo and Butagaya sub-counties. If the health department has been capitalizing on this in the campaign to eradicate the prevalence of night blindness in the area, the positive results are expected which is indicated by the study. However, statistics from this study indicated an improvement as far as VAD is concerned; from 18.3% to 15.3% for pregnant and 17.9% to 12.8% for lactating women reported by FANTA II (2010).

5.1.2.1 Influence of socio-demographic factors on nutritional status

A multiple linear regression was carried out to ascertain the extent to which socio-demographic factors of location, parity, sex of the household head, age, marital status, level of education, religion, tribe and employment status influence nutrition status according to MUAC of participants. However, illustrations from the study revealed that nutritional status according to MUAC of participants only greatly depended on the predicting variables of location, sex of the household head and marital status. It was interesting to note that presence of VAD (night blindness) was not significantly dependant on socio-demographic predictors in Jinja district while socio-demographic factor of location of participant were very significant also in predicting nutritional status according to category of anemia (IDA). This are explained as follows:

Location of participants: People are what they are or have what they have because of their location. Moreover what works in one location may not as well work in another location (FAO, 2012). Globally, location issues have been central in addressing health and nutritional questions. In the same way, this study revealed nutritional status of pregnant and lactating mothers in Jinja to depend greatly on their location. The influence of location on nutrition status emanated from the prevailing food and nutrition insecurity in Jinja also reported by Lwanga et al (2015). This is because most of the prime fertile land meant for food production have used for growing sugarcane. More so, environmental shocks like seasonal changes, geographical characteristics like forest plantations, hills and valleys as well as water bodies were mentioned during data collection to obstruct food production, access to food, access to health services and at the same time harbouring mosquitoes which cause malaria. All these are drivers of maternal under-nutrition according to Bhutta et al (2008). According to National Academy of Sciences (2010), a variety of place-based influences affecting food and nutrition security include physical conditions like altitude,

temperature etc., and social context like access to care, perception of risky behaviors, social networks, and economic conditions like quality of nutrition. Addressing locational influences on health and nutrition probably contributes to the ultimate goal of primary healthcare of better health for all regardless of where one lives especially by reducing exclusion of social inequalities. Socio-demographic predictors did not show significant effect on nutritional status according to presence of VAD (night blindness) probably because Jinja district is a vegetable growing area. It was also discovered that there was ongoing government program promoting usage of orange sweet potatoes in some areas which was acting as a buffer against vitamin A deficiencies.

Sex of the household head: The study revealed that nutritional status of pregnant and lactating women in Jinja district was found to be greatly dependent on sex of the household head. This is a confirmation that sex of the household headship is such an important determining factor for the state of maternal nutrition in Jinja. Just like in most of the developing countries, female headed households tend to be poorer, lack education thus less access to job opportunities and own less resources like land making them unable to produce enough for their consumption and welfare (FAO, 2012). The feminization of poverty revealed female-headed households to constitute a socio-economically and nutritionally vulnerable group generally more impoverished than male-headed households. However, supporting evidence derived from Mucha, (2012) maintains that the rate of hunger and malnutrition existing in many countries majorly depend on the status of women in society. This implies that public health nutrition policies targeting only women while leaving out men misses out a point in addressing the state of maternal nutrition.

Marital status of households: Little has been known about the relationship between marital status and nutritional status of pregnant and lactating women. However, this study confirmed that nutritional status of pregnant and lactating women depend greatly on their marital status. This was

hinted on earlier by a study Jones & Frongillo (2006) which highlighted significant variations in food insecurity across marital status categories of women. In fact being married conferred social support for nutrition and feeding prospects profoundly enhanced with family income and wealth. Hence married monogamy proved to benefit from consolidating or protecting family resources by avoiding sharing among wives compared to those married polygamous. This was related to what Hanson et al (2007) had put forward earlier – marriage` or long-term relationships provide social support and noneconomic resources that help individuals withstand periods of food insecurity or economic uncertainty. Conversely, single as well as separated or divorced mothers had to individually work hard in order to meet the nutritional demands of pregnancy and lactation. Heavy work load resulting from trying single, separated or divorced mothers renders them vulnerable to poor maternal nutrition and pregnancy outcomes. So given this association between marital status and nutritional status, we expect maternal malnutrition to be so prevalent among participants who were married polygamous, single, separated, divorced or widowed compared to mothers married monogamy.

5.1.2 Feeding habits of participants

The purpose of assessing feeding habits of participants in this study was to describe what women eats, how and why they eat them. To achieve this, the primary concern was therefore to understand their Dietary diversity based on Women's Dietary Diversity Scores (WDDS) and Food Frequency consumption per mother:

5.1.2.1 Dietary Diversity of participants:

Dietary diversity is a qualitative measure of food consumption that reflects household access to a variety of foods and also a proxy for nutrient adequacy of the diet of individuals. Several studies indicated that DDS is positively associated with overall dietary quality, micronutrient intake and

food security. This is usually the major focus Women's Dietary Diversity (WDD); diet quality with special emphasis on micronutrient adequacy (FAO, 2010). Since there is no single food that has it all (Wolchover, 2012), the concept of dietary diversity is then born. This concept is based on increasing consumption of variety of foods and food groups in the diet to ensure adequate intake of essential nutrients and promotion of good health. Particularly, WDDS rates consumption of diets among women in reproductive age based on nine food groups. But the study indicated that the majority of the participants were consuming far less than the recommended nine food groups with the mean daily consumption of 3.47 food groups.

Dietary quality: Dietary quality requires increased daily intake of nutrient dense foods (fruits; vegetables; animal based food products, yellow or orange foods, fortified foods among others). Poor quality monotonous diets have been however indicated by Arimond et al (2013) to be the cause of numerous micronutrient deficiencies among women in poor resource settings. Similarly, this study revealed a continuation of the same with overwhelming 97.3% of participants consuming starchy staples. Women of reproductive age living in resource-poor settings are at high risk of inadequate micronutrient intakes when diets lack diversity and are dominated by staple foods (Arimond et al, 2010). Broad inadequate intake of micronutrients might be a prime factor partly fueling the prevalence of micronutrient deficiencies among participants such as anemia reported to be at 49.2% and VAD at 15.3% o the pregnant mothers as indicated in Figure 6:4. This was because of poor food choices participants highly dominated with plant based food group (starchy staples = 97.3% and pulses = 66.1%) with poor complementation from animal based foods (organ meat = 8.1% and meat & fish = 37.9% as indicated in Figure 7:4). Plant-based foods contain only non-haem iron while animal-based foods contain 40% haem and 60% non-haem iron (Monsen, 1988).

Although most of the iron we eat is from non-haem sources, evidence actually indicate that we obtain up to 80% of our iron from haem iron because it is readily bioavailable (Hambraeus, 1999). Haem iron from animal sources are said to be superior to non-haem iron from plant-based food and at the same time haem iron also enhances absorption of non-haem iron by up to four times (Hurrell et al, 2006). This is a prime factor explaining the high prevalence of anemia since 50% of anemia is caused by iron deficiency which results from the poor quality of diets. The main cause of multiple micronutrient deficiencies is a poor quality diet, often due to an inadequate intake of animal source foods. Therefore, women who avoid animal source foods are at higher risk of micronutrient depletion during pregnancy and lactation.

Dietary adequacy: Adequate nutrition has been shown to be critical during pregnancy and lactation because of their extra nutrient demands (Black et al 2008). The importance of adequate diet requires therefore evaluating the extent to which these extra demands are met during pregnancy and lactation. Meeting extra nutrient demands during pregnancy and lactation requires paying special attention to dietary quantity and quality (Manoff Group, 2011). Dietary quantity means eating an extra serving of staple food (285kcal) a day during pregnancy and the equivalent of an extra meal (500kcal) during breastfeeding. This enhances extra weight gain of at least 1kg per in the second and third trimester during pregnancy. Dietary quality on the other hand requires increased daily consumption of fruits; vegetables; animal based food products and fortified foods among others. However, statistics from this study revealed that though 65% of participants reported consumption of vitamin A rich foods, only 36% reported consuming iron rich foods. Since fats tend to come from animal based foods, low intake of animal foods therefore affects absorption of vitamin A which is a fat soluble vitamin.

5.1.2.1.2 Significant geo-economic factors influencing low consumption of micronutrient rich foods in Jinja district

Annual income of participants: Annual income is an important factor in influencing the state of maternal nutrition as it determines economic access of nutritious food to a woman and her household (Caulfield et al, 2015). More so, according a study by Mucha (2012) low levels of income subject these women to economic dependency and their lack of power to make decisions at household level. This was also justified by this study as annual income of participants was found to be a significant factor affecting consumption of vitamin A rich foods. The influence of annual income of participants on the consumption of vitamin A rich foods is related to high levels of poverty in the this region revealed by poverty status report of the Ministry of Finance Planning and Economic Development (2014). Therefore vitamin A rich foods grown are sold for livelihood purposes. Also given unequal access to resources and human capital, women farmers can no longer afford to sustain production of these foods with respect demand. There is reduction of available land wild foods particularly leafy green vegetables and fruits which are rich sources of vitamin A due to shrive as most of land is used for sugarcane growing (Lwanga et al, 2015). Pregnant and lactating women therefore compromise eating of these very important foods by skipping or not eating them justifying the theory of compromised eating behaviors which is risky for their health. The impact of low levels of annual income has been shown by the fact that 57% of participants were skipping meals because of lack of money whereas 66% reported to have missed eating a variety of foods because they lacked the money. Skipping of meals in addition to poor dietary diversity among pregnant and lactating women is a major cause of maternal malnutrition which increases maternal mortality (Black et al, 2013).

Main use of food crop grown: In Jinja district just like in other parts of the country, food crops are grown on substance at substance level by women (Lwanga et al, 2015). The main use of food crops grown were for eating, selling, both selling and eating as well as preserving them visitors. Main food crops grown influenced the consumption of vitamin A rich foods by participants because evidence indicated that they are grown in substance gardens and their role is supply during production season, the three main categories of daily meal ingredients (condiments, staples, leafy vegetables and fruits), supply vegetables staples earlier and more conveniently than field agriculture, supply consumption of salads (fruits and vegetables), produce small surpluses for sale to market according (FAO, 2012). Location of the participants determined the type of food crops with rural women having larger farms compare to urban counterparts. Rural farmers were selling the food crops compared urban counter parts. However, this had no effect on the consumption of iron rich foods because they were animal sources.

Geographic distribution of foods or Lack of food in the area but plenty in other areas: Lack of food in an area is complex but caused by a number of indicators such as production shortfalls results from socio-cultural influences like technology and investment, food preferences, etc.; enabling environment such as political-economic forces, failure of the government to deal with disasters etc.; over dependence on natural climate, soil fertility etc (The Borgen Project, 2015). However, lack of food in areas of Jinja district were attributed to: loss of soil fertility hence foods e.g. pumpkins have stopped performing; swamps meant for growing of rice and yams have been cleared for housing construction and sugarcane growing; there is also population increase which has led to land being divided into plots for housing construction making no land available for agriculture. Furthermore, access to some foods were attributed to long distances between gardens and homes and least but not last, seasonal foods were also making it hard for participants to

consume it all year round. Lack of food in an area also sometimes referring to as hunger is the main cause of poor dietary diversity and if not addressed adequately can lead to intergenerational cycle of malnutrition (Black et al, 2013).

5.1.2.1.3 Significant socio-cultural factors influencing low consumption of micronutrient rich foods in Jinja district.

Reduction on workload while pregnant or lactation

Pregnant and lactating women need enough rest since heavy workload is detrimental on maternal nutrition (Bhuta el al, 2013; Black et al, 2008). Culture practices demands women fulfill the role of a mother and at the same time remain productive workers. The study revealed that 69% of the participants received work reduction during pregnancy or lactation period. This enabled them to receive enough rest whereas the rest of the participants (31%) did not. Therefore the society expected the 31% of participants in Jinja district to remain serving as primary caregivers in the household while shouldering both farm and household chores in addition to engaging in small business activities to sustain the welfare of the household. But based on evidence by Government of Uganda (2011), heavy workload weakens the pregnant and lactating women and it increases poor pregnancy outcomes. This offers opportunities for interventions to address gender related issues concerning work reduction in households. Jinja can be one of the districts because the findings revealed that reduction of workload influences the low consumption of micronutrient rich foods.

5.1.3   Food Frequency consumption per mother

In nutritional epidemiology, self-reported frequencies of food consumption are important proxy measures of the current diets (American Society for Clinical Nutrition, 1999). Starchy staples were the most frequently consumed food group thus constituting the main current diet for the pregnant

and lactating mothers in Jinja district. Monotonous diets mainly made up of starchy staples were shown by Black et al (2013) to lack sufficient amounts micronutrients. Majorly micronutrient rich foods such as organ meat, meat and fish, fruits were the least frequently consumed foods by the participants. Diminished consumption of micronutrient rich foods compromises dietary intake of iron and vitamin A hence justifying the theory of compromised eating behaviors put forward by Furman (2012). Low intake of micronutrients especially iron and vitamin A is critical for pregnant and lactating mothers as it causes anemia and VAD respectively thus leading to increased maternal morbidity and mortality (Black et al 2013).

5.1.4   Other geo-economic factors influencing the state of maternal nutrition in Jinja district

Maternal nutritional problems result from a complex interplay of a number of forces. Geo-economic factors are among the forces that influence how well women live and feed according to Manoff Group (2011). This study assessed for three geo-economic factors: Geographical/environmental, economic and political factors.

5.1.4.1   Environmental factors

People live and function in a multiple of environments. Maternal malnutrition has been increasing partly due to environment (Downs et al, 2012). Therefore, environment is a key determinant of the state of maternal nutrition (Butland et al, 2007) and at the same time environmental degradations have been related to malnutrition, infectious diseases and contamination. The study assessed geographical/environmental factors responsible for the state of maternal nutrition in Jinja district:

Housing conditions of participants: Housing is an important determinant of health while standard housing is a public health issue (WHO, 2010). Therefore, addressing housing issues offers

public health practitioners an opportunity to address an important social determinant of health (Krieger & Higgins, 2002). However, according to this study the majority of participants (61%) were living in good housing conditions while just 1% of the participants were living in poor housing conditions. Evidence suggests that living in poor housing conditions lead to a wide range of health conditions while lack of proper housing conditions have been linked to inadequate nutrition (Krieger & Higgins, 2002). Since only 1% had improper housing conditions, this means that there was less threat of housing to the health of the participants.

Sanitation conditions: The relationship between nutrition and WASH is complex: Unsafe water, poor sanitation and hygiene are directly linked to under-nutrition while time taken to fetch water, the cost of purchased as well as time and money spend on treating those with waterborne diseases indirectly affects maternal nutrition as it impedes food production and purchase (WHO, 2008). In relation to this, the study revealed that the majority of participants (61%) had good sanitation conditions while only had poor ones. This implies that there were reduced perceived threats on maternal nutrition from poor sanitation conditions. Poor sanitation conditions cause diarrhea, intestinal worms including hook worms are linked anaemia and environment enteric dysfunction (Cumming, et al, 2015).

Seasonal changes: Many regions of the world have experienced climatic changes causing seasonal changes (DARA, 2012). In the study area, seasonal changes were majorly attributed to rampant tree cutting for housing construction and sugar cane growing. This was affecting the growing of a variety of food crops hence influencing their dietary diversity. Geographical distribution of foods was also another major determinant of the state of maternal nutrition in Jinja district. Lack of some foods in the area was attributed to loss of soil fertility and absences of suitable environment. These reasons were making participants compromise their dietary diversity and frequency of food

consumption. Seasonality of some foods like fruits and vegetables was also causing more harm to pregnant and lactating mother.

5.1.4.2 Economic factors

Evidences from Mucha (2012) indicated that the status of women is the leading cause of high rates of hunger and malnutrition for many countries. Study findings indicated that income levels and occupation of participants were influencing feeding habits especially their dietary diversity.

Occupation of participants: The study findings showed that the majority of participants were engaged in business. Because they spend most of their time doing businesses, the largest chunk of their food constitute purchased food. The economic status of participants determines which food to purchase though food availability and demand also have a hand. However, employment and agriculture were the other major economic activities for the participants. Apart from the rural based participants, agriculture was mainly a secondary activity to urban duelers. Occupation plays a significant role in the nutrition of participants as even those doing agriculture at times purchase food. Also Occupation of the participants is a major determinant of their income levels.

Level of income: Low levels of income of participants revealed by the study is attributed to limited skills due to low levels of education shown earlier and this renders them to be engaged in low income jobs or self employed in the informal sector. These low levels of income subject these women to economic dependency and their lack of power to make decisions at household level. The economic status of these mothers influenced the feeding habits of participants on frequent occasions especially increased feeding practices like skipping of meals and missing to eat a variety of foods. But because pregnant and lactating women feed for two, food deprivation of these women

drastically depletes them which results into increased maternal mortality rates and poor pregnancy outcomes (Victora et al, 2010).

5.1.5 Other Socio-cultural factors influencing the state of maternal nutrition in Jinja district

Though socio-cultural factors affect every one, the threat posed is far much drastic to pregnant and lactating women. However, every pregnant or lactating woman as an individual has unique characteristics which determine her food preferences and lifestyle which are impacted on by her level of nutritional knowledge. Additionally, food preferences develop over time and dictated by individual experiences like motivation to eat, exposure to food, family traditions and rituals as well as personal values attached to food preferred (Rodriguez, 2004). Socio-cultural environment broadly consists of both the social system and the culture of a people (Akhter & Sumi, 2014). Socio-cultural factors in this study were defined to include all elements of the social system and the culture of people that influence positively or negatively the state of maternal nutrition:

5.1.5.1 Individual influences

As indicated in chapter two, every woman as an individual has unique characteristics which determine her food preferences and lifestyle and are impacted on by her level of knowledge. Across the globe, all women are confronted with many maternal nutrition choices during pregnancy and lactation:

Lifestyle is a key determinant of feeding habits - defines what people eat and how they eat. As indicated in chapter two, every woman as an individual has unique characteristics which determine her food preferences and lifestyle and are impacted on by her level of knowledge. Across the globe, all women are confronted with many maternal nutrition choices during pregnancy and lactation.

They practice a number of lifestyle behaviours ranging from sedentary lifestyles to poor food preferences.

Food preferences are developed over time and are said to influence feeding habits and are dictated by individual experiences like motivation to eat, exposure to food, family traditions and rituals, advertising and personal values (Rodriguez, 2004). Studies show that adequate nutrition is critical during pregnancy and lactation (Black et al, 2008). However, according to the study, mothers preferred energy rich foods compared to nutrient rich foods groups like fruits & vegetables as well as meat & fish. This because 95% of participants preferred starchy staples while the rest liked nutrient rich foods. Inadequate intake of nutrients during pregnancy and lactation is risky for mothers and the unborn baby (Bhutta et al, 2013).

Physical activity is a major driver of energy expenditure and yet maintaining an active lifestyle at any age has health benefits regardless of weight (Caulfield et al, 2015). The study revealed that the majority of participants (80%) were spending active lifestyles. However, 20% spent sedentary lifestyles. In a situation where the diets of these participants were majorly starchy staples which are rich, spending a sedentary lifestyle means increased risks for over-nutrition and conditions like obesity, cardiovascular diseases and diabetes. A study by Turi et al (2014) indicated presence of a double burden of maternal under-nutrition and over-nutrition currently in Uganda. Therefore there is need for promotion of interventions addressing both health eating and lifestyle for pregnant and lactating mothers in Jinja district.

Maternal nutritional Knowledge among participants

Maternal nutritional knowledge is a determining factor for dietary habits and lifestyle (Masuku & Lan, 2014). However, the study statistics showed that the majority of participants had average

maternal nutritional knowledge (69%) while 19% had low maternal nutritional knowledge. Only 12% had high nutritional knowledge. Evidence by Saaka (2014) has reported that maternal nutritional knowledge is positively associated with the nutritional status while a study in Western Uganda by Wamani et al (2005) has identified poor maternal nutritional knowledge as a major constraint to good nutrition care practices. But in Uganda Nutrition Action Plan of 2011, it is emphasized that in order for all Ugandans to be well-nourished, live long, healthy, active, and creative lives, they should have access to a high-quality and sufficient diet, good health services, clean water, adequate sanitation, and perhaps most importantly, proper knowledge on how to provide for the nutritional needs for themselves and those that they care for. Therefore there is need for a well-resourced, targeted and coordinated nutrition education to improve maternal nutritional knowledge hence healthcare-seeking behaviours, and practices significantly.

5.1.5.2 Social factors

The maternal nutrition are said to be affected by social influence (Camara et al, 2015). This occurs when an individual's emotions, opinions, or behaviours are affected by others. Social influence takes many forms and can be seen in socialization, conformity, peer pressure obedience and persuasion. The present study assessed peer influence, culture or family influence, gender and provider related influences:

Peer influences

Peer influence plays a critical role in making food choices and preferences. Therefore understanding peer influences affect meal selections and provide positive opportunities and examples of health eating (Herald, 2012).

Culture or family customs

Every society in the world has unique culture and traditions which provide guidelines regarding acceptable and prohibited foods (and Ezeama & Ezeamar, 2014).

Food prohibitions: The majority of the participants (46%) showed that their culture/family custom don't prohibit them from eating certain foods. However, 28% of them revealed that their culture or family customs prohibit them to eat certain foods. This is because they attach following misconceptions to those foods for instance pregnant women should avoid eating eggs on daily basis because they cause the unborn baby to grow so big for the mother to push hence leading to c-section or even death. Misconceptions that deprive pregnant women from eating eggs prevent these women micronutrients because eggs are ranked among the top ten vitamin A rich foods and at the same time a rich source of proteins and other nutrients. Another misconception was that when you eat elephant fish when you are pregnant, you give birth to a baby with pointed mouth. Thus mothers might have avoided eating fish totally during pregnancy to prevent their babies from growing pointed mouth yet fish is a very health, and nutritious food suitable for all individuals especially pregnant women. Also the study discovered that the culture prevents pregnant mothers to eat anything on a day they go for antenatal care and lastly pregnant women were also prohibited by their culture from eating raw salt because eating raw salt results into delivering a child with rough skin. This situation is also supported by a study by Emelumadu et al (2014) who maintained that these practices can have either positive or negative effect on maternal health outcome.

Foods accepted: The findings of the study indicated that 60% of the participants revealed that their culture or family customs encourage them to eat the following foods because of pregnancy or lactation: fish, milk, boiled foods, less oil, rice soup, cassava flour, plenty of fruits and vegetables and beans soup for more blood. A study by Njeri (2014), these feeding practices indicates the positives influences of culture practices. These accepted foods should be promoted

or emphasized by health and nutrition practitioners to ensure increased and sustainable use in regard to the pillars of health promotion.

Gender: women traditionally lack independent decision-making power on most individual and family or household issues. Women and men play substantial though different roles in maternal nutrition. The status of women in a society was one important determinant of the nutritional status of women. Lack of control over resources and the power to make decisions were by far the most crucial, most complex and at the same time the root cause of the problems faced by women (FAO, 2012). Therefore, improving women's access to resources and ability to make independent decisions were critical for better maternal nutrition. Consumption patterns on food were not very different within households. On a good note, the study revealed that the majority of participants (77%) were the main decision maker on the foods eaten in the home. This was because the roles and responsibilities of food production, collection and preparation in households were majorly done by women and more so women tend to be more knowledgeable about which foods are available.

However, though the majority of women had the power to make decisions on the foods eaten in a home, instead husbands privilege eat quality food was given to men. Ensuring women's decision-making role at household levels should be an important part of the national nutrition strategy should aim to involve and involve both men and women.

Provider related influence

The major obligations health workers were to: ensure that pregnant and lactating women gain weight appropriately and at the same time get enough rest as well as making sure that they are provided with provided with at least one extra serving of staple food per day while at the same

time emphasizing consumption of quality diets of vitamin and mineral rich foods like fruits and dark green vegetables, regular intake of micronutrient supplements during pregnancy and the first three months of delivery, prevention and treatment of diseases like malaria and hookworm infections especially in endemic areas in addition to ensuring child spacing of three years or longer (Manoff Group, 2011). The findings from the study showed that most the in-charges interviewed were aware of all their obligations related to maternal nutrition. But because of factors beyond their control like poverty of participants due to polygamous marriages, food insecurity in the area caused by over prioritization sugarcane to food crops. This has been also been revealed by Lwanga et al (2015) as the cause of the rampant malnutrition in the area. Capacity of health workers on addition to overwhelming workload also prevented the health workers from providing quality maternal nutrition. This has been supported by Avula et al (2014) who maintained that health needs and demands are met by health workers.

5.2   CONCLUSION

In relation to research objectives, the researcher concluded that:

There was a poor state of maternal nutrition in Jinja district expressed by following indicators of nutrition status: MUAC, Hb level and presence of night blindness (VAD). Generally, pregnant women had poorer Hb level and VAD compared than lactating mothers whereas lactating mothers had poorer MUAC than their compared to pregnant counterparts. This implied that pregnant women were more micronutrient deficient while lactating mothers were more macronutrient deficient.

The proportion of pregnant and lactating mothers with good nutritional status varied across predicting variables of location, marital status and sex of household head (socio-demographic factors) with statistically significant P values in the multivariate analysis. Rural women, single, separated/divorced, widowed and women in polygamous marriages as well as those women in female headed households were at high risk of maternal malnutrition.

The feeding habits of pregnant and lactating women in Jinja district constituted poor dietary diversity mainly made up of plant based foods especially starchy staples. They rarely consumed micronutrient rich foods whether plant-based or animal-based foods. However, animal based foods were the least consumed yet rendered among the top iron rich foods. Low intake of micronutrient foods causes micronutrient deficiencies such as iron deficiency anemia and night blindness. Geo-economic factors such as annual household income, geographical distribution of foods and main use of food crops grown as well as the socio-cultural factors associated with workload reduction were significantly associated with influencing the consumption of micronutrient rich foods and therefore proved to be critical for any intervention addressing the state of maternal nutrition in Jinja district.

The variations and complexity in the state of maternal nutrition across regions are generally influenced by a several interrelated factors. However, there are regionally specific factors that are unique to a particular region. In Jinja district the state of maternal nutrition specifically influenced by location, sex of the household head, marital status, annual income of the households, and main use of food crops grown, geographical distribution of foods as well as reduction of workload during pregnancy or lactation.

5.3   RECOMMENDATION

Health promotion aims to empower people and communities to control their own health by gaining control over the underlying factors that influence health (WHO, 1986). Translating good intentions and policies into practical design and implementation is complex. Yet what works in one area may not work as well another. Moreover, it is important to improve the state of maternal nutrition by addressing factors that influence it. On the basis of the findings, the researcher therefore recommended as follows:

There is need to improve nutritional status of pregnant and lactating women in Jinja district especially with regard micronutrient status. This can be done increasing dietary diversity through projects like poultry farming, animal rearing to supplement on their diets; promotion and utilization of stable food fortification; micronutrient supplementation as well as food based approaches home fortification with micronutrients. This because the common foods often consumed are low in micronutrients especially iron.

There is also need to sensitize the community about the need to reduce workload during pregnancy or lactation.

Address factors influencing the state of maternal nutrition before or during design or implementation of interventions. Therefore health and nutritional promoters should learn: working in ways which enable women to have control over their nutrition by understanding socio-cultural practices important to nutrition, geo-economic attributes as well as the significant socio-demographics among others.

The tendency to focus on only women when addressing poor state of maternal nutrition should stop because this overlooks the instrumental role men play in improving maternal nutrition. Both men and women need to be involved in this process, acknowledging their respective roles and needs, and fostering mutual awareness and partnership. This will help communities understand the dangers of subjecting a pregnant or lactating woman to heavy workloads or denying the nutritious food such as eggs.

5.4   Suggestions for further research

The study findings point to a number of opportunities for further research. These include but are not limited to the following:

1   There is need to understand the ways in which dietary diversity of pregnant and lactating women can be sustainably improved in Jinja district.

2   There is also need for a comprehensive research to study ways in the male partners can be convincingly influenced to adequately support maternal nutrition.

3   Also a comprehensive research to understand the magnitude of environmental degradation on the maternal and child nutrition in Jinja district

4   Furthermore, there is need to conduct a study on assess for factors affecting causing variations in the state of maternal nutrition across the various locations in Jinja district.

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APPENDICES

Appendix I: Budget

Item/detail	Quantity	Rate	Amount (Ug Sh)
Stationary			
Pens	One dozen	6,000	6,000
Printing of questionnaires	150 copies	1,200	180,000
Hiring of anthropometric and biochemical equipments	5 MUAC tapes	10,000	50,000
	Lab services	50,000 for 10 days	500,000
Research assistants	5 people	50,000 per day * 10	500,000
Transport	6 people	10,000 per day * 10	600,000
Coordination	1 person	50,000 per day* 10	500,000
Lunch allowances	7 people	5,000 per day * 10	50,000
Printing & binding	Draft copies	2 copies	30,000
Printing & binding	Final copies	4 copies	60,000
Miscellaneous	###	###	150,000
Total			**2,626,000**

Appendix II: Work plan

Activity		Time Frame						
		May	June	July	August	September	October	November
Completion of proposal			■	■				
Pretesting of tools					■			
Data collection					■			
Analysis					■			
Handing of first draft						■		
Handing in of final draft						■		
Defending Dissertation							■	

Appendix III: Consent form

Consent Information

My name is Babi Dan a student of Uganda Martyrs University pursuing a Master of Public Health – Health Promotions. I am carrying out research on *Factors Influencing the State of Maternal Nutrition in Jinja District, South-Eastern Uganda.* The findings from this study will help to strengthen maternal nutrition services provided in Jinja district and Uganda in general. This research being undertaken is authorized by the Jinja district local government.

To achieve success for this study, it is important to gather information from pregnant and lactating mothers attending antenatal and postnatal services at health facilities as well as in the communities in Jinja district. Additional information from health workers or in-charges of antenatal clinics will also be necessary for this study. I would therefore like to request you to participate in this survey.

Participation in this study is completely voluntary and the information you shall provide will be strictly kept confidential. The session may take about 30 minutes.

Permission to proceed

Do you have any question? Yes ☐ No ☐

Do you agree to participate? Yes ☐ No ☐

Sign/thumb print………………………… ……….. Date……………………………..

Appendix IV: Questionnaire

Introduction

This questionnaire is divided up into sections. Please answer all questions in all the sections by ticking or writing the response you find most appropriate in the space provided. Each section has its own set of instructions. Please follow them carefully.

SECTION A: SCREENING QUESTIONS

i). Are you pregnant? 1. Yes   2.No   3.Dont know

ii). Are you currently breastfeeding? 1. Yes   2. No

iii). How long have you been a resident of Jinja district? 1. < 6 months 2. More than 6months

SECTION B: SOCIO-DEMOGRAPHIC FACTORS

Qn1.   Socio-demographic characteristics of the respondent

Location (write either *Rural or Urban*)	
County	
Sub-county	
Village	
Number of children you have produced	
Sex of household head *(male, female)*	
Date of birth	
Marital status *(Married monogamy, married polygamy, single, separated/divorced, widowed)*	
Level of education (*None, primary, secondary, tertiary)*	

Religion *(Catholic, Protestant, Muslim, Pentecostal, Others specify*	
Ethnicity	
Employment status (employed, not employed, self employed……………………………)	

SECTION C: NUTRITION STATUS

Qn2. Clinical assessment for VAD

a).   Do you have visual problems especially when its dark? 1. Yes   2. No

Qn3. Anthropometric assessment

Parameter measured	1st reading	2nd reading	Average
MUAC (cm)			

Qn4. Biochemical assessment for IDA

a). What is the Hb reading of the respondent …………………………………………………….

Category of Anemia	Hb level	Tick category of individual
Normal	>11g/dl	
Mild	10-10.9g/dl	
Moderate	7-9.9g/dl	
Severe	<7g/dl	

SECTION D: FEEDING HABITS

Qn5. Dietary assessments of pregnant and breastfeeding mothers using Dietary Diversity questionnaire (DDQ)

a).Please describe the foods (meals and snacks) that you ate yesterday during the day and night, whether at home or outside the home. Start with the first food you ate in the morning. (*Ensure that all foods and drinks mentioned are written down. When composite dishes are mentioned, ask for the ingredients used. Probe for food preparation, whether food was from garden, donated or purchased. When the respondent has finished, probe also for meals and snacks not mentioned.*)

Breakfast	Snack	Lunch	Snack	Dinner	Snack

Food group	Examples	Yes = 1 No = 0
1. Starchy staples (cereals, white tubers and roots, matooke)	Rice, maize, millet, sorghum, wheat, white sweet potatoes, cassava, white yams, matooke etc and food made from these or their products e.g biscuits, chapatti, noodles	

2. Dark green leafy vegetables	Sweet pepper, nakati, spinarch, sukuma wiki, dodo, jobyo, pumpkin leaves, coco yam leaves, cassava leaves or any dark green leafy vegetable	
3. Vitamin A rich vegetables, tubers and fruits.	Pumpkin, carrots, squash, yellow/orange sweet potatoes, ripe bananas, papaya, pineapples, watermelon, passion fruit, apples, guavas, jack fruit	
4. Other fruits and vegetables	Buga, eggplants, Biringania, other fruits & vegetables including wild fruits and vegetables	
5. Organ meat	Liver, kidney, heart, lungs or other organ meats or blood based food	
6. Meat and fish	Beef, goat, lamb, pork, rabbit, wild game, chicken, duck, turkey or other bird meat and Fresh or dried fish or shell fish eg silver fish (Mukene), tilapia (engage) etc.	
7. Eggs	Fresh, fried or boiled	
8. Legume, nuts or seeds	Beans, lentils, peas, nuts e.g mbala nuts (kulekula), seeds or food made from these.	
9. Milk and milk products	Cheese, yoghurt, milk or other milk products etc	

Qn6. Dietary assessment using Food Frequency Questionnaire

FOODS AND AMOUNTS	AVERAGE USE LAST YEAR

	Never or <1 per month	1-3 per month	Once a week	2-4 per week	5-6 per week	Once a day	2-3 a day	5-6 a day	6+ per day
1. Starchy staples (cereals, white tubers and roots, matooke)									
2. Dark green leafy vegetables									
3.Vitamin rich vegetables, tubers and fruits									
4. Other fruits and vegetables									
5. Organ meat									
6.Meat and fish									
7. Eggs									
8. Legume, nuts and seeds									
9. Milk and milk products									

SECTION E: GEO-ECONOMIC FACTORS

Qn7. Occupation and Income levels of the respondents

a). What is your main source of household income? 1. Business 2. Agriculture

3. Animal keeping 4. Employment 5. Others…………………………………………….

b). Do you grow some food crops? If yes, what do you grow? (Probe for   vegetables and fruits)

……………………………………………………………………………………………

c). What do you use them for? 1. Eating, 2.For visitors 3. Selling 3. 4. Both selling and eating

5. Other specify……………………………………...

f). Do you rear some animals or fish? If yes, which ones? 1. Poultry 2. Livestock 3.Both Poultry and Livestock 4. Others………………………………………………………………..

g). What do you use them for? 1. Eating 2. For visitors 3. Selling 4. Both eating and selling 5.Others…………………………………………………………………………………

i). What is your annual income from the various sources in Uganda shilling? 1. 0-200,000

2. 200,001-400000   3. 400, 001-600,000 4. 600, 001-800,000 5. 800,000-1,000,000

6. >1,000,000

Qn8. Housing conditions

Description	Rank	Type	Condition (V.good=5, good=4, Fair=3, bad=2 &V.bad=1)
Roofing material			
Construction material			
Floor material			
Floor space			
Lighting			
Household size			
AVERAGE RANK			
OVERALL CONDITION			

Qn9. Sanitation levels/status

Item	Rank	Presence	Condition (v.good=5, good=4, Fair=3, bad=2 & v.bad=1)
Waste management			
Water supply			
Latrine/toilet			
Waste water management			
Disinfection			
Drying rack			
Hang line for drying clothes			
AVERAGE RANK			
OVERALL CONDITION			

Qn10. Economic Influences

a). Have you ever skipped a meal in your household because you lacked money?

    1. Yes   2. No   3. Don't know

b). How often do you think this happens in a month? 1. Daily   2. Every week   3. Rarely

    4. Never at all   5. Don't know 6. Others………………………….

f). Have you ever missed to eat a variety of foods at single meal in your household because of

    lack of money?   1. Yes   2. No   3. Don't know

g). How often do you think this happens in a month? 1. Daily   2. Every week   3. Rarely

    4. Never at all   5. Don't know 6. Others …………………………….

Qn11. Environmental/geographical influences

a). Are there any foods you think you are not consuming because of environmental/geographical challenges are limiting your household from having or accessing those foods? 1. Yes 2. No 3.Don't know

b). Which one exactly is limiting you to access food? …………………………………..

b). Many areas have experienced climate or seasonal changes, in your area what do you attribute this to? 1. Cutting of trees 2. Industrialization 3. Urbanization 4. Don't know 5.Others ………….

Qn12. Availability of other resources

a). Which of the following items do you have in your household? 1.Radio 2.TV 3. Both 4. None

b). How has your nutrition been influenced because of listening to any of those items? ………………………………………………………………….......................................

c). What do you use for cooking? 1. Kerosene 2. Electricity 3.Charcoal   4. Gas 5. Firewood 6.Others …………………………………………………………………………………..

d). In which way has it (cooking item) influenced your nutrition? ……………………………….

SECTION F: SOCIO-CULTULTURAL FACTORS

Qn.13. Life style of the respondents

a). Do you usually eat between meals (snacking)? 1. Yes   2.No

b). If yes, how often in a day? 1. Once 2.Twice 3.Thrice 4.More than three times

c). Are you on dieting? 1. Yes   2.No   3.Dont know

d). If yes, what is the reason for the special diet? 1. Fashion/ slendering 2.Weight management 3.Managing a disease 4.Religious reasons 5.Others specify……………………….

e). Do you usually eat away from home? 1. Yes   2.No

f). Which kind of food do you always eat when you are away from? 1. Fast foods   2.Local foods 3.Fruits & vegetables 4. Dip fried meat/fish 5.Others ………………….

d). In which way do you really want your food to be prepared? 1. Boiled 2.Steamed 3.Fried

   4.Roasted 5.Others specify………………………………………….

e). Do you smoke?   1. Yes   2.No

f). What physical activities do you always engage in? 1. Walking 2.Jogging 3. Digging

   4.Sports 5. None 5.Others specify…………………………..

Qn14. Food preferences of the respondent

a). Every individual has unique likes and dislikes concerning foods: I would like to know your

most favourite foods that you always want to eat it on daily basis? ……..………………………

b). Why do you like to always eat this food on daily basis? ……………………………………

c).What is your least favourite food? ....

d). Why is it your least favourite? ....…………………………………….

e). Which drinks do you always use to escort your meals? 1.Milk/tea/coffee

   2. Water 3. fresh fruit juices   4. Beers/alcohols/wines   5. Cafenaited drinks

   6. Others specify…………………………………………………………………………

Qn15. Nutrition knowledge of respondents

a). Is it right for pregnant or breastfeeding mothers to be served with extra meals in a day? 1. Yes

   2. No. If yes, why? ....

b). Which feeding habits are recommended by health workers during pregnancy or lactation?

…………………………………………………………………………………………………..

c). Which feeding habits are discouraged during pregnancy or lactation?……………………..

………………………………………………………………………………………………….

d). Why are pregnant or breastfeeding women encouraged to eat a balanced diet?

…………………………………………………………………………………………………

e). Give two examples of vitamin/mineral rich foods grown in your area………………… …….

f). Give two examples of protein-rich foods found in your area…………………….…………

g). Give two examples of energy rich foods found in your area……………………………….

i). How would you tell that some one is anemic or is iron deficient? What causes it?..................

……………………………………………………………………………………………

i). How do we maintain proper hygiene and sanitation of the food we intend to eat? ....

………………………………………………………………………………………..

Qn16. Health status of the respondent

a). Do you have any condition affecting your appetite or feeding? 1.Yes   2. No 3.Don't know

b). If yes, what is that condition? …………………………………………………….

c). Do you have any condition requiring special nutritional attention? 1.Yes 2.No 3.Don't know

d). If yes, what is it? ....

e). What special nutrition attention does your condition requires you to have?…………………

Qn17. Peer influence

a). Are there time when you feel that your feeding habits are not proper for you but your friends

like it that way? 1. Yes   2. No

b). If yes, give a reason for your answer……………………………………………………….

Qn18. Cultural, Gender and Family Customs

a).Does your family/culture prohibits to eat some foods when you are pregnant or breastfeeding?

        1.Yes   2.No.

b). If yes, which one? ……………………………………………………………………….

c). Which reason do they give you? ………………………………………………………..

d). Are there foods your family/culture encourage you to eat when you are pregnant it?

1.Yes   2.No

e). If yes, which one? ……………………………………………………………………..

f). Why do they encourage you to eat it? ……………………………………………………………

g). Who usually makes decisions on the type of foods to prepare for consumption in your household?1.Husband 2. Myself 3.Children 4.Parents 5. Others……………………….

g). who is most privileged to be served quality meals in your home? 1. Husband 2. Myself 3.Children 4.Visiter 5.Others specify…………………………………………………..

h).Since you are pregnant or lactating, has your household spared you from doing heavy work?

1. Yes   2. No

Qn19. Religion influences

a). Does your religion talk about what one should eat or should not? 1. Yes 2.No 3.Don't know

b). If yes, what does it say? ………………………………………………………………

Qn20. Provider related influences

a). According to you, do you find health healthworkers very helpful in improving your nutrition?

1.Yes   2.No   3. Don't know

b). Give reason for your answer? ………………………………………………………………

c). Does this motivate or demotivate you? 1.Motivate   2. Demotivate   3. Not bothered

d). Do you have other organisations dealing concerned with maternal nutritional services in your area?1. Yes   2.No

e). If yes, how have they helped you in improving your feeding habits? ………………………..

f). Have you ever received micronutrients supplements either from health facilities or an organisations? 1. Yes   2. No

Thank you for your cooperation

Appendix V: Interview guide for in-charges of antenatal/postnatal clinics at health facilities

Respondent ID: _ _ _ _ _ _ _ _

Health facility:	
Age	
Sex:	
Position:	
Period spent in that position	

Qn1. In health sector, good nutrition care starts with nutrition assessments. Describe how you carry out nutrition assessments of pregnant or lactating mothers? What challenges do you always face when assessing nutrition statuses of these mothers?

Qn2. In practice, nutrition assessment is always followed by dietary assessments. Describe how you carry out dietary assessments. What challenges do you always experience when do it? What do you think are the factors responsible causing malnutrition among pregnant or lactating mother?

Qn3). How do you routinely monitor weight gain? What are the challenges faced?

Qn4). In summary form, what key maternal nutritional messages would package for mothers as a take-home to ensure that they will always recall and use in prevention of maternal malnutrition?

Qn5). Malaria and hookworm infections are another challenge impacting on maternal nutrition. So far, what do you say about this challenge and what are the main factors responsible for the prevalence?

Qn6. What issues do mothers bring up to you when you talk to them about proper feeding during pregnancy and lactation? What advise do you usually give them?

Thank you for your corporation

Appendix: Observation Checklist

In the course of the study, the following maternal nutrition issues will be given careful attention:

1. How maternal nutrition services such as nutritional assessments, counseling and support provided to pregnant or lactating mothers at health facilities.

2. Reactions of mothers towards maternal nutrition services given to them

3. Feeding habits of pregnant and lactating mothers:

   - Type of foods consumed

   - Quality and quantity of meals consumed.

   - Variety of foods consumed especially noting whether plenty of fruits and vegetables are included

   - Food preparation methods

   - Other behaviours like snacking, meal skipping,

4. Hygiene and sanitation (both personal and in the household)

5. Supportive lifestyle and care to these mothers in the community like allowing them to rest more, being served extra meals, encouraging them to do physical activities etc

@@@@@@@@@@@@@@ END @@@@@@@@@@@@@@@@@@

Making a difference

Faculty of Health Scienc
Email: health@umu.ac.
20th July 20

To The Responsible Officer,

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Dear Sir/Madam

RE: INTRODUCING MR. DAN BABI

This is to introduce to you **Mr. Dan Babi** as a *bona fide* student of Uganda Martyrs University, under the Faculty of Health Sciences. Mr. Babi is pursuing a programme leading to the award of *Master of Public Health –Health Promotion*. He has been cleared to undertake field research for his dissertation on the topic:

Factors Influencing the State of Maternal Nutrition in Jinja District, South Eastern Uganda

The research topic and protocol have been approved by the relevant University authorities. Any assistance rendered to enable him conduct this study will be highly appreciated by the University.

Yours sincerely,

John Francis Mugisha (PhD)
Associate Professor / Dean,
Faculty of Health Sciences,
Uganda Martyrs University

JINJA DISTRICT LOCAL GOVERNMENT

Telephone: 0434 - 243914
Fax: 256 - 043 – 121267
E.mail:ddhs.jinja@health.go.ug

THE REPUBLIC OF UGANDA

Office of the Chief Administrative Officer
Department of Health,
P.O. Box 1551,
Jinja

Our Ref: MED/D/164/1
Your Ref:

29th July, 2016

……………………………………..

RE: INTRODUCTION OF DAN BABI

This is to introduce to you Mr. Dan Babi a student of Uganda Martyrs University.

He wishes to carry out a research on topic titled: **Factors influencing the state of Maternal Nutrition in Jinja District, South Eastern Uganda.**

Permission has been granted for him to undertake this research in our district.

Please render him the necessary assistance.

Yours in service,

Bagagire Nathan
For; District Health Officer, Jinja

PHONE NO. 256-77-6-613296

OFFICE OF THE
CHIEFADMINISTRATIVE OFFICER
JINJA DISTRICT LOCAL GOVERNMENT
P.O. BOX 1551
JINJA

OUR REF: CR/164/1

THE REPUBLIC OF UGANDA

25ᵗʰ July, 2016

YOUR REF:

The District Health Officer
Jinja District Local Government.

RE: RESEARCH

This is to introduce to you Mr. Dan Babi a student at Uganda Martyrs University. He wishes to carry out a research on topic titled **"Factors Influencing the state of Maternal Nutrition in Jinja District, South Eastern Uganda."** at Health Department.

This is therefore to inform you that he has been permitted to undertake this research in our district in your Department.

Please render him the necessary assistance.

CHIEF ADMINISTRATIVE OFFICER
...CT LOCAL GOV'T