MATERNAL WORK LOAD, FOOD CHOICES AND NUTRITIONAL STATUS OF RURAL SMALLHOLDER FEMALE FARMERS IN MPIGI DISTRICT, CENTRAL UGANDA

BY

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DECLARATION

I MIREMBE WINNIE 19/U/GMHN/19024/PD hereby declare, this work is the first of its kind and no part of this publication has been presented anywhere else unless otherwise stated.

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APPROVAL

The following research report by MIREMBE WINNIE under the topic of **"Maternal workload, food choices and nutritional status of rural small holder female farmers in Mpigi District, central Uganda"** was done under my supervision and is henceforth forwarded to the Kyambogo University Graduate School with my approval.

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ABBREVIATIONS AND ACRONYMS

ASFs	Animal Source foods
BMI	Body Mass Index
FAO	Food and Agriculture Organization
GDP	Gross Domestic Product
HIV	Human Immunodeficiency virus
LMICs	Low- and Middle-income countries
NCDs	Non communicable diseases
SPSS	Statistical Package for the Social Sciences
SSA	Sub-Saharan Africa
TB	Tuberculosis
UBOS	Uganda Bureau of Statistics
UDHS	Uganda Health Demographic Health Survey
UNICEF	United Nations Children's Fund
WHO	World Health Organization

Operational Definitions

Nutrition: refers to the process by which living things receive and utilize the necessary materials (food) for survival, growth and maintenance of worn-out tissues (Madhura, 2019).

Nutritional status: Refers to an individual's health condition as it is influenced by the intake and utilisation of nutrients (Todhunter, 1970). For the purpose of this study, Nutrition status is the classification from the results obtained from the measurement of the individual's weight in kilograms divided by height in square meters.

Food choice: refers to the selection of foods for consumption, which results from the competing and interacting influences of a variety of factors: sensory, physiological and psychological responses of an individual, Social, environmental and economic factors (Antonelli, 2017).

Maternal workload: refers to amount of women's field work or activities along with long hours (i.e., more than three hours) spent on activities (Geissler, 1992: O'Donnell & Eggemeier 1986).

Smallholder Farmer: refers to a farmer that cultivates a limited amount of land and rely predominantly on family labor for farming operations (IFAD, 2016: IFPRI, 2011).

Productive gender roles: refers to the roles undertaken by men and women to get paid / wages in cash or to produce goods that are not consumed (used) by themselves (Fajarwatia et al., 2016). For example, working in formal and informal sectors such as farming, trade, farming labourers among others.

Reproductive gender roles: refer to the roles and responsibilities associated with child care and domestic tasks. For examples giving a birth, cooking, nurture and care for children, fetching water, and washing, cleaning among others (Naidu & Rao, 2018).

Unpaid work: refers to all of the work done to care for, nurture and sustain human beings including cooking, cleaning, washing, feeding, and all tasks usually identified with a mother (Naidu & Rao, 2018).

Productive work: refers to any form of work which contributes to the gross domestic product (GDP) (Fajarwatia et al., 2016).

Household: refers to a person or group of people who normally live and eat from a common pot (UBOS, 2014).

ABSTRACT

Introduction: This study investigated the interplay between maternal workload, food choices, and the nutritional status of rural smallholder female farmers in Mpigi District, Central Uganda. The research aimed to evaluate the nutritional status of women of reproductive age, explore maternal activities, food choices and determine the relationship between maternal workload, food choices and nutritional status.

Methodology: A total of 386 female farmers aged 18-49, with children under five years, participated in the cross-sectional survey. Quantitative methods were employed, encompassing data collection on demographics, food choices, time allocation, anthropometric measurements, and dietary data. Random sampling method was used to select study participants within selected enumeration areas in the study district. Chi-square test of independence, was applied to assess the relationship between maternal workload, food choices, and the nutritional status of rural smallholder female farmers.

Results: More than half (57%) of the respondents consumed food from less than five food groups. Dark green vegetables, vitamin A fruits/vegetables, meat, fish, chicken and eggs were the least consumed. This dietary pattern increased the risk of micronutrient deficiencies thus triple burden of malnutrition, with 5.2% underweight and 36.5% overweight or obese. The majority (92.5%) of smallholder female farmers worked for less than 10.5 hours per day, with various activities such as food crop farming, child care, and food preparation occupying most of their time. Notably, smallholder female farmers who worked more extended hours were more likely to consume protein-rich foods like eggs, meat, fish, and chicken. Furthermore, there was a statistically significant association ($p=0.049$) between maternal workload and nutritional status, as mothers working longer hours were more likely to be overweight or obese.

Conclusion: This research underscores the interplay between maternal workload, food choices, and the nutritional status of smallholder female farmers. It emphasizes the importance of empowering women in rural settings and the need for a balance between work hours, dietary intake and food choice to combat malnutrition effectively. Additionally, it suggests a potential trade-off between extended working hours and maternal health, which can negatively impact overall nutritional status.

CHAPTER ONE: INTRODUCTION

1.1 Background to the Study

In developing countries, women contribute critically to rural agricultural economies. Women's roles differ noticeably between and within regions and are shifting rapidly across the world, where economic and social forces are transforming the agricultural sector (Luqman et al., 2011). Rural women regularly manage complex households and pursue numerous livelihood strategies for family welfare. The activities they involve in characteristically include producing agricultural crops, attending to animals, processing and cooking food, collecting fuel and water, engaging in trade and marketing, caring for family members and working for incomes in agricultural or other rural enterprises so as to sustain their homes (FAO, 2011; FAO et al., 2017). These activities contribute to maternal workload that could have an effect on nutritional status and health status of rural women.

According to Geissler (1992), maternal workload refers to amount of women's field work or activities along with long hours (i.e., more than three hours) spent on activities. Certain activities like agricultural associated activities involve using physical energy, and may be disadvantageous to women's nutritional status which is an individual's health condition as it is influenced by the intake and utilization of nutrients contributing to either poor nutritional status (underweight, overweight and anaemia) or good nutritional status (Alderman, 1997; Kadiyala *et al.*, 2014).

Good nutritional status of women refers to a state of health and well-being in which a woman's body receives and utilizes essential nutrients in appropriate quantities to support her growth, reproductive health, and overall functioning (Kanguru et al., 2017). Contrary, poor nutritional status among women of reproductive age appears in form of micronutrient deficiency, underweight and overweight. Micronutrient deficiencies is defined as a lack of

essential vitamins and minerals like iron, zinc, iodine, calcium, vitamin A all required in small amounts by the body for proper growth and development Ahmed, Hossain and Sanin. (2012). Underweight among women is having a body mass index (BMI) of less than 18.5 kg/m^2 while overweight is having a body mass index of greater or equal to 25 kg/m^2. These usually have a negative effect on reproductive health. It is well known that an undernourished mother inevitably gives birth to an undernourished baby, perpetuating an intergenerational cycle of undernutrition ((Eiman *et al.*, 2021; Kanguru et al., 2017).

Poor nutritional status among women depends on several factors namely; the political and economic situation, education level, the season and climate conditions, food production, cultural and religious beliefs, food customs, prevalence of infectious diseases, poverty, and family size coupled with maternal physiological state (Habaasa, 2014). The afore cited factors have an influence on maternal food choices, defined as the selection of foods for consumption (Antonelli, 2020). Individual food choices, surrounded by the pattern of food consumptions, evolve according to the variations in natural environment, biological basis, physical need, lifestyle, and advance in technology.

More than 80 percent of economically active women in Africa work in agriculture and it is their significant source of food and income (Carletto et al., 2015; Kadiyala et al., 2014; Meinzen, 2019). Despite the above mentioned, agricultural work could be the reason for women to increase their work effort and lengthen their working hours (Komatsu et al., 2019; Ruel & Alderman, 2013). Nevertheless, if women devote more time on agricultural activities, they may have less time to care for, or process and cook nutritious food for themselves and their families. Therefore, if agriculture is the main source of employment and income for many, then time used in agriculture can have an influence on their nutritional outcomes (Johnstona et al., 2018).

Agriculture, an engine of progress for reducing poverty, remains a leading occupation in sub-Saharan Africa with women contributing 60 to 80% of the labour force. There is growing acknowledgement that women are now involved in greater roles and making crucial contributions to agricultural and rural economies in developing countries (FAO et al, 2017). Although women in Uganda spend most of their time in the day (7hours) on unproductive work like sleeping, resting, relaxing, eating, drinking, and personal care work than men (5hours), 70% are engaged in agriculture compared to 58% males (MAAIF, 2021; UBOS, 2019). About 24% of the women in Uganda spend large proportions of their time in a typical 24-hour day on paid work (Oxfam, 2018). Unlike men that spend 5 hours of their day on productive work, women spend a maximum of 3 hours (UBOS, 2019).

Malnutrition remains a key challenge in most Sub-Saharan African economies, including Uganda, with most of its population residing in rural areas and depending on agriculture for their livelihoods (Diiro, 2017). An estimate close to 39.0% of women of reproductive age are affected by anaemia, 18.4% of women live with obesity and 8.4% with underweight in Africa (WHO, 2017). In Uganda nine percent of women are thin, 24% are overweight or obese and 32% anaemic. Particularly, in the South-central region of Uganda where Mpigi is located, 6.6% women were thin, anaemia was at 27.7% while overweight and obesity were at 36.5% (UBOS & ICF, 2018).

Women are also at risk of ill health and poor nutrition due to both biological and social vulnerabilities like increased nutrient requirements during pregnancy and lactation, collective with physically demanding agricultural domestic work, and reduced nutrient intakes (Harris, 2014). In most of the region, women not only spend lengthier workdays than men but also extra hours each week in agricultural work. Time is an important input to nutritional outcomes as it influences practices about food consumption, food choices, and childcare which fall in women's domain in most societies (Hull, 2013; Johnston et al, 2018). In

addition, having less time for themselves reduces their chances of seeking health services away from their households. This reduces the possibility of health check-ups, and access to other health and nutrition information which predisposes women to poor nutrition outcomes like anaemia, underweight and overweight or obesity (Komatsu, 2018).

Women's responsibility is at least equal to that of men in determining the choice and quantity of food available at the household level, and it is significantly more important in determining the variety and palatability of the household diet (Leslie et al., 1997). However, women participate in several activities that contribute to heavy workload and extra time use, with undesirable health and nutrition implications (IFAD, 2016). The study established the relationship between maternal workload, food choices and nutritional status of smallholder female farmers and suggested strategies to improve their working and living conditions.

1.2. Problem Statement

Women's active participation in agriculture regularly translates into a heavy workload because it increases their work effort and lengthens their working hours (Komatsu et al., 2019; Ruel & Alderman, 2013). Rural women can work for as many as 6 to 8 hours per day, doing farm work while managing their domestic tasks at the same time (UBOS, 2017). Rural women have limited time during the day to do everything, like working in their gardens, which usually are far from their homes, collecting water and fuelwood, cooking food and caring for themselves, the sick and elderly. This situation forces them to reduce the time they spend preparing meals, leading to the adoption of quick food preparation methods that negatively impact both family nutrition and the household's food security. (Komatsu., 2018; Popkin, 1980). Household food insecurity is still a global challenge affecting mostly people from Low and Middle-Income Countries (LMICs) especially the rural population (USAID, 2018). In Uganda, despite several nutrition specific and sensitive interventions such as maternal, child health-nutrition and agricultural extension services to fight malnutrition, high

levels of poor nutritional status continue to exist with anaemia at 27.7%, underweight at 6.6%, overweight and obesity at 36.5% among women in South Central of Uganda where Mpigi district is located (UBOS & ICF, 2018).

However, there is inadequate evidence on the influence of maternal workload and food choices on the nutritional status of smallholder female farmers in Uganda. Findings from this research will therefore help to establish the relationship between maternal workload and food choices as well as their effect on the nutritional status of smallholder female famers thereby informing programming to design effective and sustainable nutrition sensitive agricultural interventions.

1.3 General Objective

The general objective of the study was to examine the relationship between maternal workload, food choices and nutritional status of rural smallholder female farmers in Mpigi District in Central Uganda.

1.3.1 Specific Objectives

The study focused on these objectives:

1. Assess the nutritional status of rural smallholder female farmers in Mpigi District.
2. Examine the food choices among rural smallholder female farmers in Mpigi District.
3. Determine maternal workload of rural smallholder female farmers in Mpigi District.
4. Examine the relationship between maternal workload and food choices among rural smallholder female farmers in Mpigi District.
5. Assess the relationship between maternal workload and nutritional status of rural smallholder female farmers in Mpigi District.

1.3.2 Research Questions

The study pursued answers to these questions:

1. Are rural smallholder female farmers in Mpigi District malnourished?
2. What are the food choices made by rural smallholder female farmers in Mpigi District?
3. What are the primary activities and time allocation among rural smallholder female farmers in Mpigi District?
4. How does the maternal workload relate with food choices of rural smallholder female farmers in Mpigi District?
5. How does maternal workload relate with the nutritional status of rural smallholder female farmers?

1.4 Theoretical Framework

Agriculture contributes to food availability and dietary diversity, either from home production or through the market. Agriculture could be the foundation of good nutrition. However, in many circumstances while agricultural systems yield food, they rarely produce food with the essential diversity and at affordable costs, especially for the disadvantaged farmers (with limited sources of income and access to markets). Agriculture interventions have intensively concentrated on the production of staple foods with inadequate attention to diversity of food (Herforth & Ballard, 2016).

In Uganda, over 70% of women are involved in agricultural work although they do not benefit much from the harvest with their spouses selling off almost all the produce and spending most of the preceding on alcohol consumption, extra marital relationships that result into increased exposure to HIV/AIDs, gender-based violence affecting the women and children. The afore mentioned contribute to food and nutrition insecurity affecting women's

nutritional status, health and well-being. This can compound households into a vicious cycle of poverty with its associated effects (McKenna, 2014: MAAIF, 2021).

In addition, agriculture as a gender issue influences women's time use, participation in decision-making, thus nutritional status. Agricultural work could be the reason as to why women work for longer hours and if they spend more time on agricultural production, they may have fewer hours to care for, or process and cook nutritious food for themselves. Women also generally experience increased nutrient requirements due to physically demanding reproductive and productive activities like agricultural work. (Herforth and Ballard, 2016: McKenna, 2014).

1.4.1 Conceptual Framework

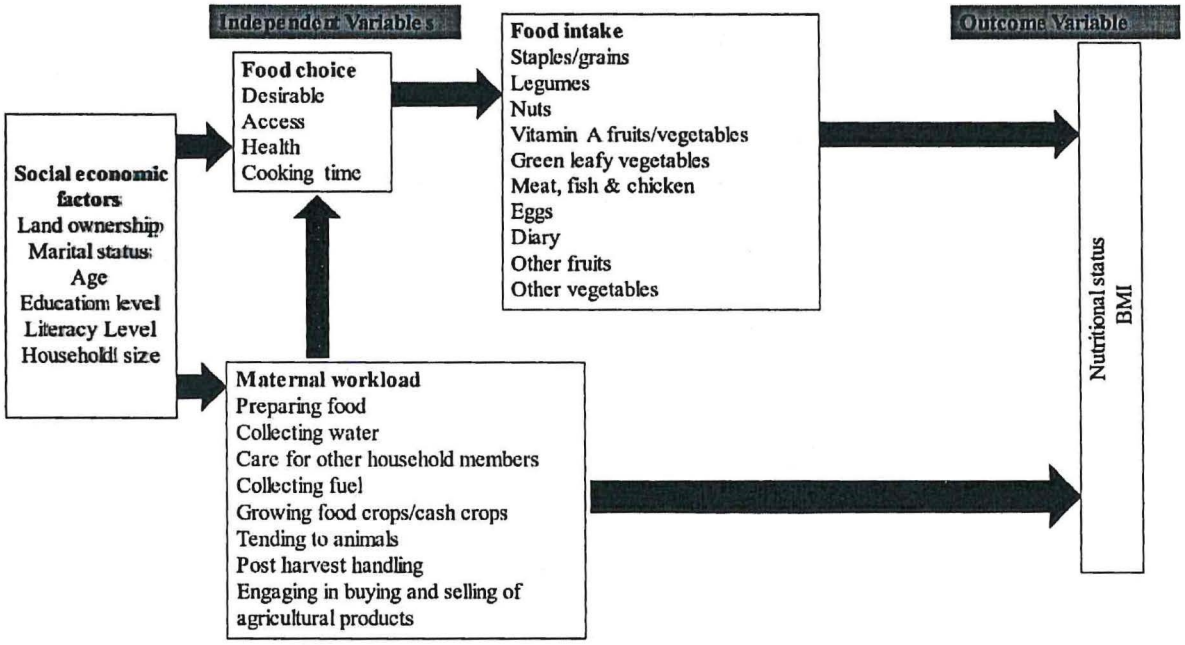

Figure 1. *Conceptual framework of factors associated with Nutritional status of smallholder female farmers*

The conceptual framework illustrates the relationship between maternal workload, food choice and nutritional status of smallholder farmers. For this study, activities that contribute to maternal workload (domestic and productive activities) and food choice are the independent variables while nutritional status (BMI) is the dependent variable. This study assumes that agricultural activities, household responsibilities and food choice affect female farmers' nutritional status. Nutritional status is defined as the classification from the results obtained from the measurement of the individual's weight in kilograms divided by height in square meters (WHO, 2021).

In reference to the UNICEF conceptual framework, there are three levels that describe the causes of malnutrition; the basic, underlying and immediate causes. In this study, social

economic factors reflect the basic causes of malnutrition. Access to natural resources like land influences crop and animal production that results into food security and dietary diversity hence improving nutritional status. In contrast, the size of land owned or accessed by rural women may reflect the level of agricultural activities engaged in for example having many acres of land influences time is spent at the fields, mothers remain with limited time to prepare decent meals and thus affecting nutrition status. In addition, gender dynamics like gender roles influence workload and thus nutritional status in a way that, mothers are more engaged in household activities like cooking, taking care of household members, collecting fuel and water and at the same time participate in productive activities like crop and cash crop farming. Participation in agricultural activities like food crop farming contributes to household food security and when the household is food secure, it will increase dietary intake and thus improved nutrition status. Participation in these activities may also reduce mothers' time for self-care including seeking health services and preparing nutritious meals for themselves. If mothers are unable to seek health care, it may deteriorate their health through disease which is an immediate cause of malnutrition as it affects intake (through loss of appetite and productivity) and utilisation (through mal absorption) of food. The cost of food in a given location affects food affordability and availability at household level. When the food is available and affordable by households, it may result into dietary diversity and thus good nutrition outcome.

Factors affecting food choice influence access, preparation, intake and utilisation which in turn results in the nutritional status of mothers. The mothers' education level affects nutrition status in a way that having knowledge about nutrition influences what is eaten and food preparation method. In addition, one's education level may increase their employment chances and thus increasing income which enables acquisition of resources for food production or, purchase food for themselves or household. An individual's physiological state influences nutrition status by affecting dietary intake, food availability through enabling or limiting production due to disease

and access to food. Marital status of a woman is associated with household leadership and access to resources like land. Usually men own land, this enables married women to have a higher chance to access land that enables production of food thus influencing nutrition out comes.

CHAPTER TWO: LITERATURE REVIEW

2.1 The Concept of Nutrition

Nutrition is the process by which living things obtain and utilize the necessary materials (food) for survival, growth and maintenance of worn-out tissues. It is from the food consumed that human beings get nutrients that are utilized for survival, growth and maintenance of worn-out tissues (Madhura, 2019). There are six major nutrients of which each has specific purpose in the body. Those which are a source energy are the carbohydrates and fats, proteins for growth and repair of tissues and cells, vitamins and minerals regulate chemical process in the body. Water is available in most foods and is an essential component and a universal solvent for various biochemical processes in our bodies. It is useful in transportation of nutrients and is required for all cellular activities (Ekesa *et al.*, 2020). An imbalance between dietary intake and requirements results into malnutrition that is either under nutrition, which results from less food intake and hard physical work or over nutrition resulting from excess food intake and less physical activities.

Women nutrition status plays a key role in preventing adverse maternal and child health outcomes yet there is little existing information on the nutrition status of women of reproductive age (WRA). Women have distinct nutritional requirements throughout their life as there is always increased nutrition demand during any stage of reproductive age which eventually affects their health and the health of the foetus and/or infant. Nutrition of women before, during pregnancy and when breastfeeding is critical in determining the health and survival of the mother and of her baby. Women of reproductive age who are menstruating lose blood each month and need meals which provide the nutrients for making haemoglobin and red blood cells, iron, folate, vitamin a and vitamin B12 and protein. Before pregnancy, especially during adolescence, there is a burst growth which may be delayed if one is malnourished. Adolescent

girls may require additional intake of nutrients like calcium, iron, zinc vitamins, 1400kc/day and more (Bulirani et al., 2018; MOH, 2020)

During pregnancy, poor diets lacking in key nutrients – like iodine, iron, folate, calcium and zinc – can cause anaemia, pre-eclampsia, haemorrhage and death in mothers. They can also lead to stillbirth, low birthweight, wasting and developmental delays for children. Poor nutrition during breastfeeding makes it more challenging for mothers to replenish their nutrient stores and meet their additional dietary needs. A balanced diet therefore should contain all the nutrients as required by the body and in proper amounts that is to say carbohydrates contributing 50-60% of total calories, proteins 10-15%, 20-30% from both visible and invisible fat for maintenance of a normal nutritional status and other physiological processes (WHO, 2017).

2.2. Overview of Nutritional Status among Smallholder Female Farmers

Hunger and malnutrition have persistently impaired health, quality of life and survival of people in developing countries with Uganda inclusive. Its effects on human and economic costs are huge, affecting mostly the poor and the vulnerable groups like women and children (WHO, 2016). Although global hunger reduction continues, in 2014, FAO reported, over 805 million people were chronically undernourished of whom 23.8% were resident in Sub Saharan Africa (FAO, 2014).

Malnutrition is as a result of taking in less, more or imbalanced carbohydrates, protein, or fats (macronutrients) and vitamins and minerals (IFAD, 2014). About 793 million people are reported to malnourished globally (FAO, 2016). Malnutrition is categorized into two forms i.e., undernutrition comprising of wasting and micro nutrient deficiency while over nutrition constitutes of overweight and obesity (Lutter et al., 2011).

The major cause of undernutrition is nutrient deficiencies while overweight and obesity (overnutrition) is due to extra nutrients intake like fats and sugars more than the body requires. For one to acquire optimal health, there is need to have dietary diversity (WHO, 2016). Nutritious foods offer protection against malnutrition and averts chronic diseases like heart disease, diabetes and cancer (Black et al., 2008).

More than half of the world's hungry people reside in rural areas and majority are smallholder female farmers (IFAD, 2014). In addition, more than 2 million people globally suffer from micro nutrient malnutrition with iron deficiency among women being one of the top 10 leading causes of death in developing countries (WFP, 2016). Despite the reduction in rate of low Body Mass Index (BMI) among adult women in sub-Saharan Africa, it is still greater than 10% in the region (Black et al., 2016).

2.2.1 Undernutrition

Maternal undernutrition remains a serious public health concern in Sub Saharan Africa leaving the most vulnerable people like women and children at risk (Ahmed, Hossain and Sanin, 2012; Kyobutungi et al., 2015). Increased agricultural workload demands during pregnancy increases the risks of negative maternal energy balance and poor growth outcomes in early infancy (Pradeilles et al., 2019). Studies that have examined the impact of labour-intensive agricultural work on maternal nutrition and pregnancy outcomes in Low- and Middle-Income Countries show labour-intensive agriculture reduces birth weight and/or weight gain in pregnancy (Agarwal et al., 2011; Rao et al., 2013). According to the Barkers hypothesis, there are high chances of an undernourished mother to give birth to an undernourished child which often occurs as a low birthweight baby, premature and at the worst still births (Barker et al., 2018). Undernutrition is one of the major health and nutritional challenges in most communities specifically among children in their first 1000-days life. It is a great cause of childhood morbidity and mortality in addition to leading to irreversible impairment of physical and mental

growth of those who survive (MOH, 2019). The percentage of women of reproductive age in Uganda who are thin has reduced over years, from 12% in 2006 and 2011 to 9% in 2016 (UBOS & ICF, 2017).

The long-term impact of undernutrition in women and children cannot be stressed. Malnutrition limits women's survival to childbirth connected complications like heavy bleeding after delivery and cervical tears, renders them defenceless when it comes to sicknesses, sufficiently attend their families and challenges their ability to work thus affecting agricultural production (Ahmed et al., 2012). Similarly, women with a low height are at risk of experiencing complications during delivery compared to those with a higher stature because of cephalopelvic disproportion (Black et al., 2018). An association was also established between maternal low body mass index and poor health status affecting the woman's productivity (Fishman et al., 2014; Black et al., 2018). Therefore, it could be argued that nutrition status of an individual influences their participation in productive activities.

2.2.2 Overweight and Obesity

Obesity has nearly tripled globally to around, 13% of the world's adult population (WHO, 2021). More women are obese (15%) than men (11%) which makes the prevalence to vary seriously among men and women (Kanter & Caballero, 2012; WHO, 2021). In Africa, the prevalence of overweight and obesity among adults aged 18 years and above is 39% and 13% respectively (WHO, 2017). The rate of overweight and obesity is higher with 18.4% among African women than men (7.8%) and in urban areas compared to rural areas (Agyemang et al., 2016; WHO, 2017; UNICEF et al, 2020). In one study conducted in East Africa, results showed that overweight & obesity among women and men was at 43.4% and 34% respectively (Steyn et al., 2011).

However, in Uganda, the percentage of women who are overweight or obese has increased from 17% in 2006 to 19% in 2011 and 24% in 2016 (UBOS & ICF, 2018). The rate is higher among urban women (34%) than rural women (20%). Education and wealth were reported to be contributing factors to the increase in the proportion of women who are overweight or obese. For example, 34% more women in the highest wealth quintile were overweight or obese than those in the lowest wealth quintile (UBOS & ICF, 2018).

According to WHO report, overweight and obesity kills more people than underweight in most countries (WHO, 2021). The 2017 WHO report indicated that 8% of global deaths were ascribed to obesity. In addition, 4.7 million premature deaths occur globally in relation to obesity (Ritchie & Roser, 2017). Further, the same report shows that one in every 10 women who die during or after child birth are overweight or obese. Although obese women are more at health risk than normal women, community perception of obesity differs which may pose challenges to maternal mortality measurements (Kanguru et al., 2017). Most of them develop complications and non-communicable diseases which reduce on the number of women who would contribute to agricultural activities thus less food production for their households and entire population (WHO, 2021). In addition, overweight or obese individuals face challenges of laziness, lack of willpower, absenteeism, and hence low productivity (Giel, 2010).

2.3 Factors Associated with Under and Over Nutrition

The causes of under nutrition among women are numerous and multifaceted and these include inadequate maternal care, household food insecurity, poverty, poor access to health care, low socio-economic background including, female headed households, low education level and lack of good income (UNICEF, 2013; Mawuli., 2019). In addition, aspects like women's involvement in decision-making, headship, production diversification, women's empowerment, commercialization and degree of purchasing power contribute to the nutrition status of rural

female smallholder farmers (Ihab et al, 2013; Patel et al, 2012). Some studies show that income and level of educational are the key factors affecting dietary diversity and thus nutrition status of women in rural communities (Saaka et al., 2021). Brinkman et al. (2010) showed that female headed families with more income and resources had a more-diversified diet and thus better nutrition status.

Maternal occupation is a significant factor associated with low BMI. Research conducted in Uganda, specifically in the districts of Nakaseke and Nakasongola showed that female pastoralists were 0.12 times less likely to be wasted than peasant female farmers. This was linked to additional nutrition value got from cow milk and other milk products which subsequently lowers the risk of undernutrition unlike the peasant farmers (Habaasa, 2014). Similarly, a study done in Pakistan showed that females who were cash crop and food crop farmers were at risk of being undernourished because they don't have time to care for themselves and prepare diversified diets (Sumera et al., 2020).

The education status of females is a powerful significant factor associated with nutritional status, in a study done in Northern Mountainous Vietnam, 90% of females who were illiterate were found to be under nourished unlike those who attained education (Nakomori et al., 2010). Education attainment for women is vital in their nutrition wellbeing. With increasing maternal education, women have more power within the family to allocate resources and will use this on food allocation and other expenditure for their families (UNDP, 2011). In another study conducted in Sudan, 43% women who had attained at most primary level of education were underweight while 37% who achieved secondary education were found to be underweight. Female educational level was connected to resourcefulness, better utilization of existing health care systems, practice of good health behaviors, fewer births and better caring practices, all of which contribute to better maternal nutrition (Ahmed et al., 2011).

Evidence shows that the nutrition status of mothers is influenced by their knowledge about micronutrients for example the importance and deficiency symptoms of iron, iodine, vitamin A and D in the body (Omari, 2017). According to some studies knowledge level of the mother's increases with increase in age. Evidence further shows that mothers' education and knowledge about nutrition increases with increase in age.

A lack of care for women, especially in third world countries, is an associated factor of malnutrition (Ene-Obong, 2011). When pregnant women are given inadequate nutrition care, themselves and their children are at risk of malnutrition (Taylor, 2012). The malnourished child will grow into a malnourished adolescent and later woman of reproductive age and the cycle continues. In such circumstances, if mothers receive adequate knowledge on appropriate care practices without male involvement, may give limited impact (Lesiapeto, 2010). Men decide on access of women to economic resources like land, which has implications on the nutrition status of women and this makes the health of women to rely completely on their husbands (Lesiapeto, 2010). Existing literature has shown that women are disproportionately disadvantaged in terms of land access however, women access to land has a significant positive effect on household nutritional outcomes as it is associated to increaed food production at household level and thus food security(Njeri, 2021; Nnaji et al., 2021). Undernutrition is related to low income and poor socioeconomic status and thus these populations are at high risk of undernutrition; in 2015, the World Bank estimated that 700 million people lived in poverty (World Bank & IMF, 2015). Poverty associated with inadequate dietary intake exposes women of reproductive age to immediate cause of under-nutrition in communities across the world and likewise malnutrition is a legitimate indicator of poverty in society (Bebbington, 2019).

In Uganda, despite tremendous drop in the levels of poverty from 44% to 25% in the past ten years (MFPED, 2013), there has been negligeable improvements in nutritional related indicators, especially anemia among women of child bearing age (UBOS & ICF, 2018). In addition, the rate at which individuals are affected by hunger and undernutrition has increased

as a result of a rapidly growing population at a rate over 3% in the last decade (UBOS, 2014; FAO et al., 2015).

Reviewed literature indicates that social factors have both direct and indirect influence on the nutrition status and health outcomes of individuals. This study therefore, will ascertain if similar characteristics influence the nutrition status of female rural smallholder farmers in Mpigi district.

2.4 Agricultural Activities Performed by Smallholder Females Farmers

Rural women in Uganda broadly engage in various forms of agricultural activities. This section provides a detailed description of the agricultural activities undertaken by rural women and their contribution to maternal workload.

2.4.1 Preparing Fields for Planting

The ploughing of agricultural fields in preparation for planting is mainly done by women and their children in rural areas and men mostly use animals to plough their gardens. Clearing the fields is a key activity conducted after ploughing but before planting seeds and it is essential for improved seedlings and good yields (Epule et al., 2018). About 68% of the women are involved in this activity and 23.3% of the women are engaged in levelling land (Aggarwal et al., 2013). According to Raidimi (2014), women take up obligation for numerous pre-planting activities including felling trees, levelling the soil using hands and applying fertiliser. Their participation in other activities, for example ploughing using oxen and levelling the land, varies significantly during the rainy and the dry season. However, using oxen in agriculture activities is not a common doing by women, they use their hands which is hectic and takes a lot of time hence maternal workload (Kossek & Lee, 2018).

2.4.2 Crop Planting and Weeding

Studies conducted in Pakistan and India, indicated that majority of the women, 65.5% actively participate in the preparation of nursery beds for seedlings of vegetable and transplanting them in different fields (Aggarwal et al., 2013; Luqman et al., 2011). Rural women also add manure to the fields, thinning crops and removing weeds. In order to ensure good coverage of the fields by crops in case seed germination rates are low, gap-filling activities are also conducted by women (REACH, 2018). All these are done using traditional farming tools like hand hoes that require using physical energy, and may be disadvantageous as it increases women's nutritional demands that may or may not be met depending on one's nutrient intake (Kadiyala et al, 2014).

2.4.3 Harvesting, Processing and Storage

Majority of the women, 76.8% perform the duty of harvesting, processing and storage of agricultural produce and this shows that most of activities are entirely performed by women (Aggarwal et al., 2013; SOFA & Doss, 2011). Shifting produce to threshing floor is a task mostly handled by men as this activity involves heavy load handling. However, threshing, winnowing, drying and cleaning of grains is work mostly done by women (SOFA & Doss, 2011).

It essential to process some crop yields in order to ensure prolonged shelf life and 39.3% of the women actively participate in the this for proper storage and better market opportunities (Aggarwal et al., 2013). Study results also show that after harvesting, 90% of the women engage in storing the crop produce in an appropriate way for example using grain storage containers and other storage structures set up for the purpose (SOFA & Doss, 2011). This study therefore attempted to understand how these agricultural activities contribute to maternal workload and influence food choices by smallholder female farmers.

2.4.4 Marketing of Agricultural Products

Although a small percentage of 8.6% women are actively involved in marketing of crop yields, this agricultural activity is considered a male domain and it is fully done by the men in the family (Aggarwal et al, 2013). This usually leaves women financially dependent on men for all household needs including foods which may not be locally produced at home like fish, milk and milk products (Ugwu, 2019). From a study conducted in a rural district of southwestern Uganda, findings revealed that most males (93.6%) were directly engaged in food purchase for their families and this resulted into better nutritional status of family members (Kansime et al., 2017). The study therefore, focused on establishing women's participation in these activities and how it influenced their nutrition status.

2.4.5 Livestock Management

Results from a study conducted in Cape Province, South Africa showed that 10.9% of rural women participated in grazing animals, 36.4% were involved in animal feeding, purchasing feed from co-operatives was done by 21.7% and watering of animals at 31% (Nyangiwe et al., 2018). In addition, Arshad et al. (2013) found out that few females in Tehsil Jhang, 0.8% engage actively in grazing animals while most of them, 75.8% and 77.5% participate in feeding and providing water to the animals respectively. From studies conducted by Toppo et al. (2004) and Kathiriya et al. (2013), indicated that 27.1% women are involved in procuring animal feeds and grazing animals (10.9%). Their study results further showed that women executed other activities like cleaning animal shelters (66.7%), milking (25.6%), and cleaning troughs for animal feeding. According to Javed et al. (2016) and Kathiriya et al. (2013) most of the women are involved in the cleaning of shelters for dairy cattle. The study therefore focused on understanding to what extent these activities contribute to maternal workload and thus influencing food choice by rural women.

2.5 Maternal Workload

Women spend a significant amount of time on agricultural activities in rural areas of low- and middle-income countries, which, coupled with other activities, leads them to experience high overall time burdens (Rost et al., 2015). In developing countries with Uganda inclusive, between 43% and 60% of women contribute to the agricultural labour force (Doss, 2014). Women experience inequitable access to resources like land, agricultural extension services, credit and technologies such as labour-saving equipment (IFAD, 2016). As a result, they spend most of the days' time executing different tasks and this reduces the time left to attend to their own nutrition and wellbeing. This may impact negatively on maternal nutrition outcomes as time contributes a lot to nutrition status since it defines practices about food choices, preparation and consumption (Hull, 2013; Johnstona et al., 2018; McKenna, 2014; Komatsu et al., 2018).

In addition to physically demanding agricultural work and domestic responsibilities, women experience biological and social vulnerabilities including increased nutrient needs before, during pregnancy and lactation which puts them at risk of ill health and poor nutrition (Harris, 2014). Therefore, when the agricultural work done by women is increased, it can negatively affect nutrition by reducing women's available time for activities that enhance nutrition and health (Headey et al., 2012; Kadiyala et al., 2014).

Despite the fact that men and women experience time constraints, always women have more time trade-offs since they do a lot of unpaid work and their paid and unpaid work is always conducted concurrently (Blackden & Wodon, 2016). The unpaid "reproductive work" involves different activities like food preparation, feeding of young children, breastfeeding, collecting water, collecting firewood, dealing with household and children's hygiene among other demands. This might lessen both the time offered to care and quality of care for an individual woman thus affecting the health and nutrition status (Kadiyala et al., 2014).

Given the competing priorities involving women, they may have reduced time to access different nutritious foods, cook healthy and nutritious meals hence dietary diversity may be affected. Additionally, women who devote long hours in agriculture usually do not seek health care beyond their households. This lowers the chances of child vaccination, health check-ups, and getting health and nutrition information (Bhalotra, 2010). In contrast, if all the time women spend on reproductive work is shifted to agricultural or other productive work, it could possibly increase resources devoted to nutrition, such as food, health services, and hygiene (Gillespie et al., 2012). In a study conducted in Bihar, it was observed that female participation in agricultural activities contributed to sustained crop yield and improved family welfare (Singh et al., 2019).

A recent review by Johnston et al. (2018) provides understandings about how nutritional consequences differ by household structure, nutrition indicator, season and work intensity but the mechanisms for these connections are explained in details. There is limited evidence provided on which factors across contexts bring about the effects of women's time use in agriculture on maternal nutrition. A clear understanding of how time is allocated to productive and reproductive tasks and how it is connected to women's nutrition and health is one way of bringing a keen focus on workload and time trade-offs (Komatsu et al., 2018). Therefore, this study attempted to understand how the fore mentioned reproductive and productive agricultural activities and time input affect the nutrition status of rural smallholder female farmers.

2.5.1 Relationship between Maternal Workload and Food Choices

Health and nutrition of vulnerable groups like women of child bearing age is determined by social economic factors, culture, and family and community settings. These play a major role in influencing maternal nutrition practices, access to food and other resources. Taking an example of rural settings where most families entirely depend on agriculture as their source of food and

income, the yields determine food availability and access. This makes vulnerable groups prone to undernutrition, anaemia and other illnesses in circumstances when there are low farm yields or certain crops are not produced entirely in such communities (UNICEF, 2012).

The association and the effect of health and nutrition on female smallholder farmers may be defined by circumstances linked to the social status of women including skilled and unskilled workforce which have a bearing on their nutrition and health outcomes. Women in the skilled workforce are empowered and are exposed to a relatively balanced status with clear evidence to actively participate in day-to-day decision-making unlike those in the unskilled labour force who exhibit poor maternal health outcomes in most rural settings in Africa. This poor maternal health outcomes are attributed to heavy agriculture work load due to use of traditional farming equipment coupled with complex household and care activities. As a result, women remain with limited or no time to prepare nutritious meals for themselves and their families. (Cetin, 2015; Komatsu et al., 2019; UNICEF, 2012).

Lifestyle factors, low physical activity and poor dietary diversity build on an individual's healthy behaviours when it comes to food choices are said to have contributed to the increased rates of malnutrition (Antonelli, 2017; WHO, 2020). The connection between time, the environment and personal characters influences food choice (Swinburn et al., 2011). One's food choice and food consumption patterns evolve according to variations in natural environment, biological foundation, physiological needs, lifestyle, and advances in technology.

Since the agriculture sector deals with food production, it is obviously related to nutrition. All agriculture activities lead to improved crop yields and increasing crop yields contributes to food and nutrition security. However, there is no evidence of their role towards improving people's food choices, diets and nutritional status (FAO, 2017). Close to that, most agriculture programmes show limited impact on reducing undernutrition (IFPRI, 2015). Nutritional quality

and dietary diversity are key to improving nutrition status but they are not common practices among rural smallholder female farmers (FAO, 2017).

There is however limited evidence on the influence of maternal workload on food choices of smallholder female farmers, despite Uganda's agricultural sector being composed of smallholder farms based primarily in rural communities with high prevalence of undernutrition although more than half of all agricultural production is consumed locally (Bahiigwa, 1999; Roa, 2003). These farms are entirely dependent on weather and soil fertility. Food insecurity therefore, is as a result of poor rains, pests and diseases leading to poor crop yield that in the end affect the nutrition status of the smallholder female farmers (Bahiigwa, 1999). The Uganda census results on Agriculture show that 57% of the 3.6 million surveyed households fell below the minimum dietary diversity score (UBOS, 2010). The study therefore focused on establishing the relationship between maternal workload and food choices of rural female smallholder farmers.

2.5.2 Relationship between Maternal Workload and Nutritional Status of Female Farmers

Time is crucial for nutritional outcomes of women of reproductive age because it determines food production, procurement and preparation, in addition to maternal care (Johston et al., 2018). Rural women spend a considerable portion of their time on agricultural activities which may lead to time constraints and subsequent decisions about the trade-off between activities that are relevant for nutrition. For example, if women spent more time in the field growing crops, they may have less time to prepare nutritious foods for themselves and their children (Komatsu., 2018; Johston et al., 2018).

Although time burdens are associated with improved calorie intake measures, increasing time burdens for women of reproductive age has a negative impact on indicators of nutritional outcome (Paolisso et al., 2022; Kumar, 2014). This results in a shift in household food

provisioning away from home-grown or home-prepared foods towards purchased foods (Kumar, 2014). In some cases, overall calorie intakes may increase leading to a shift in dietary patterns and in a long-run worsening nutrition outcome (Johston et al., 2018). In addition, long hours spent on both productive and reproductive work is associated with low well-being of women of reproductive age (Seymour et al., 2016).

However, Bamji and Thimayamma (2010) reported that there seemed to be no relationship between patterns of time use and nutritional outcomes due to poor quality time use data and time burdens being seasonal (Peterman et al., 2013; Stevano et al., 2018; Kumar, 2014). The body mass index of women with increased work load due to activities like agriculture work is not that different from that of the women with less workload (Headey et al., 2011).

CHAPTER THREE: METHODOLOGY

3.1 Study Area

The study was conducted in Mpigi district, central Uganda, located 40km southwest of Kampala, the capital city of Uganda. The district is about 0.07% of the country size, covering an area of 1,041.13 square kms. It borders with the districts of Wakiso in the North East and East, Mityana in the North, Butambala in West and North West, Kalangala and Lake Victoria in the South and Kalungu is to the southwest. Mpigi district also lies on the shores of Lake Victoria, the major fresh water lake on the continent of Africa (UBOS, 2017).

The district is made up of six sub-counties, one town council (Mpigi town council) and one town board (Kayabwe). It has a total of 56 parishes and 399 villages. It is primarily a rural district, with only 8.4% of the population living in urban areas. According to the National Population and Housing Census 2014 report shows that Mpigi district has a Population of 251,512 among which are 125,314 males and 126,198 females with 69% of this population deriving their livelihoods from subsistence farming as the major source of income and food. The key crops being mainly bananas and coffee but also beans, millet, groundnuts, maize and livestock as the district boosts of favorable climatic conditions with cool temperatures and bimodal annual rainfall throughout the year with well drained fertile soils. However, it is important to note that 54.2% of the households in Mpigi district have less than two meals a day despite the above-mentioned agricultural activities (UBOS, 2017).

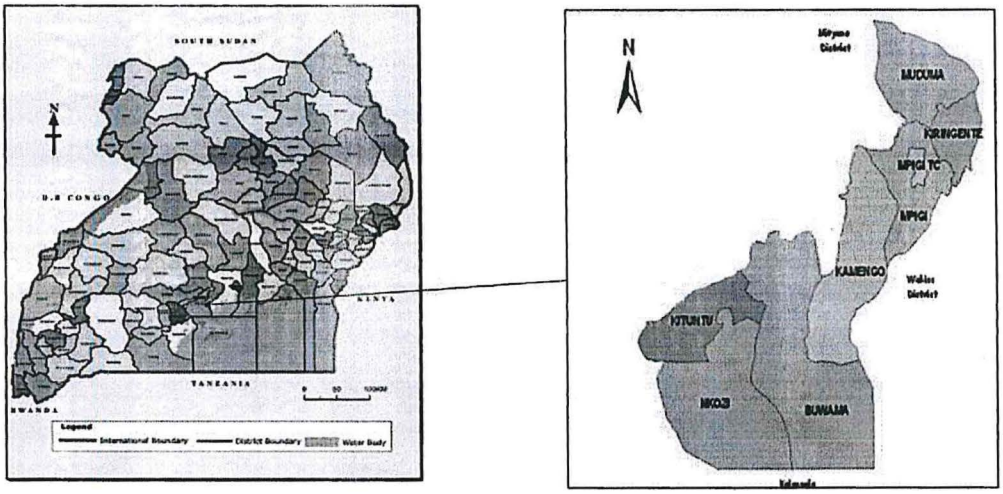

Figure 2 *Map of Mpigi District*

3.2 Study Population

The study participants included mothers aged 18-49 years residing in Mpigi district, having a child who is 6 to 59 months old. Women of reproductive age were found to be from fairly younger age groups, aged 18-49 years (REACH, 2018; Singh *et al*, 2019). In addition, mothers with children below 6 to 59 months years are more likely to have competing priorities between childcare, other paid and unpaid work (Tas & Tanima, 2021).

3.3 Study Design

A cross-sectional study design was employed to collect data on maternal workload, food choice and nutrition status of smallholder female farmers in Mpigi District. Cross sectional study design was used because it enables data collection at a given point in time.

3.4 Inclusion and Exclusion Criteria

The study involved women of reproductive age (18-49 years) who had children 6 to 59 months old. The respondents gave verbal informed consent before participating in the study and those that were incapacitated to participate were excluded in the study.

3.5 Sample Size and Sampling

Sample size was obtained using a 50% prevalence (P) worst-case scenario where half the population being malnourished is assumed for prevalence. A worst-case scenario of 50% prevalence of malnutrition among smallholder female farmers was used because the prevalence of malnutrition among female smallholder farmers in Mpigi district was unknown. In addition, the study involved data collection on many variables including maternal workload that involved agricultural and household activities versus time use; food choice that was being assessed depending on individual perception of food according to cost, health, access, desirability and how fast or slow the food cooks; Nutritional status; Household composition specifically the household structure and size, social economic status (income, education levels, household assets and access to resources especially land; food environment that involved access to food, markets, food affordability and food availability). Kish Leslie formula of determining the sample size (Cochran, 1963) was used as follows:

$$n = \frac{z^2 PQ}{\sigma}$$

n = sample size

z = standard deviation corresponding to 95% confidence interval = 1.96

P = estimated prevalence of malnutrition in Mpigi at 50% or 0.5

Q= 1-p; (1-0.5) =0.5

σ = standard error = 0.05

By substitution,

$$n = \frac{(1.96)^2 \times 0.5 \times (1-0.5)}{(0.05)^2}$$

=386

= 386participants

Kituntu and Buwama sub counties where agricultural activities are mostly done were studied. On average each sub- county had seven parishes and three parishes were randomly selected from each sub county using random numbers; Bukasa, Kasozi and Kantini from Kituntu Sub County, Buyijja, Bbongole and Nabitete from Buwama Sub County. Finally, within parishes, each parish was divided into villages, and averagely each parish had eight villages from which four villages (50%) were randomly selected making a total of 24 villages. In each of the villages, a list of households with all eligible mothers was developed with guidance of the local council members from which households to participate were carefully selected using simple random sampling methods. These households formed the sample population for the research study. The households with eligible mothers were assigned random numbers and selection of participants was done using random number generator until the target sample size of 17 respondents from each village was reached. This gave a total of 408 respondents giving an excess of 22 participants to cater for the non-response rate at 5.3%. Verbal informed consent was obtained where the respondents were requested to take part in the study. Each identified household was visited by the research team to verify if an eligible mother resided in the household. Informed verbal consent was got from all who agreed to participate.

3.6 Data Collection

Quantitative method of data collection was used in data collection. The collection of primary data was done using semi-structured questionnaire through household questionnaire, 24-hour dietary recall, 24-hour recall for time use and anthropometric assessments.

3.6.1 Maternal Questionnaire

The household questionnaire was used to collect information on maternal demographics, household roster/household members, household conditions, water and sanitation, involvement in agriculture, household social economic attributes, women's empowerment and inclusion in production, access to resources, income, leadership and time.

3.6.2 24 Hour Dietary Recall

The 24-hour recall was done to collect food choice data and this involved asking participants to remember and give in detail all the foods and drinks consumed in the previous 24 hours before the study, from the time they woke up until they went to sleep. The record included all foods and drinks consumed throughout the 24-hr period including all meals, snacks, drinks, sweets etc. Emphasis was put on the time of eating or drinking, the type of food for example orange juice, chocolate, orange squash and ingredients that are added during preparation and cooking. The foods were grouped into the ten recommended food groups of women of reproductive age as follows; Grains white roots and tubers and plantains, Eggs, Pulses, Dark green leafy vegetables, Nuts and seeds, vitamin A-rich fruits and vegetables, Dairy, Other vegetables, Meat, poultry and fish.

3.6.4 Anthropometric Assessments

Measurements of mothers' weight and height were taken at least twice for each mother and the average of the two measures per variable were considered. Thereafter, body mass index was

calculated using the formular (weight/ height^2). The BMI calculated was used to categorise nutritional status of mothers in Mpigi district. The BMI was classified as follows; Underweight (<18.5kg/m^2), normal BMI (18.5 – 24.9kg/m^2), over weight/Obesity (≥25 kg/m^2). (UBOS & ICF, 2018; WHO, 2004).

3.6.5 24-hour Recall for Time Use

The use of the diary method is a vital tool in social, economic and policy research in time-use (TU) data collection and it is arguably the most effective tool for gauging the time people spent on activities (Gershuny, 2000; UBOS, 2019). The time spent on different activities was used to determine maternal workload. The women empowerment in agriculture index (WEAI) categorises maternal workload of 10.5h and above as high and to denote an inadequately empowered woman (Alkire et al., 2013; IFPRI, 2015).

A recall of the time spent by the respondents on different activities conducted over a specific period of time and the start and ending time for each activity was done. The participants reported the first activity they did at the start of the day, what followed and at what time this activity started and was completed, and so on successively through the 24 hours of the day. The 24 hours of a day were split into 60 minutes' intervals. Emphasis was put on the distribution and timing of activities over the course of a day, such as sleep, work, household, consumption, agricultural and leisure activities.

3.7 Validity and Reliability

These are the standards used to evaluate measurements and results in a study. Validity refers to how accurate the measurements are and whether it is what was intended to be measured while reliability refers to how consistent the measurements would be if other studies were made (Boslaugh, 2008).

3.7.1 Validity

Face validity of the study instrument was ensured by sending the study instruments to experts (Boslaugh, 2008). Content validity was ensured by conducting a literature review as per the study objectives and the study instruments were developed in line with the same. The importance of doing this was to make sure the questions represented the objectives and literature on maternal workload, food choices and nutritional status of smallholder female farmers.

3.7.2 Reliability

There are 3 major approaches to assessing or measuring reliability namely; multiple-occasions reliability, multiple-forms reliability and internal consistency reliability. However, for this study reliability was not assessed.

3.8 Instrumentation

Questionnaires were developed in line with the objectives of the study. Furthermore, reference was made to tools used in previous but similar studies and other protocols for example UDHS survey tool templates. The following were developed and used for data collection: Consent form, 24-hour dietary recall, 24-hour recall for time use and Household questionnaire.

The questionnaires were reviewed by the data collection team during a three-day training session with roleplays translating to Luganda without changing the meaning, this was done by experienced personnel who have been involved in different research projects before.

Weighing scales and height meters were used during anthropometric assessment of the mothers from their homes. The weighing scales were well calibrated before the exercise and during respondents' weight taking, it was made sure that the weighing scale was at zero before each measurement. Mothers were required to dress in light clothes, take off extra items like shoes and scarfs. BMI wheels were used to easily determine and classify nutrition status of mothers.

3.9 Quality Assurance and Control

3.9.1 Training of research assistants

This study was part of a larger study where the researcher participated in developing of questionnaire, training of research assistants before conducting data collection and the training was to enable everyone get familiar with the questionnaire and equipment to be used during data collection in the field.

3.9.2 Pre-testing

Due to budgetary constraints, role plays were conducted during the training to ensure validity of research instruments. This helped to assess the language clarity, ability to obtain information from respondents, acceptability in terms of length and ethical consideration for clients. Unclear questions or ambiguous responses were improved. The questionnaire and equipment were pre-tested and calibration of equipment was done where needed. This was done to detect and correct any errors made in measurements by the equipment and during the development of the questionnaire in order to ensure validity and reliability of data collection tools and the ensuing findings of the study.

3.10 Data Analysis

Data was analysed using the Statistical Package for the Social Sciences (SPSS) programme (version 16.0). Descriptive analysis was used to analyse data on respondents' demographic characteristics, dietary intake, food choices, age, maternal workload and BMI of the mothers. Chi-square tests were done to examine the relationship between maternal workload and food choices, and to determine the relationship between maternal workload and Nutritional status of female farmers in Mpigi District.

3.11 Ethical Considerations

Approval to conduct the study was sought from Clarke International University and Uganda National Council for Science and Technology (UNCST) with ethical clearance number A146ES. Informed verbal consent was sought from each respondent before commencement of the interview. Trained research assistants with experience in handling medical information were used in order to ensure confidentiality of respondents. In addition, respondents were assigned codes not names as a way of emphasizing confidentiality.

CHAPTER FOUR: RESULTS

4.1 Socio-demographic and Household Characteristics of Respondents

With the assumption that education and literacy level provide farmers with knowledge and skills that can lead them to a better understanding of agricultural production and nutritional status, the respondents were asked to state their ability to read or write and highest level of education reached.

Respondents were also asked to name the head of the family and number of wives, as well as status of landownership. It was assumed that these household characteristics have an influence on the time use, choice of food and nutritional status of the smallholder female farmers.

Table 1 Individual and Household Characteristics of the Respondents, N=386

Individual and Household characteristics	Frequency	Percentage
Age		
18- 25years	136	35.2
26- 34 years	155	40.2
35-44 years	78	20.2
Above 45 years	17	4.4
Literacy		
Can read and write	60	15.5
Only read	326	84.5
Education level attained		
No education	20	5.2
Primary	219	56.7
Secondary incomplete	134	34.7
Complete secondary and above	13	3.4
Household structure		
Male headed monogamous	240	62.2
Male headed Polygamous	67	17.3
Female headed	79	20.5
Access to agricultural land		
No	25	6.5
Yes	361	93.5
Agriculture land ownership		
Do not own land	264	68.4
Owns alone	28	7.3
Owns jointly	94	24.3

Study results in Table 1 indicate that the majority of respondents were aged between 26-34 years (40.2%), and the least were above 45 years of age (4.4%). Most of the responds could only read (84.5%) and few could read and write (15.5%). The majority of the respondents had primary education (56.7%) and the least had above secondary level education (3.4%).

The majority of the households involved in agricultural activities were male headed with one wife (62.2%) and the least were male headed with multiple wives (17.4%). Most of the responds did not own land (68.4%) and few owned land alone (7.3%). With assumption that the number of household occupants may influence the choice of food prepared at home and the amount served, respondents were requested to list people they stayed with and ate from the same pot and the average household size was 5.5.

4.2 Nutritional Status of Smallholder Female Farmers

The nutritional status of female smallholder farmers was determined using body mass index as summarized in Figure 3. The BMI was classified as follows; Underweight (<18.5kg/m^2), normal BMI (18.5 – 24.9kg/m^2), over weight/Obesity (≥25 kg/m^2) (UBOS and ICF, 2018; WHO, 2004).

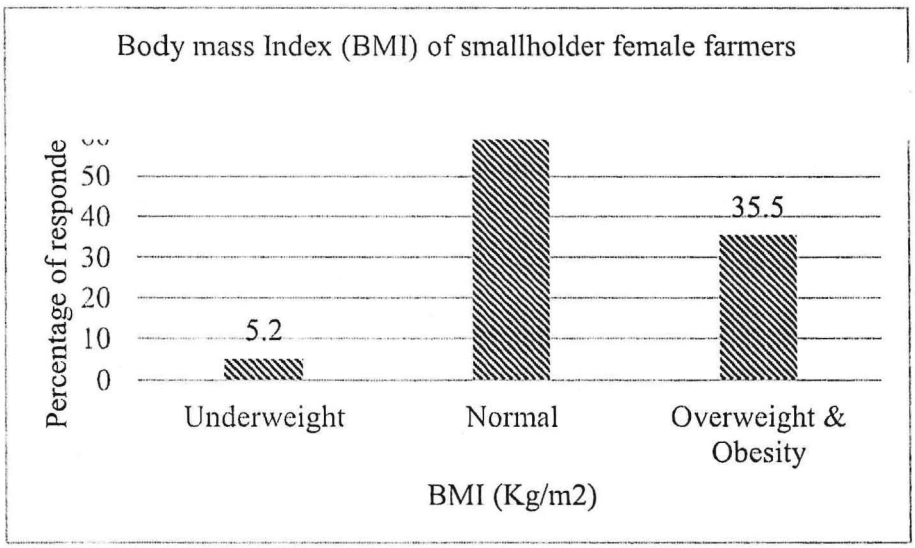

Figure 3 *Body Mass Index (BMI) of Female Smallholder Farmers*

Results from Figure 3 show that a majority (59.3%) of the respondents had a normal body mass index, 35.5% were overweight/obese and 5.2% were underweight.

4.2.1. Dietary Diversity of Female Farmers

Minimum Dietary Diversity for Women (MDD-W) is described as a population-level indicator of diet diversity for women of child bearing aged (15-49 years). The MDD-W is based on 10 food groups recommended for women of reproductive age and these include grains, roots, and tubers, pulses, nuts and seeds, dairy, meat, poultry, and fish, eggs, dark leafy greens and other vegetables, Vitamin A-rich fruits and other fruits (INDDEX Project, 2018). Study results showed that the mean dietary diversity score of the participants was 4.35 out of 10 recommended food groups for women of reproductive age and the majority of the respondents consumed less than five food groups (57%) (Figure 4).

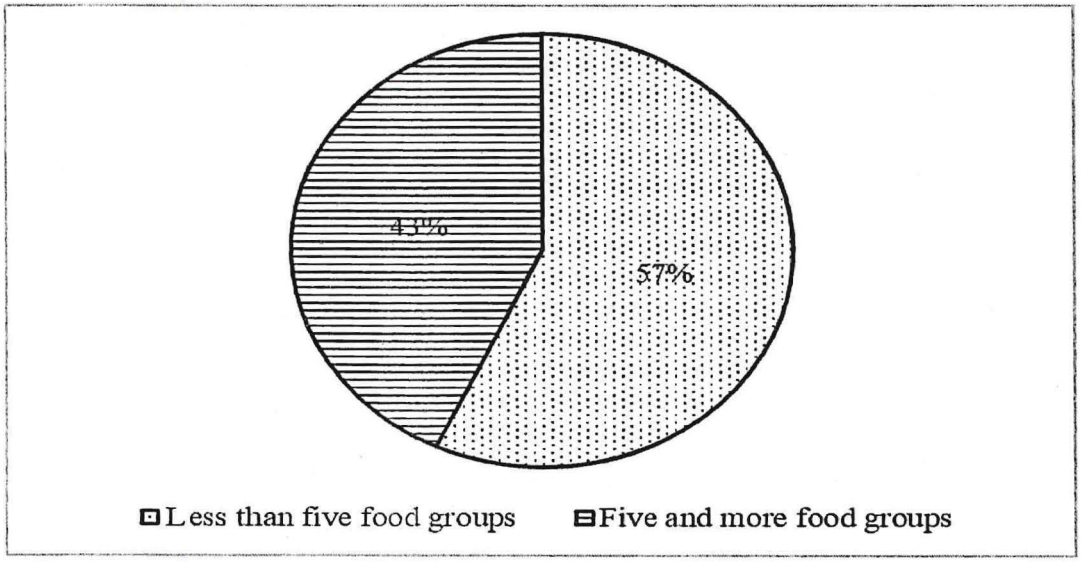

Figure 4 *Dietary Diversity Score of smallholder female farmers*

4.3. Food choice by female smallholder farmers in Mpigi District

The respondent's food choice was assessed using 24-hour dietary intake recall and food frequency questionnaire.

4.3.1 Dietary intake in the 24 hours preceding the survey

Results in Figure 5 show that, most of the mothers consumed starchy staples (99.5%) and other vegetables (90.7%), those who consumed vitamin A rich fruits and vegetables (21.5%), dark leafy vegetables (25.6%), meat, poultry & fish (43.0%) and eggs (10.4%) were the least found in participants' diets representing an overall low level of micro-nutrient intake.

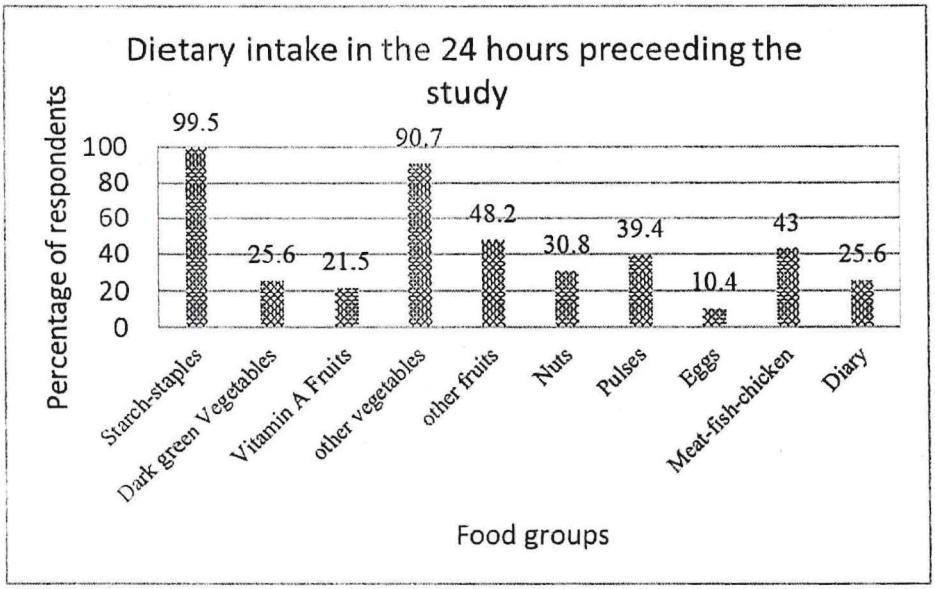

Figure 5 *Foods consumed from different food groups by the respondents in the past 24 hours*

4.3.2 Frequency of foods consumed in the 7 days before the survey

In the previous seven days before the survey, study results in Figure 6 show that food that was most frequently consumed by respondents was starch staples (98.9%) and the least frequently consumed were green leafy vegetables (36.2%), Eggs (37.3%), Vitamin A rich vegetables and fruits (43%), meat, and fish (38.3%).

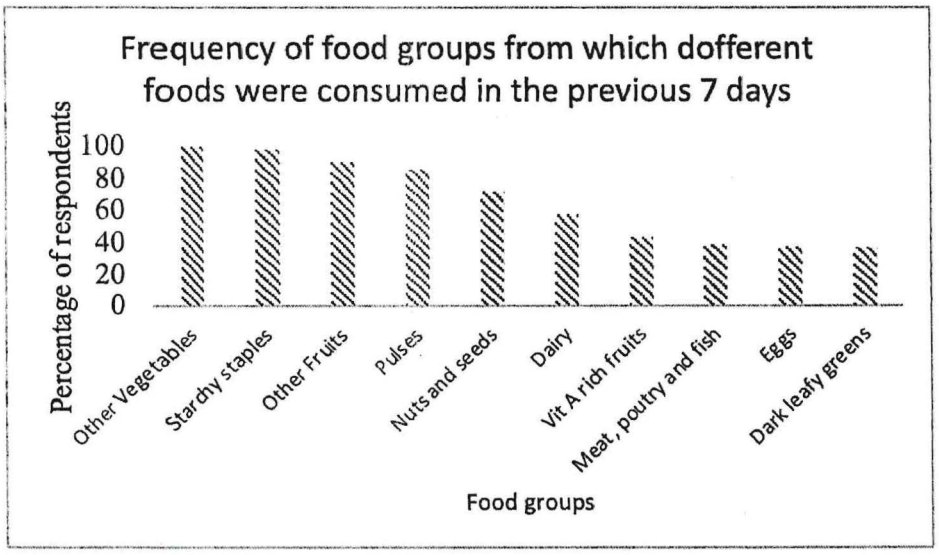

Figure 6 *Frequency of food consumed in the previous 7 days*

4.3.3 Perception about the different foods consumed by the respondents

To understand why respondents, choose to eat food from different food groups, their perception towards the different foods was assessed.

Table 2 Respondents' perception about Food from different food groups

	Affordable	Expensive	Healthy	Unhealthy	Fast to cook	Slow to cook	Desirable	Undesirable	Accessible	Inaccessible
Maize	108(28%)	278(72%)	348(90.2%)	38(9.8%)	287(74.4%)	99(25.6%)	257(66.6%)	129(33.4%)	293(75.9%)	93(24.1%)
Matooke	125(32.4%)	261(67. %)	295(76.4%)	91(23.6%)	223(57.8%)	163(42.2%)	345(89.4%)	41(10.6%)	286(74.1%)	100(25.9)
Bananas	242(62.7%)	144(37.3%)	347(89.9%)	39(10.1%)	341(88.3%)	45(11.7%)	340(88.1%)	46(11.9%)	276(71.5%)	110(28.5%)
Beans	153(39.6%)	233(60.4%)	354(91.7%)	32(8.3%)	34(8.8%)	352(91.2%)	280(72.5%)	106(27.5%)	318(82.4%)	68(17.6%)
Groundnuts	99(25.6%)	287(74.4%)	354(91.7%)	32(8.3%)	184(47.7%)	202(52.3%)	300(77.7%)	86(22.3%)	273(70.7%)	113(29.3%)
Milk	148(38.3%)	238(61.7%)	370(95.9%)	16(4.1%)	365(94.6%)	21(5.4%)	352(91.2%)	34(8.8%)	240(62.2%)	146(37.8%)
Mangoes	286(74.1%)	100(25.9%)	359(93.0%)	27(7.0%)	381(98.7%)	5(1.3%)	336(87.0%)	50(13.0%)	220(57.0%)	166(43.0%)
Cassava	338(87.6%)	48(12.4%)	266(68.9%)	120(31.1%)	272(70.5%)	114(29.5%)	186(48.2%)	200(51.8%)	352(91.2%)	34(8.8%)
Greenleafy vegetables	263(68.1%)	123(31.9%)	363(94.0%)	23(6.0%)	363(94.0%)	23(6.0%)	334(86.5%)	52(13.5%)	202(52.3%)	184(47.7%)
Pumpkin	252(65.3%)	134(34.7%)	368(95.3%)	18(4.7%)	325(84.2%)	61(15.8%)	319(82.6%)	67(17.4%)	237(61.4%)	149(38.6%)
Tomatoes	251(65.0%)	135(35.0%)	351(90.9%)	35(9.1%)	372(96.4%)	14(3.6%)	366(94.8%)	20(5.2%)	311(80.6%)	75(19.4%)
Meat	26(6.7%)	360(93.3%)	322(83.4%)	64(16.6%)	78(20.2%)	308(79.8%)	354(91.7%)	32(8.3%)	162(42.0%)	224(58.0%)
Fish	25(6.5%)	361(93.5%)	372(96.4%)	14(3.6%)	308(79.8%)	78(20.2%)	355(92.0%)	31(8.0%)	137(35.5%)	249(64.5%)
Eggs	135(35.0%)	251(65.0%)	375(97.2%)	11(2.8%)	361(93.5%)	25(6.5%)	359(93.0%)	27(7.0%)	252(65.3%)	134(34.7%)
Chicken	21(5.4%)	365(94.6%)	361(93.5%)	25(6.5%)	94(24.4%)	292(75.6%)	365(94.6%)	21(5.4%)	178(46.1%)	208(53.9%)

Study results in Table 2 show that the most affordable foods were cassava (87.6%), mangoes (74.1%), green leafy vegetables (68.1%) pumpkins (65.3%) and tomatoes (65%). All animal protein source foods (chicken, fish, meat, milk and eggs), maize (72%), matooke (67%) and groundnuts (74.4%) were perceived to be expensive. Majority of the foods were considered healthy to eat and desirable apart from cassava that was considered undesirable (48.2%). In addition, majority of the foods asked about were considered easy to cook apart from beans (91.2%), meat (79.8%) and chicken (75.6%) that were considered slow to cook. Foods that were accessible according to the results included maize (75.9%), matooke (74.1%), bananas (71.5%), groundnuts (70.7%), cassava (91.2%) and tomatoes (80.6%). Results further show that the most inaccessible foods were fish (64.5%), chicken (53.9%) and meat (58%).

4.3.4 Sources of Food from the different Food Groups consumed by the Respondents

To further understand why food from different food groups was consumed, the Female smallholder farmers were asked about the sources of food from different food groups. As shown in Figure 7, the sources of food mentioned were; home production, purchasing, gift, other sources like picking from another field and not applicable was in situations where the particular food was not eaten by the respondent.

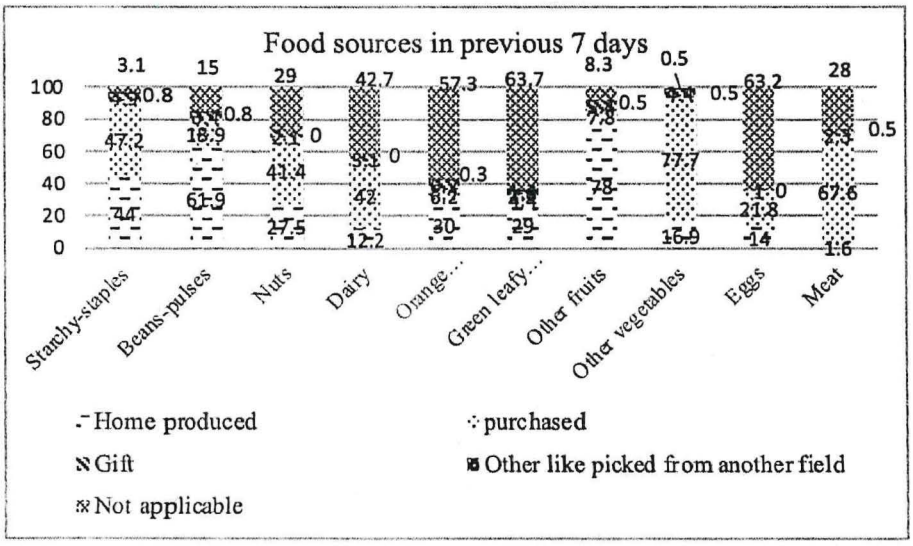

Figure 7 *Food sources in the 7 days before the survey*

Results in Figure 7 show that beans/pulses (61.9%) and other fruits (78%) were the most home-produced foods. Other vegetables (77.7%), Meat, fish & chicken (67.6%), starchy staples (47.2%) and nuts (41.4%) were mostly purchased. Green leafy vegetables (63.7%), Eggs (63.2), orange vegetables/fruits (57.3%) and dairy (42.7%) were mostly not consumed in the 7 days before the survey and their source was not applicable.

4.3.5 Crops grown and animals reared in the last 12 months

Study results in Figure 8 below shows that cassava (83.7%), beans (81.9%), maize (68.4) and sweet potatoes (68.9%) were the most grown crops and the least grown were pumpkins (9.6%), green leafy vegetables (30.1%). The most reared animals for meat were pigs (58.0%) and the least were cattle for dairy (19.7%).

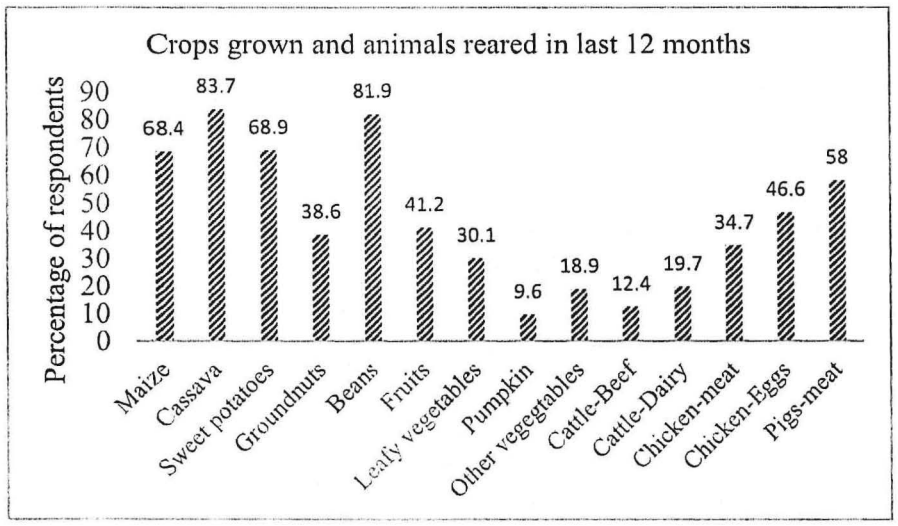

Figure 8 *Crops grown and animals reared in the last 12 months*

4.4. Time Use by Smallholder Female Farmers

The productive and domestic work done was derived from a detailed 24-hour time allocation module in which respondents were asked to recall the time spent on primary activities in the previous 24 hours, starting at 4:00 a.m. on the day before the interview.

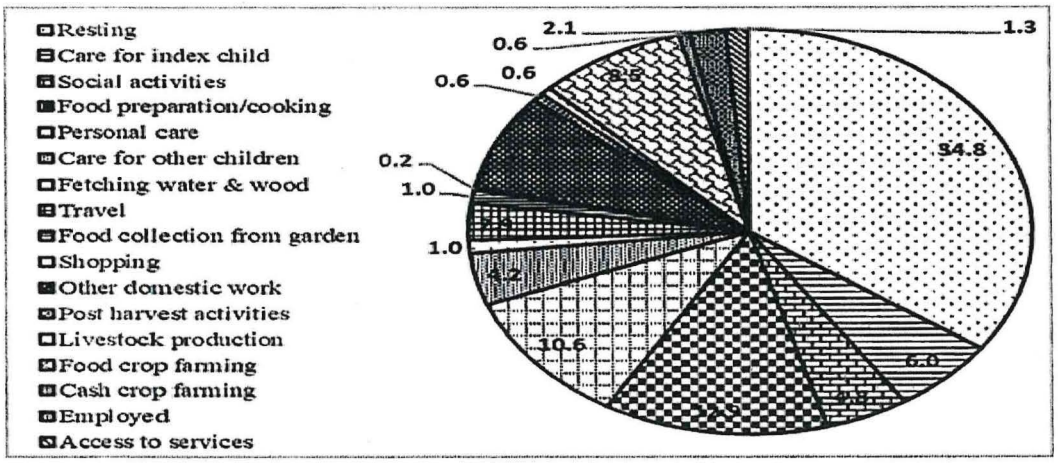

Figure 9 *Maternal Workload of Smallholder Farmers*

Study results in Figure 9 show that time allocation to the different activities by smallholder female farmers varied with resting (34.8%), food crop farming (12.9%), food preparation (8.5%) and child care (10.6%) taking up most of the mothers' time. Less time was spent on cash crop farming (0.6%) and Livestock production (0.6%). Results further showed that the average time spent on both productive and reproductive work was 15.1h with reproductive/unpaid work (9.6h) taking up most of the time.

4.4.1 Maternal Workload

According to Alkire et al. (2013) and IFPRI, (2015) the women empowerment in agriculture index (WEAI) categorises maternal workload of 10.5h and above as high and to denote an inadequately empowered woman.

Table 3 Maternal workload, N=386

Workload category	Frequency	Percent
Worked more than 10.5h	29	7.5
Worked less than 10.5h	357	92.5
Total	386	100

Results in Table 3 show that majority of the mothers worked for less than 10.5h (92.5%) and few worked for more than 10.5h (7.5%).

4.4.1.1 Activities that Contributed to Maternal Workload

The activities that rural smallholder farmers conducted for more than 3 hours are summarised in Figure 10 below.

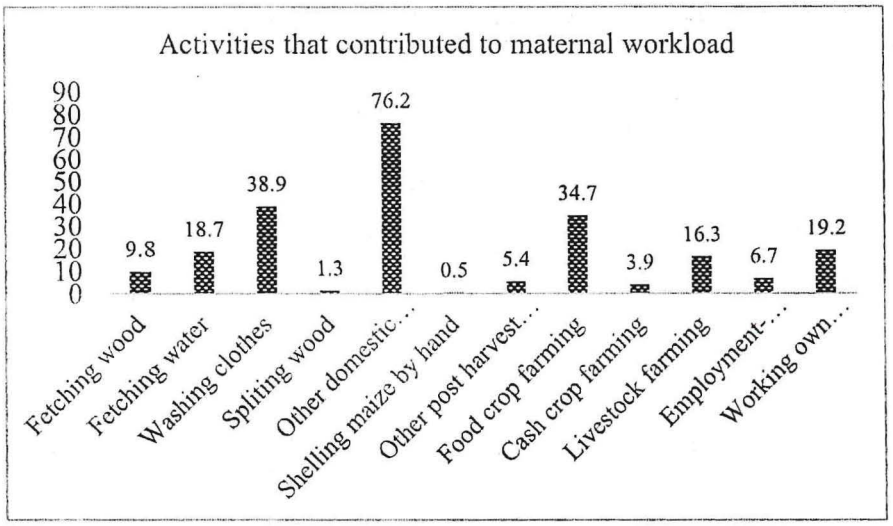

Figure 10 *Activities that contributed to maternal workload*

Study results in Figure 10 show that other domestic activities like cleaning (76.2%), washing clothes (38.9%) and food crop farming (34.7%) mostly contributed to maternal workload. The activities that least contributed to maternal workload were maize shelling by hand (0.5%), splitting wood (1.3%) and cash crop farming (3.9%) as shown in Figure 10.

4.5 Relationship between Maternal Workload and Food Choices of Female Farmers

To understand how maternal workload relates with mothers' food choice, a chi square test of the mothers' dietary intake in the 24 hours preceding the study, frequency of foods consumed in the previous seven days and mothers 'workload was run.

4.5.1 Maternal Workload and Dietary Intake in the 24 hours Preceding the Study

A chi square analysis was conducted to determine the relationship between maternal workload and dietary intake by rural smallholder female farmers in the 24 hours preceding study.

Table 4 Maternal Workload and Foods Eaten from Different Food Groups 24 hours Before the Study, N=386

Foos consumed 24h before the study	Worked more than 10.5h, n=29	Worked less than 10.5h, n=357	Chi square value	*P*
Starchy staples				
No	0 (0)	2 (100)	0.16	0.855
Yes	29 (7.6)	355 (92.4)		
Dark green vegetables				
No	20 (7.0)	267 (93.0)	0.48	0.311
Yes	9 (9.1)	90 (90.9)		
Vit. A vegetables & fruits				
No	22 (7.3)	281 (92.7)	0.13	0.439
Yes	7 (8.4)	76 (91.6)		
Other vegetables				
No	3 (8.3)	33 (91.7)	0.04	0.522
Yes	26 (7.4)	324 (92.6)		
Other fruits				
No	14 (7.0)	186 (93.0)	0.16	0.419
Yes	15 (8.1)	171 (91.9)		
Nuts				
No	20 (7.5)	247 (92.5)	0	0.564
Yes				
Pulses-beans				
No	16 (6.8)	218 (93.2)	0.39	0.331
Yes	13 (8.6)	139 (91.4)		
Eggs				

No	22 (6.4)	324 (93.6)	6.41	0.021*
Yes	7 (17.5)	33 (82.5)		
Meat, Fish & chicken				
No	17 (7.7)	203 (92.3)	0.03	0.508
Yes	12 (7.2)	203 (92.8)		
Milk				
No	24 (8.4)	263 (91.6)	1.16	0.198
Yes	5 (5.1)	94 (94.9)		

*P<0.05

Study results in Table 4 show that there was a statically significant relationship (p=0.021) between maternal workload and eating eggs as mothers who worked for more than 10.5h were 6.41 times more likely to eat eggs than those who worked for less than 10.5h. The rest of the foods did not show any significancy. The percentage of respondents who had eaten or did not eat those food in the 24 hours preceding the study did not differ by workload category.

4.5.2 Maternal workload and Frequency of Foods Consumed in the Seven days Before the Study

A chi square analysis was conducted to determine the relationship between maternal workload and frequency of food consumed by rural smallholder female farmers seven days before the study.

Table 5 Maternal workload and foods consumed in the 7 days before the study, N=386

Foods consumed in the previous 7 days	Worked more than 10.5h, n=29	Worked less than 10.5h, n=357	Chi square Value	P
Starchy staples			0.33	0.731
No	0 (0)	4 (400)		
Yes	29 (7.6)	353 (92.4)		
Beans-Pulses			0.04	0.552
No	4 (6.9)	54 (93.1)		
Yes	25 (7.6)	303 (92.4)		
Nuts			1.37	0.169
No	11 (10)	99 (90)		

Yes	18 (6.5)	258 (93.5)		
Dairy			1.09	0.197
No	15 (9.1)	149 (90.9)		
Yes	14 (6.3)	208 (93.7)		
Other fruits			2.74	0.08
No	0 (0)	31 (100)		
Yes	29 (8.2)	326 (91.8)		
Green leafy vegetables			0.04	0.503
No	19 (7.7)	227 (92.3)		
Yes	10 (7.1)	130 (92.9)		
Vitamin A fruits/vegetables			0.33	0.355
No	18 (8.2)	202 (91.8)		
Yes	11 (6.6)	155 (93.4)		
Other vegetables			5.22	145
No	1 (50)	1 (50)		
Yes	28 (7.3)	356 (92.7)		
Meat, fish, chicken			3.74	0.036*
No	3 (3.1)	95 (96.9)		
Yes	26 (9.0)	262 (91.0)		
Eggs			0.22	0.388
No	17 (7.0)	225 (93)		
Yes	12 (8.3)	132 (91.7)		

*P<0.05

Results in Table 5 show that there is a statically significant relationship (p=0.036) between maternal workload and eating meat, fish and chicken. Mothers who worked for more than 10.5h were 3.74 times more likely to have eaten meat, fish and chicken than those who worked for less than 10.5h. The rest of the foods did not show any significancy and the percentage of respondents who had eaten or did not eat those foods in the 7 days preceding the study did not differ by workload category.

4.6 Relationship between Maternal Workload and Nutritional Status of Smallholder Female Farmers

A chi square analysis was conducted to determine the relationship between maternal workload and nutritional status of rural smallholder female farmers.

Table 6 Relationship between maternal workload and Nutritional status of female smallholder farmers in Mpigi district, N=386

Nutrition status categories	Worked more than 10.5h, n=29	Worked less than 10.5h, n=357	Value	*P*
Underweight	2 (10)	18 (90)		
Normal	11 (4.8)	218 (95.2)		
Overweight & Obesity	16 (11.7)	121 (88.3)	6.02	0.049

Study results in Table 6 show that there is a statistically significant relationship (p=0.049) between maternal workload and nutritional status of female smallholder farmers. Respondents who worked for less than 10.5h were 6.02 times more likely to be normal (body mass index of 18.5 – 24.9kg/m^2), while those who worked for more than 10.5h were 6.02 times more likely to be overweight or obese (body mass index of ≥25 kg/m^2).

CHAPTER FIVE: DISCUSSION

5.1 Socio-demographic Characteristics of Study Respondents

Majority of the mothers were in the age group of 26-34years of age. This reflects the youthful and active reproductive age structure of the population. Females of this age group are energetic and economically active to participate in most of the agricultural activities as compared to the few that were above 45 years of age. About half of the respondents did not attain primary education level (41%) which is in line with the Uganda demographics and health survey results that indicates that 54% of women are not able to complete primary level education. This is probably because there is gender imbalance in the division of labour at household level which burdens women with a lot of household chores and over 80% of engagement in agricultural activities. There is gender imbalance against women access to education emanating from many socio-cultural factors such as early marriages, early pregnancies, preference of the boychild to a girl child to access education which select girls out of school. In addition, women in developing countries are considered as household caretakers hence they do not access education easily in most communities (Bishaw, 2014). Findings from a study done in Ethiopia by Teferau (2007) also revealed that female farmers were less educated. Therefore, the study results showing few smallholder farmers that could read and write (15.5%) may be attributed to the mothers not attaining education above primary level.

Majority of the households were male headed with one wife Patriarchal system is dominant in Ugandan setting because of strong cultural norms that specify a man as a head of a household. Most households having one wife is a reflection of the changing culture and religious values where men are now sticking to one wife marriage because of economic hardships that

disadvantage marrying more than one wife. In addition, male headed households tend to be economically engaged in productive agriculture. This also collaborates with findings of a study conducted in Tanzania (Mtenga, 2018) that showed that married couples engage more in agriculture activities because of access to land by the men. According to FAO (2016) and IFPRI (2011), land in Uganda is usually owned by men yet women assume the primary role of food production for the household consumption. This is reflected in the study results that show that only 7.3% of the respondents owned land alone. Therefore, since most of the land is owned by men, they will influence decisions on which crops to grow, how much yields to sell and what to use the income generated for (Kansime et al., 2017; IFPRI, 2011).

The average household size of 5.5 in the study area is in agreement with the national average of 5 as reported by the Uganda demographics and Health survey of 2016. According to Sango, (2013) family size determines nutritional status of family members because of the amount of labour force available in conducting agricultural activities and portion size of food served among family members. A small household size favours nutrition status due to food distribution within household (Nyaruhucha et al. 2016).

5.2 Nutritional Status of Rural Smallholder Female Farmers

The results confirm the double burden of maternal malnutrition that is underweight and overweight or obesity as reported by Black et al., (2013). The prevalence of underweight (5.2%) among rural smallholder female famers is lower than that of the region, South Central (6.6%) and national (9%) statistics of Uganda. The levels of overweight and obesity was also found to be lower than the regional prevalence (36.5%) but higher than the national prevalence (24%) (UBOS & ICF 2017). This is because of the evidenced high consumption of high energy foods from grains, roots & tubers. This is contrary to findings by Sumera et al., 2020 in a study

conducted among farmers in Pakistan that found that female farmers had a high risk of being underweight.

In addition, the majority of the respondents consumed foods from less than five food groups contrary to a study conducted by Singh *et al.* (2019) in Bihar where female participation in agricultural activities contributed to sustained crop yield and improved dietary diversity at household level. This is probably because the most locally grown foods at household level were; beans (pulses), groundnuts, passion fruits, jackfruits and starchy staples that make up only three food groups. According to the 2015 global report by FANTA project, women consuming foods from five or more food groups out of ten have a greater likelihood of meeting their micronutrient needs than women consuming foods from fewer food groups. Therefore, study results show that smallholder farmers are at risk of micro nutrient deficiencies since low dietary diversity among women of reproductive age indicates high risk of micronutrient deficiencies as reported by Gracia et al., (2018).

5.3 Food choice by Female smallholder Farmers in Mpigi District

Smallholder female farmers consumed mainly starchy staples, pulses or beans and other vegetables probably because these foods were considered affordable, accessible, easy to cook, desirable and healthy to eat. Although Vitamin A rich fruits/vegetables, eggs, meat, fish and chicken were considered desirable and healthy to eat, they were least consumed foods probably because they were perceived to be expensive, inaccessible and mostly purchased. These findings are in line with Turner et al., (2019) dicussion on how the food environment characterised by both external and internal domains like food accessibility, affordability and desirability influences what an individual chooses to eat.

In addition, starchy staples, pulses and other vegetables were mainly home produced. This is in line with study results in a study conducted in South Africa by Murungani and Magoshi, 2019 that showed smallholder farmers supplemented their diets through markets. Additionally, smallholder female farmers produce cereals and fruits to reduce the amount of money they spent of food purchases.

Study results were similar to a study conducted in three countries of Malawi, Kenya and Uganda where women consumed mostly foods from the starchy staple group; grains, white tubers and plantain. The study results are also in line with study results by Ihab et al., 2013 in a study conducted among mothers in rural Malaysia and another study in India by Patel et al., 2012 that revealed that smallholder farmers choose to eat what they locally produce at their farms.

5.4. Time use and Maternal workload of Smallholder Female Farmers in Mpigi District

The average time spent on domestic work and productive work was 9.6 hours and 3 hours respectively. This means that women spend more time understating reproductive activities for example care and management of the sick, children, and participate less in productive activities that generate income to the family a situation that keeps women economically disadvantaged. This is correspondents to results of the time use report by UBOS, 2019 in Uganda, gender and time use results in sub–Saharan Africa by Blackden & Wodon (2016) that revealed that women spend more time on unpaid work (7 hours) than productive work (3 hours) (UBOS, 2019). The average time spent on both productive and domestic work was 15.1 h, and this correspondents to findings by Nti et al (2001) in Ghana that showed that women conducted several activities that lasted up to 17.5 h daily.

A study conducted in Kenya by Omwaha. (2016) showed that women spend 12.5 hours while male spend 8 hours working daily. Smallholder female spent most of their time resting, food

crop farming, preparing food, child feeding, travel for food and another domestic wok. These results correspond to a study conducted among mothers in Pakistan by Rasheed et al, (2012) and Indonesia by Alia Fajarwatia et al., (2016) that found out that women are under burden of unpaid work contributed to by different household activities, like cooking, dish washing, washing and pressing cloths, cleaning of house, sewing, taking care of children and caring for other family members. Similarly, a gender and time use report by Mark Blackden and Quentin Wodon (2016) in South Africa also shows that in addition to their prominence in agriculture and in much of the informal sector, women bear the brunt of domestic task like processing food crops, providing water and firewood, and caring for the elderly and the sick. This could be because women often assume prime responsibilities for care and food in most rural societies (FAO, 2020; Hull, 2013; Johnston *et al*, 2018).

5.5 Relationship between Maternal workload and Food Choices by Smallholder Female Farmers

Majority of the respondents in both workload categories ate mostly foods from starchy-staples, pulses like beans, nuts like groundnuts and other vegetable like tomatoes probably because these were the major foods produced locally at household level and the production of those foods tend to be dominated by women for basic household nutrition.

Respondents who worked for more than 10.5h were 6.41 times more likely to have eaten eggs and 3.74 times more likely to have eaten meat, fish and chicken than those who worked for less than 10.5h. This is probably because, those who worked for more than 10.5h devoted more time for crop and animal production for household consumption and in situations where certain food is not produced at home, the excess yield was sold off for extra income which was used to purchase foods they did not have. The study results correspond to results in study conducted by

Bhandari et al., (2016) in Nepal among women of reproductive age that showed that the dietary intake of women consisted majorly of cereals/staples and pulses with less meat, fruits and vegetables. Women who consume limited animal source foods, fruits and vegetables, increase their risk of micronutrient deficiencies (Gracia et al., 2018; Bhandari et al., 2016).

5.6 Relationship between Maternal workload and Nutritional Status of Smallholder Female Farmers

Mothers who worked for more than 10.5h were more likely to be overweight or obese probably because of increased calorie intake due to high energy dense foods consumed from staples/grains. This is in line with study results by Paolisso et al., (2022) and Kumar's (2014) that reported increased maternal workload having a negative impact on nutritional outcome. In a systematic review by Johston et al., (2018), it is reported that increased maternal time use increases calorie intakes as a result of changes in dietary patterns and in a long-run worsening nutrition outcome. The study results also correspond to study results by Kamisha et al, 2012 in a study conducted in Minnesota among rural women that showed that working for more than 40 hours a week affected healthful eating among smallholder farmers due to lack of time to balance work, leisure and having decent meals. Harvey and Taylor (2010) support with findings that a household with low household time overhead will be healthier and generally better off than a household with high time overhead in a study conducted in South Africa.

These results are contrary to finding by Headey et al., (2011) in a study conducted in India among women and children that showed that the body mass index of women with increased work load due to activities like agriculture work is not that different from that of the women with less workload. Bemji and Thimayamma, (2010) also argues that there is no statistically

significant impact of maternal time use on nutrition out comes among women in a study conducted in rural South India.

CHAPTER SIX: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

6.1 Summary of the Findings

More than half of the respondents consumed food from less than five food groups with dark green vegetables, vitamin A fruits/vegetables, meat, fish, chicken and eggs being the least consumed. This puts smallholder female farmers at a risk of micronutrient deficiencies thus triple burden of malnutrition since underweight and overweight/obesity were at 5.2% and 36.5% respectively.

Majority (92.5%) of the smallholder farmers worked for less than 10.5h with resting (34.8%), food crop farming (12.9%), care of index child (10.6%) and food preparation (8.5%) taking up most of the mothers' time.

Respondents who worked for more than 10.5h were 6.41 times more likely to have eaten eggs ($p=0.021$) in the 24 hours before the study and 3.74 times more likely have eaten meat, fish/chicken ($p=0.036$) more times in the seven days preceding the survey than those who worked for less than 10.5h.

Mothers who worked for more than 10.5h were more likely to be overweight than those who worked for less than 10.5h

There was statistically significant relationship ($p=0.049$) between maternal workload and nutritional status. Mothers who worked for more than 10.5h were more likely to be overweight/obese (BMI of ≥ 25 kg/m^2) while those who worked for less than 10.5h were more likely to be of normal body mass index (BMI of 18.5-24.9 of ≥ 25 kg/m^2).

6.2 Conclusions

There was an association between maternal workload, food choice and nutritional status of smallholder farmers. These findings speak directly to the need for women empowerment in rural settings. Whereas mothers who worked for more hours ate foods from food groups (eggs, meat, fish & chicken) that were perceived expensive, they were more likely to be overweight/obese thus poor nutritional status. In addition, a likely tradeoff on maternal health as a result of working for more hours which also eventually reverse the benefits of dietary diversity leading to malnutrition.

6.3 Recommendations

Using a multisectoral approach, there is need to intensify social behavior change and communication (SBCC) to improve dietary diversity of the women of reproductive age. This can be done through nutrition education programs tailored to the cultural and dietary preferences of smallholder female farmers in Mpigi district. Teach them about balanced diets, portion control, and the importance of consuming a variety of foods. Promote the consumption of locally available, affordable, and nutritious foods. This can be encompassed in programs and interventions implemented across sectors like Health, Education through revision of curriculums, Trade and industries, community development services and others.

Develop human capital programs that integrate social protection for improved nutrition outcomes. There is need for a broad view of government social policy and prevailing economic constraints. It's also vital to gain a deeper understanding of men's roles within the household, as their contributions play a significant role in shaping the overall nutrition landscape.

Available technologies can make a difference in households' responses to increased time burdens. Through MAAIF and government programs like PDM, households should access

agricultural technologies that allow them to gain time savings in activities, such as domestic work, that are particularly critical, then the ways in which increased time burden and workload are experienced can be different. This will allow women to reduce the burden of one activity and then replace it with another.

For future research, there is need to understand the specific factors leading to overnutrition among smallholder female farmers. With support from academia, time use data should be improved, particularly in the attention paid to simultaneous activities and the inclusion of measures of work intensity

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APPENDICES

APPENDIX I: CONSENT FORM

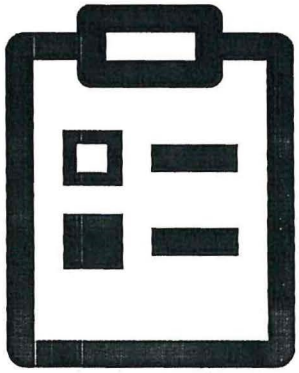
My name is **Mirembe Winnie** a student of Master of Science in Human Nutrition at Kyambogo University, Kampala. I am here to carry out a study on **Maternal workload, Food Choice and Nutritional Status of Small Holder Female Farmers In Mpigi district**. The most immediate benefit of this study will be to establish the relationship between maternal workload, food choice and nutrition status of small holder female farmers in Mpigi district.

This research also includes an exercise to measure your weight and height. Your answers will be used to get a better understanding of the food choices and nutrition levels in your area. Your answers will remain confidential and the information you provide will only be used for research purposes and your participation is absolutely voluntary. Your cooperation during the study will be highly appreciated.

Can we proceed? Yes ☐ No☐

APPENDIX II: QUESTIONNAIRE

Maternal Questionnaire



Date of record: *(dd/mm/yy)*	***Time START:*** *(24-hr)* _____ ***Time END:*** *(24-hr)* _____
Maternal ID:	***Child ID:***
Enumerator ID:	***Supervisor ID:***
District:	***Sub-district:***
Parish:	***Village:***

	Yes	***Date:*** *dd/mm/yy*
Checked by supervisor: *(code)*	☐	
Checked by co-ordinator: *(code)*	☐	
Data entry completed: *(code)*	☐	

HOUSEHOLD ROSTER

READ ALOUD: *TBD*

Q1	***INSTRUCTIONS:*** *Ask participant who lives in this house, starting with the household head, and for each person, their sex, age group, educational level.*									
	Name	*Age* *Completed years* *(completed months for children <2)*		*Sex* *0=Male* *1=Female*	*Relationship to HH Head* *01=HH Head* *02=Wife/partner* *03=Index child* *04=Child* *05=Sister/ Brother* *06=Father/ Mother* *07=Father in law/ Mother in law* *08=Brother in law/*	*Mother* *(tick)*	***HH Members 6yrs and above:***			
		Num	*Y=Years* *M=Months*				***Currently in school*** *0=No* *1=Yes*	***If yes, in school this week?*** *(i.e. was the school in session)* *0=No*	***Highest level of education completed*** *0=Never went to school* *1=Primary incomplete*	***Literacy*** *Read & write with understanding in any language.* *0=No*

					sister in law *09=Other family member* *10=Non-family member*			*1=Yes*	*2=Primary complete* *3=Secondary incomplete* *4=Secondary complete* *6=Tertiary*	*1=Yes*
1										
2										
3										
4										
5										
6										

7										
8										
9										
10										

Q2	***What is the household structure?*** ***Circle only one***	***1=Male headed, with single wife*** ***2=Male headed with multiple wives*** ***3=Female headed, (divorced, single or widowed)*** ***4=Other, specify:_____***	

HOUSEHOLD FOOD INSECURITY

READ ALOUD: *TBD*

Q27	*In the past 4 weeks, was there ever* ***no food to eat of any kind*** *in your house because of lack of resources to get food?*	*0=No* *1=Yes*	*Skip to* ***Q28***
Q27a	*How often did this happen in the past 4 weeks?*	*1=Rarely (1–2 times)* *2=Sometimes (3–10 times)* *3=Often (>10 times)*	
Q28	*In the past 4 weeks did you or any household member go to* ***sleep at night hungry*** *because there was not enough food?*	*0=No* *1=Yes*	*Skip to* ***Q29***
Q28a	*How often did this happen in the past 4 weeks?*	*1=Rarely (1–2 times)* *2=Sometimes (3–10 times)* *3=Often (>10 times)*	
Q29	*In the past 4 weeks did you or any household member go* ***a whole day and night without eating anything*** *at all because there was not enough food?*	*0=No* *1=Yes*	*Skip to* ***Q30***
Q29a	*How often did this happen in the past 4 weeks?*	*1=Rarely (1–2 times)*	

		2=Sometimes (3–10 times) *3=Often (>10 times)*	

READ ALOUD: *Now I am going to ask you about some of the foods that your household has eaten in the last 7 days, either in the home or outside the home.*

Q32	*FOOD*	***In the last 7 days, did anyone in your household eat this food?*** *Tick if yes.*	***If eaten, What was the source of the food?*** ***H** - Home produced; **B** – Bought; **W** - Wild / gathered; **G** – Gift; **P** - Picked from another's field; **A** – food aid/ given by an organisation; **O** - Other*	***If B, How much did the household spend in the past 7 days to purchase this food?*** *(USh.)* *88=IDK*	***If B, Whose income was used to purchase this food in the last 7 days?*** *All that apply.* ***S**-Self* ***P**-Partner / Spouse* ***F**-Other family*	***If B, What type of vendor?*** *1-permanent shop; 2-weekly / biweekly market; 3-mobile vendor near home 4-street vendor; 5-Other, specify*

					member's *N-Non-family* *member's*	
1	*Maize porridge/ maize meal*					
2	*Rice*					
3	*Banana/plantain*					
4	*Millet*					
5	*Sorghum*					
6	*Bread from wheat flour (chapati, buns)*					
7	*Beans & pulses*					
8	*Ground nuts*					
9	*Sesame*					
10	*Milk & milk products*					
11	*Fruit*					

12	*Root vegetables (sweet potato, potato, cassava)*					
13	*Green, leafy vegetables*					
14	*Orange vegetables (carrots, pumpkin)*					
15	*Other vegetables*					
16	*Fish*					
17	*Red Meat*					
18	*Chicken Meat*					
19	*Eggs*					
20	*Salty snacks*					
21	*Sweets and cakes*					

FOOD CHOICE

READ ALOUD: *Now I am going to ask you some questions about which foods you think are inexpensive, healthy, and accessible.*

Q33	*FOOD*	***How expensive or inexpensive do you think [FOOD] is?*** *1= very expensive* *2=somewhat expensive* *3=somewhat cheap* *4= very cheap* *88=IDK*	***How healthy or unhealthy do you think [FOOD] is?*** *1=very unhealthy* *2=somewhat unhealthy* *3=somewhat healthy* *4=very healthy* *88=IDK*	***How quick or slow do you think [FOOD] is to cook?*** *1=very slow* *2=somewhat slow* *3=somewhat quick* *4=very quick* *88=IDK*	***How desirable or undesirable do you think [FOOD] is?*** *1=very undesirable* *2=somewhat undesirable* *3=somewhat desirable* *4=very desirable* *88=IDK*	***How accessible or inaccessible do you think [FOOD] is?*** *1=very inaccessible* *2=somewhat inaccessible* *3=somewhat accessible* *4=very accessible* *88=IDK*

1	*Maize meal*					
2	*Matooke*					
3	*Banana*					
4	*Beans*					
5	*Groundnuts*					
6	*Milk*					
7	*Mango*					
8	*Cassava*					
9	*Green, leafy vegetables*					
10	*Pumpkin*					
11	*Tomato*					
12	*Fish*					
13	*Eggs*					

Time allocation

READ ALOUD: *TBD*

Q40	***Do any of the household members participate in any of the following activities?***	
	Activity	***Tick all that apply***
1	*Work as employed (incl. casual and salaried labour) & own business work (e.g. making food or crafts to sell) (E)*	☐ *Self* ☐ *Partner/Spouse* ☐ *Child* ☐ *Other household member (Specify: _____)*
2	*Farming / Livestock / Fishing / Wild harvesting of mushrooms, herbs, insects or other food (for either home consumption or for income) (G)*	☐ *Self* ☐ *Partner/Spouse* ☐ *Child* ☐ *Other household member (Specify: _____)*
3	*Food preparation (incl. peeling, boiling water, chopping, pounding, etc.) (L)*	☐ *Self*

		☐ *Partner/Spouse* ☐ *Child* ☐ *Other household member (Specify: _____)*
4	*Fetching water (M)*	☐ *Self* ☐ *Partner/Spouse* ☐ *Child* ☐ *Other household member (Specify: _____)*
5	*Fetching wood (M)*	☐ *Self* ☐ *Partner/Spouse* ☐ *Child* ☐ *Other household member (Specify: _____)*
6	*Child feeding (N)*	☐ *Self* ☐ *Partner/Spouse*

		☐ *Child* ☐ *Other household member (Specify: _____)*
7	*Other domestic work (M) Laundry, cleaning, caring for child/adult/elderly care* *(N)*	☐ *Self* ☐ *Partner/Spouse* ☐ *Child* ☐ *Other household member (Specify: _____)*
8	*Travel to acquire food – own grown / market* *Other travel and commuting (P)*	☐ *Self* ☐ *Partner/Spouse* ☐ *Child* ☐ *Other household member (Specify: _____)*
9	*Other post-harvest activity (drying, cleaning, sorting, packing) (G)*	☐ *Self* ☐ *Partner/Spouse* ☐ *Child*

		☐ *Other household member (Specify: _____)*

Modified from A-WEAI Module G3(A): Access to productive capital

READ ALOUD: *Now I'd like to ask you about your household's access to and ownership items that could be used to generate income.*

Q41	***Does anyone in your household currently have access to any of these [ITEM]?*** *DO prompt.*	***Have access to*** *0=No* *1=Yes*	***If yes, Do you own any of the [ITEM], either solely or jointly?*** *0=No* *1=Yes, solely* *2=Yes, jointly (Specify with whom)*
1	*Agricultural land (pieces/plots)*		
2	*Large livestock (oxen, cattle)*		
3	*Small livestock (goats, pigs, sheep)*		
4	*Chickens, Ducks, Turkeys, Pigeons*		
5	*Fish pond or fishing equipment*		

6	*Farm equipment (non-mechanized: hand tools, animal-drawn ploughs)*		
7	*Farm equipment (mechanized: mechanized maize sheller, tractor-plough, power tiller, treadle pump)*		
8	*Nonfarm business equipment (solar panels used for recharging, sewing machine, brewing equipment, fryers)*		
9	*House (and other structures)*		
10	*Large consumer durables (TV, sofa)*		
11	*Small consumer durables (radio, cookware)*		
12	*Other land not used for agricultural purposes (pieces, residential or commercial land)*		
13	*Means of transportation (bicycle, motorcycle, car)*		

READ ALOUD: *Next I'd like to ask you about your household's experience with borrowing money or other items in the past 12 months.*

INSTRUCTIONS: *Ask all questions for all lending sources.*

Q42	***If you wanted to…*** ***Would you or anyone in your household be able to take a loan or borrow cash/in-kind from [LENDING SOURCE]?*** *DO prompt.*	***Take a loan or borrow cash/in-kind*** *0=No* *1=Yes* *2=Maybe* *88=IDK*	***(a) Has anyone in your household taken any loan or borrowed cash/in-kind from [LENDING SOURCE] in the past 12 months?*** *0=No* *1=Yes, cash* *2=Yes, in-kind* *3=Yes, cash and in-kind* *88=IDK*	***(b) If (a)…*** ***Who makes the decision to borrow from [LENDING SOURCE] most of the time?*** *Enter all that apply.* *S= Self* *P=Partner / Spouse* *H=Other household member* *N= Other non-household member*	***(c) Who makes the decision about what to do with the money/item borrowed from [LENDING SOURCE] most of the time?*** *Enter all that apply.* *S= Self* *P=Partner / Spouse* *H=Other household member* *N= Other non-household member*
1	*Non-governmental*				

	organization (NGO)				
2	*Informal lender*				
3	*Formal lender (bank/financial institution)*				
4	*Friends or relatives*				
5	*Group based micro-finance or lending e.g. VSLs*				

A-WEAI Module G5: Group membership

READ ALOUD: *Now I'm going to ask you about groups in the area. These can be either formal or informal and customary groups.*

Q43	***Is there a [GROUP] group in your area?*** *DO prompt.*	***(a) Group*** *0=No* *1=Yes* *88=IDK*	***(b) If (a)…*** ***Are you an active member of this [GROUP]?*** *Tick for yes.*
1	*Agricultural / livestock/ fisheries producer's group (including marketing groups)*		
2	*Water users' group*		
3	*Forest users' group*		
4	*Credit or microfinance group (including VSLA)*		
5	*Mutual help or insurance group (including burial societies)*		
6	*Trade and business association*		
7	*Civic groups (improving community) or charitable group (helping others)*		
8	*Local government*		

9	*Religious group*		
10	*Other women's group (if none of the above)*		
11	*Other (specify)*		

Access to extension services

Q44	*Have you [MOTHER] met with an agricultural extension worker or livestock/fisheries extension worker <u>in the past 12 months</u>?*	*0=No* *1=Yes*	*Skip to **Q45***
Q44a	*How many times did you meet with the agricultural extension worker or livestock/fisheries worker in the past 12 months?*	*__ (number of visits)*	

A-WEAI Module G2: Role in Household Decision-Making Around Production & Income Generation

READ ALOUD: *Now I'd like to ask you some questions about your participation in certain types of work activities and on making decisions on various aspects of household life.*

Q45	***Did you [MOTHER] participate in [ACTIVITY] <u>in the past 12 months</u>?*** *DO prompt.*	***Participated*** *Tick for yes.*	***(a) When decisions are made regarding [ACTIVITY], who is it that normally takes the decision?*** *Enter <u>all that apply</u>.* *S= Self (IF <u>ONLY</u> S, SKIP TO (d))* *P=Partner / Spouse* *H=Other household member* *N= Other non-household member*	***(b) How much input did you have in making decisions about [ACTIVITY]?*** *Enter <u>only one</u>.* *0=No input or input in few decisions* *1=Some decisions* *2=Most or all decisions* *3=No decision made*	***(c) if you want(ed) to…*** ***To what extent do you feel you can make your own personal decisions regarding [ACTIVITY]?*** *Enter <u>only one</u>.* *0=Not at all* *1=Some extent* *2=Completely*	***(d) How much input did you have in decisions on the use of the income generated from [ACTIVITY]?*** *Enter <u>only one</u>.* *0=No input or input in few decisions* *1=Some decisions* *2=Most or all decisions* *3=No decision made*

1	*Food crop farming: (primarily for household consumption)*					
2	*Cash crop farming: (grown primary for sale)*					
3	*Livestock raising, fishing or fish pond*					
4	*Non-farm economic activities: (Small business, self-employment)*					
5	*Wage and salary employment (in-kind or monetary work)*					
6	*Major household expenditures (e.g., bicycle, land, boda boda)*					
7	*Procuring food (e.g., purchasing, gathering)*					

8	*Other minor household expenditures (besides food,*					
9	*Feeding children*					
10	*Other child care (e.g., bathing, taking to clinic, helping with schoolwork)*					

Perception of time and resources for infant care and feeding, and use of agricultural labour saving devices

READ ALOUD: *Now I'm going to ask you some questions about your time and resources for infant care and feeding, and use of agricultural labour-saving devices.*

Q46	*Do you agree with the following statements?*	*0=No, I completely disagree.* *1=Yes, I completely agree.* *2= I agree/disagree to some extent (Explain briefly, if possible)* *88=IDK*	

1	*I can make an independent decision to access and pay for services (like maize shelling); I don't need to ask for permission.*		
2	*I have my own resources to pay for maize shelling services.*		*If yes, SKIP to 4*
3	*I can access resources to pay for maize shelling services.*		
4	*I can decide which activities to do during the day.*		
5	*I can decide when to do these activities during the day.*		
6	*I do not have anyone telling me what work to do.*		
7	*I have access to the foods that I think my baby needs.*		
8	*I have the resources to give the baby the food that I would like to.*		
9	*In the past 7 days, I have had sufficient time to feed my baby.*		
10	*In the past 7 days, I have had sufficient time to take care of my baby.*		
11	*In the past 7 days, I have had sufficient time to do my work during the day.*		

12	*In the past 7 days, I have had sufficient time for sleep.*		
13	*In the past 7 days, I have had sufficient time to do things that I enjoy during the day.*		
14	*In the past 7 days, I have had sufficient time to rest/relax.*		

Wealth Status

READ ALOUD: *TBD*

Q47	*What type of material is mainly used for construction of the wall of the dwelling?* *Circle only one.*	*1=Unburnt bricks with mud, mud and poles, or other* *2=Unburnt bricks with cement, wood, tin / iron sheets, concrete / stones, burnt stabilized bricks, or cement blocks*	
Q48	*What type of material is mainly used for construction of the roof of the dwelling?* *Circle only one.*	*1=Thatch, or tins* *2=Iron sheets, concrete, tiles, asbestos, or other*	
Q49	*What source of energy does the household mainly use for cooking?*	*1=Firewood, cow dung, or grass (reeds)* *2=Charcoal, paraffin stove, gas, biogas, electricity (regardless*	

	Circle only one.	*of source), or other*	
Q50	*What type of toilet facility does the household <u>mainly</u> use?* *Circle only one.*	*1=No facility / bush / polythene bags / bucket / etc., or other* *2=Uncovered pit latrine (with or without slab), Ecosan (compost toilet), or covered pit latrine without slab* *3=Covered pit latrine with slab* *4=VIP latrine, or flush toilet*	
Q51	*Does any member of your household own a (functioning) radio?*	*0=No* *1=Yes*	
Q52	*Does every member of the household have at least one pair of shoes?* *Circle only one.*	*0=No* *1=Yes*	
Q53	*Does the household own a (functioning) fridge?*	*0=No* *1=Yes*	

Q54	*What is the <u>main</u> source of drinking-water for members of your household?* *Circle only one.*	*1=Piped water into dwelling* *2=Piped water to yard/plot* *3=Public tap / standpipe* *4=Borehole / Tubewell* *5=Protected dug well* *6=Unprotected dug well* *7=Protected spring* *8=Unprotected spring* *9=Rainwater collection* *10=Bottled water* *11=Cart with small tank/drum* *12=Tanker-truck* *13=Surface water (river, dam, lake, pond, stream, canal,*	

		irrigation channels) *14=Other (specify)* *88=IDK*	
Q55	*Do you treat your water in any way to make it safer to drink?*	*0=No (SKIP TO 69)* *1=Yes, always* *2=Yes, sometimes*	
Q56	*What do you <u>usually</u> do to the water to make it safer to drink?* *Circle only one.*	*1=Boil* *2=Add bleach/chlorine* *3=Add ash* *4=Strain it through a cloth* *5=Use a water filter (ceramic, sand, composite, etc.)* *6=Solar disinfection* *7=Let it stand and settle* *8=Other (specify)* *88=IDK*	

Anthropometric Measurement

READ ALOUD: Now we would like to measure your weight and height and the weight. We will measure you twice each to make sure that we get the measurement correct. If we can't get the measurement correct we may have to measure a third time. This should take no more than 10 minutes and we can share the results with you afterwards.

Measurements

Variables	***Measurements***	***Comments***
Mother's Height	*a)* |__|__|__|.__| *b) b)* |__|__|__|.__| *c) c)* |__|__|__|. __| *if discrepancy**	*Straightforward to measure:* *Yes* □ *No* □ *If no, specify:*
Mother's Weight	*a)* |__|__|__|.__| *b)* |__|__|__|.__| *c)* |__|__|__|. __| *if*	*Straightforward to measure:* *Yes* □ *No* □ *If no, specify:*

	*discrepancy**	

**Only take a third measurement when difference between the 1st & 2nd measurements are:*

*o Maternal **Height** does not agree to within 0.5 cm*

*o Maternal **Weight** does not agree to within 0.2 kg*

Quantitative Diet Recall - Mother

***PASS #1**: LIST ALL FOODS*

***READ ALOUD**: Now I'd like to describe everything that you [MOTHER] ate or drank yesterday during the day or night, whether at home or anywhere else. Include all foods and drinks, any snacks or small meals, as well as any main meals. Remember also to include all foods and beverages until you [MOTHER] went to sleep (for the final time) last night. Let's start with the first food or drink you consumed yesterday...*

***PASS #2**: DETAILS FOR EACH FOOD*

READ ALOUD: Now think back to the first food or beverage you [MOTHER] ate when you first woke up yesterday.

What time of day was it taken? Did you [MOTHER] add anything to it? For mixed dishes ask – what ingredients were in it? What was the source of ingredients? Where did you buy it from?

Food or Beverage	***Time*** *Or time of day*	***Ingredients/additions***	***Source***	***Market***

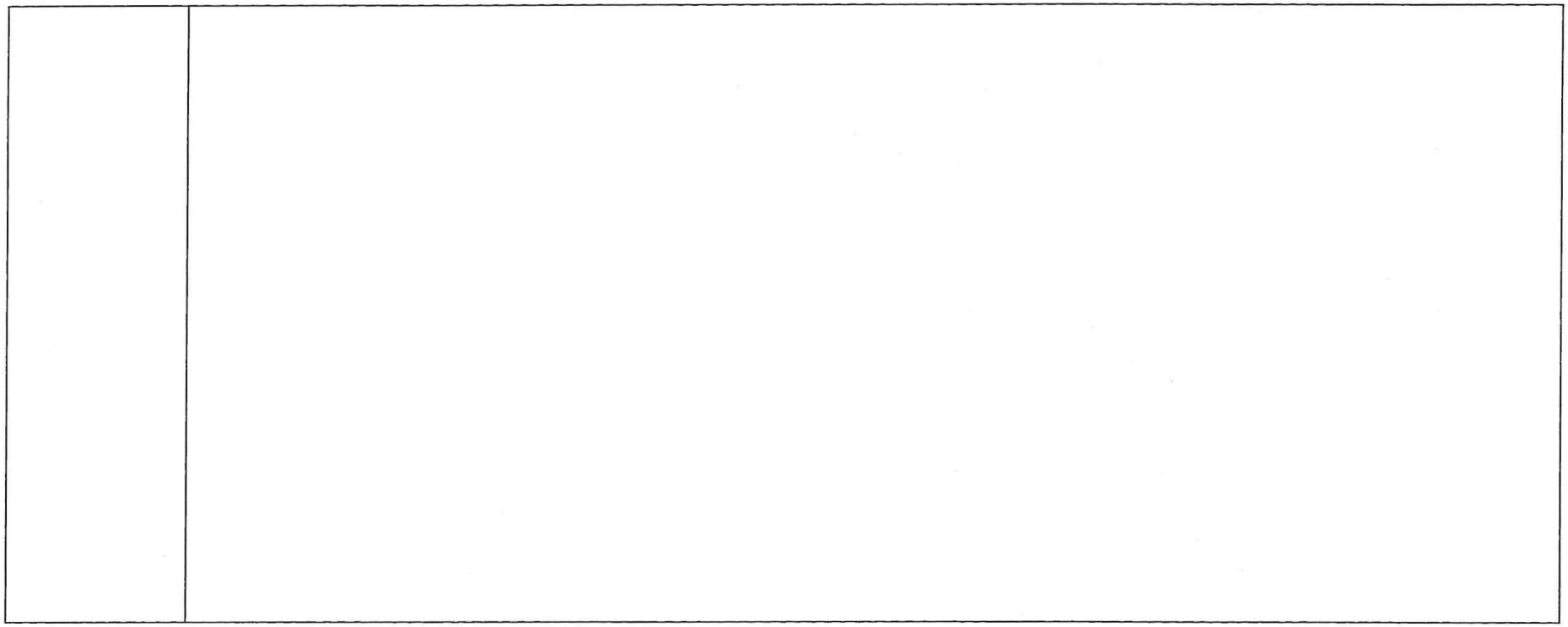
***Source:* H** – *home produced; B – bought; W – wild / gathered; G – gift; P – picked from another's field; A – food aid/ given by an organisation; O – other*

***Market:* 1** – *permanent shop; 2 – permanent market; 3-weekly / biweekly market; 4-mobile vendor near home 5- street vendor; 6-other, specify.*

Time use recall: Mother's Activities

PASS #1: *LIST ALL ACTIVITIES*

Time	***Activity***



Recall?																					*Comments*
Activity	*4:00*				*5:00*				*6:00*				*7:00*				*8:00*				*9:00*				
Sleeping																									
Resting																									
Watching TV/radio/reading																									
Playing with the index child																									
Chatting with friends /relatives																									
Answering phone for the study																									
Other interactions with the study																									
Food Preparation																									
Cooking food for the family to eat																									
Cooking food for sale as a business																									

Eating or drinking																				
Breast feeding the index child																				
Feeding the index child food or drinks																				
Feeding other children or adults																				
Personal care																				
Care of the index child																				
Care of other children or adults																				
Fetching wood (including travel)																				
Fetching water (including travel)																				
*Travel to or from the **farm** to acquire food*																				
*Travel to or from **market** to acquire food*																				

Other Travel																					
Food collection from garden/farm																					
Food shopping																					
Other shopping																					
Washing clothes																					
Chopping / splitting firewood																					
Other domestic work																					
*Shelling maize – **by hand***																					
*Shelling maize – **by machine***																					

Recall?																					***Comments***
Activity (cont'd)	***4:00***				***5:00***				***6:00***				***7:00***				***8:00***				***9:00***				
Other post-harvest processing																					

Fish-livestock product processing																					
Food crop farming																					
Cash crop farming																					
Livestock production																					
Fish farming																					
Wild food gathering & fishing																					
Working for others - employed																					
Working – own business																					
Supervising employees who are farming																					

Accessing services e.g., health services																				
Studying																				
Social activities & hobbies																				
Religious activities																				
Unknown																				
Other, specify																				
Recall?																				***Comments***
Activity	***10:00***				***11:00***				***12:00***				***13:00***				***14:00***				***15:00***				
Sleeping																				
Resting																				
Watching TV/radio/reading																				
Playing with the index child																				

Chatting with friends /relatives																				
Answering phone for the study																				
Other interactions with the study																				
Food Preparation																				
Cooking food for the family to eat																				
Cooking food for sale as a business																				
Eating or drinking																				
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Other Travel																				
Food collection from garden/farm																				

Food shopping																				
Other shopping																				
Washing clothes																				
Chopping / splitting firewood																				
Other domestic work																				
*Shelling maize – **by hand***																				
*Shelling maize – **by machine***																				

Recall?																			***Comments***
Activity (cont'd)	***10:00***				***11:00***				***12:00***				***13:00***				***14:00***				***15:00***				
Other post-harvest processing																									
Fish-livestock product processing																									
Food crop farming																									

Cash crop farming																				
Livestock production																				
Fish farming																				
Wild food gathering & fishing																				
Working for others - employed																				
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Supervising employees who are farming																				
Accessing services e.g., health services																				
Studying																				
Social activities & hobbies																				
Religious activities																				
Unknown																				
Other, specify																				

Recall?																			***Comments***
Activity	***16:00***				***17:00***				***18:00***				***19:00***				***20:00***			
Sleeping																				
Resting																				
Watching TV/radio/reading																				
Playing with the index child																				
Chatting with friends /relatives																				
Answering phone for the study																				
Other interactions with the study																				
Food Preparation																				
Cooking food for the family to eat																				

Cooking food for sale as a business																			
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Chopping / splitting firewood																			
Other domestic work																			
*Shelling maize – **by hand***																			
*Shelling maize – **by machine***																			

Recall?																	*Comments*
Activity (cont'd)	*16:00*				*17:00*				*18:00*				*19:00*				*20:00*				
Other post-harvest processing																					
Fish-livestock product processing																					
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Accessing services e.g., health services																					

Studying																				
Social activities & hobbies																				
Religious activities																				
Unknown																				
Other, specify																				

APPENDIX III: INTRODUCTION LETTER

KYAMBOGO UNIVERSITY
P. O. BOX 1 KYAMBOGO
Tel: 041 - 4286792 Fax: 256-41-220464
Website: www.kyu.ac.ug
Office of the Dean, Graduate School

15/11/ 2021

To Whom It May Concern

RE: LETTER OF INTRODUCTION

Dear Sir/Madam,

This is to introduce **Ms Mirembe Winnie** Registration Number **19/U/GMHN/19024/PD** who is a student of Kyambogo University pursuing a Masters Degree.

She intends to carry out research on **"Relationship between maternal workload, food choices and Nutritional status of Small holder farmers in Mpigi District."** as partial fulfillment of the requirements for the award of Master of Science in Human Nutrition of Kyambogo University.

We therefore kindly request you to grant her permission to carry out this study in your institution.

Any assistance accorded to her will be highly appreciated.

Yours sincerely,

for Assoc. Prof. Muhamud N. Wambede
DEAN, GRADUATE SCHOOL

APPENDIX IV: ACCEPTANCE LETTER

Uganda National Council for Science and Technology

(Established by Act of Parliament of the Republic of Uganda)

Our Ref: A146ES **3 September 2021**

Joweria Nambooze
Soland Associated consults ltd
Wakiso

Re: Research Approval: **FOOD CHOICES AND THE FOOD ENVIRONMENT OF SMALL-HOLDER FARMERS IN MPIGI**

I am pleased to inform you that on **03/09/2021**, the Uganda National Council for Science and Technology (UNCST) approved the above referenced research project. The Approval of the research project is for the period of **03/09/2021** to **03/09/2022**.

Your research registration number with the UNCST is **A146ES**. Please, cite this number in all your future correspondences with UNCST in respect of the above research project. As the Principal Investigator of the research project, you are responsible for fulfilling the following requirements of approval:

1. Keeping all co-investigators informed of the status of the research.
2. Submitting all changes, amendments, and addenda to the research protocol or the consent form (where applicable) to the designated Research Ethics Committee (REC) or Lead Agency for re-review and approval **prior** to the activation of the changes. UNCST must be notified of the approved changes within five working days.
3. For clinical trials, all serious adverse events must be reported promptly to the designated local REC for review with copies to the National Drug Authority and a notification to the UNCST.
4. Unanticipated problems involving risks to research participants or other must be reported promptly to the UNCST. New information that becomes available which could change the risk/benefit ratio must be submitted promptly for UNCST notification after review by the REC.
5. Only approved study procedures are to be implemented. The UNCST may conduct impromptu audits of all study records.
6. An annual progress report and approval letter of continuation from the REC must be submitted electronically to UNCST. Failure to do so may result in termination of the research project.

APPENDIX V: ETHICAL CLEARENCE

CLARKE INTERNATIONAL UNIVERSITY
LEAD • INNOVATE • TRANSFORM

RESEARCH ETHICS COMMITTEE

(+256) 0312 307400
rec@ciu.ac.ug
www.rec.ciu.ac.ug

30/07/2021

To: Joweria Nambooze

Type: Initial Review

Re: CLARKE-2021-122: FOOD CHOICES AND THE FOOD ENVIRONMENT OF SMALL-HOLDER FARMERS IN MPIGI , Version 2 Clean copy, 2021-07-17

I am pleased to inform you that the Clarke International University REC, through expedited review held on **27/07/2021** approved the above referenced study.
Approval of the research is for the period of **30/07/2021** to **30/07/2022.**

As Principal Investigator of the research, you are responsible for fulfilling the following requirements of approval:

1. All co-investigators must be kept informed of the status of the research.
2. Changes, amendments, and addenda to the protocol or the consent form must be submitted to the REC for re-review and approval prior to the activation of the changes.
3. Reports of unanticipated problems involving risks to participants or any new information which could change the risk benefit ratio must be submitted to the REC.
4. Only approved consent forms are to be used in the enrollment of participants. All consent forms signed by participants and/or witnesses should be retained on file. The REC may conduct audits of all study records, and consent documentation may be part of such audits.
5. Continuing review application must be submitted to the REC **eight** weeks prior to the expiration date of **30/07/2022** in order to continue the study beyond the approved period. Failure to submit a continuing review application in a timely fashion may result in suspension or termination of the study.
6. The REC application number assigned to the research should be cited in any correspondence with the REC of record.
7. You are required to register the research protocol with the Uganda National Council for Science and Technology (UNCST) for final clearance to undertake the study in Uganda.

The following is the list of all documents approved in this application by Clarke International University REC: