

**HOUSEHOLD FOOD SECURITY AND NUTRITIONAL STATUS OF
CHILDREN 24-59 MONTHS IN NAMUTUMBA DISTRICT**

BY

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DECLARATION

I **Kizito Ndegeya** (Reg No. 19/U/GMHN/19029/PD) hereby declare, this thesis is my original work and has never been presented for a degree in any other University.

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APPROVAL

The research report by Kizito Ndegeya titled “*Household food security and nutritional status of children 24-59 months in Namutumba district*”, we as University supervisors confirm the work was done by the candidate under our supervision and is therefore, forwarded to the Kyambogo University Directorate of Research and Graduate Training with approval.

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ACRONYMS

DNCC:	District Nutrition Coordination Committee
ENA:	Emergency Nutrition Assessment
FAO:	Food and Agriculture Organization
HFA:	Height for Age
HFIAS:	Household Food Insecurity Access Scale
HH:	Household
HHH:	Household Head
LMICs:	Low- and Middle-Income Countries
MAD:	Minimum Acceptable Diet
MMF:	Minimum Meal Frequency
NPHS:	National Population and Housing Census
SES:	Socio-Economic Status
SMART:	Standardized Monitoring and Assessment of Relief and Transitions
SPSS:	Statistical Package for the Social Sciences
UBOS:	Uganda Bureau of Statistics
UDHS:	Uganda Demographic Health Survey
UNICEF:	United Nations Children’s Fund
USAID:	United States Agency for International Development

WFA:	Weight for Age
WFH:	Weight for Height
WFP:	World food program
WHO:	World Health Organization

OPERATIONAL DEFINITIONS

Household:	A household refers to a person or group of persons who live together in the same dwelling unit, acknowledge one adult as their head, following the same housekeeping arrangements, and are regarded a single unit.
Ethnicity:	Refers to the tribe of the household head
Food security:	A situation that exists when all people, at all times, have physical, social, and economic access to sufficient, safe, and nutritious food that meets their dietary needs and food preferences for an active and healthy life.
Marital status:	Household head staying with a partner regardless of the nature of marriage
Household size:	Number of people living in the same dwelling unit
Household assets:	Nature of property a household poses/owns and utilizes for food production
Education level:	The highest level of schooling a person attained (primary, secondary and tertiary)
Mother/caregiver:	A person taking care of a child and is one responsible for the child's feeding
Gender:	Being a male or female

Economic slowdowns: Refers to economic activity growing at a lower rate compared to the previous period.

Economic downturns: A period when business declines as measured by the growth rate in GDP.

ABSTRACT

Background: Household food security is complex and significantly affects children's nutritional status, ultimately impacting their growth and development.

Objective of the study: This was to establish the food security situation among households and the nutritional status of children 24-59 months in Namutumba District. Specifically, the study assessed the Household food security status, childhood nutritional status, and associated factors. The connection between child nutritional status and household food security was also examined.

Methodology: A mixed-methods research and cross-sectional analysis were carried out utilizing a structured household questionnaire, focus group discussions, and key informant interview guides. In the study, a total of 308 households were randomly chosen, and the nutritional status of each indexed child was evaluated through anthropometric measurements. Out of these, 299 households and 289 children had complete data and were thus analyzed to produce the final outcomes of the study.

Results: Almost all households (99%) experienced food insecurity with the majority facing severe food insecurity (60.2%). Household size (Adjusted PRR: 1.04; 95% C.I: 1.01, 1.08; $p=0.005$), limited access to agricultural land (Adjusted PRR: 1.26; 95% C.I: 1.07, 1.49; $p=0.005$), inadequate household food stocks (Adjusted PRR: 1.52; 95% C.I: 1.20, 1.92; <0.001) and low wealth index (Adjusted PRR: 0.71; 95% C.I: 0.52, 0.96, $p=0.027$) were positively associated factors with HH food insecurity. However, caregiver factors never had any association. The prevalence of stunting was as high as 28.0% with severe stunting at 10.4%. Wasting was at 3.1% with 0.7% severely wasted and underweight at 9.7%. None of the HH, caregiver and child characteristics had significant influence on the nutritional status of children. Simple and multiple linear regression models revealed HFIAS scores having a negative association with both WHZ scores ($\beta=-0.81$, $p=0.007$) and HAZ scores ($\beta=-0.37$, $p=0.039$). This implies that increase in HH food insecurity increases the likelihood of both wasting and stunting among children. On the other hand, food insecurity had no relationship with underweight ($\beta=0.001$, $p=0.998$) among children.

Conclusion: Results from this study highlighted the essential function of food security in preventing stunting and wasting while enhancing health and wellbeing in children 24-59 months. Nevertheless, it does not affect underweight as a composite indicator of nutritional status in children, suggesting that food security by itself is solely inadequate to foster optimal growth and development in children. Consequently, there is a necessity to enhance both nutrition-specific and sensitive interventions, focusing on bettering the quality of health services, income sources, access to agricultural land, and food supplies. All these factors are crucial for enhancing the nutritional results of children in Namutumba district.

Key words: Household, food security, nutritional status, stunting, wasting and underweight.

CHAPTER ONE: INTRODUCTION

1.1 Background

Childhood nutrition and food security play pivotal roles in shaping a nation's future, as they directly impact the growth process as well as the intellectual development of children (UNICEF, 2018). Food insecurity and malnutrition have been ongoing issues, especially in developing nations, resulting in harmful impacts on health, education, and productivity (Adebisi et al, 2019; UNICEF, 2018). In spite of attempts to tackle these problems, a thorough grasp of the elements affecting food security and the nutritional wellbeing of children is still difficult to achieve.

Household food security is one of the fundamental factors affecting the nutritional status of children under five and is recognized to impact dietary consumption (Semazzi & Kakungulu, 2020). Childhood undernutrition arises from insufficient nutrient intake, illnesses, and inadequate care of children, significantly harming their growth and development (Ghatas, 2014). The consequences of under-nutrition in children are both short term where illnesses and death may occur. And on the other hand, long standing/permanent consequences may include low intellect due to impaired brain development, low immunity, low productivity and non-communicable diseases later in life (Fall & Kumaran, 2019; Semazzi & Kakungulu, 2020).

The food security status of individuals, households, and nations is affected by several factors, including population growth, food prices, climate change, unemployment, poverty, and the exhaustion of natural resources (Khanam et al., 2020). Multiple socio-economic factors also have a great impact on the state of

food security among households and these include; family size, age composition of household members; ethnicity, marital status, age, gender, religion, social group, education and income level (occupation and assets) of household heads and mothers/caregivers (Power et al., 2018).

Child wellbeing is adversely affected by food insecurity, which has emerged as a worldwide issue due to the increasing number of children experiencing malnutrition (Adebisi, 2019). Globally, in 2022, 29.6% (2.4 billion) of the world's population faced food insecurity, and nearly 11.3% (900 million) endured severe food insecurity. Consequently, it was estimated that 22.3% of children under five suffered from under-nutrition, equating to 148.1 million children, with 6.8% experiencing wasting (45 million) and 5.6% being overweight (37 million). Stunting and wasting were more common in rural settings while urban areas were seen to have more overweight children (World Health Organization., 2023). In LMICs, children face a significant risk of under-nutrition due to inadequate nutrient consumption, recurring infections, suboptimal care practices, and the unequal distribution of food stemming from elevated levels of food insecurity in these nations.

By 2020, there were 789.4 million individuals in Africa experiencing food insecurity, including 346.4 million facing severe food insecurity and 452 million dealing with moderate food insecurity. The significant levels of food insecurity were driven by conflicts, climate shifts, economic slowdowns, and recessions. The COVID-19 pandemic compounded the situation, disrupting all businesses and livelihood efforts across Africa. As a result, there has been a significant increase in the trend of undernutrition in the continent across all sub-regions. Whereby in 2020, 281.6 million African population was undernourished and

since 2014 the situation increased by 89.1 million people. Out of the population with undernutrition in the continent, Eastern Africa accounts for the majority (nearly 44.4%) followed by Western Africa (26.7%) then Central Africa (20.3%), Northern Africa (6.2%) and Southern Africa accounts for the least prevalence of 2.4% (FAO, ECA & AUC, 2021).

Uganda, being a developing nation, continues to confront the adverse impacts of food insecurity and inadequate nutritional outcomes in children under five, despite various interventions designed and executed to tackle nutrition challenges. The situation regarding food security in Uganda is a critical concern. The Hunger map from the World Food Program showed that by January 2023, 16.4 million individuals in the country were facing food shortages, an increase of 1.2 million reported from October to December 2022 (Mwesigwa, 2023). The World Bank's 2022 report indicated that 48% and 11% of households in Uganda experienced moderate and severe food insecurity, respectively (Atamanov et al., 2022).

The Uganda demographic health survey of 2022 indicates among children 24-59 months, a 27.8% stunting rate, 2.2% wasting, and 9.8% underweight. Children in rural households (30%) and with uneducated mothers (35%) had higher chances of suffering from stunting in comparison to those who were from urban settings (24%) and with educated mothers; 10% (Uganda Bureau of Statistics (UBOS) and ICF. 2018). Over half (53%) of all children surveyed were anemic. Stunting and anemia are classic indicators of chronic under nutrition; and wasting indicates acute malnutrition (UBOS and ICF. 2018).

In Busoga region where the study area is located, food security is also a serious concern affecting 0.4 million out of the 1.2 million people faced with poverty (UBOS; Annual Agriculture survey (AAS), 2020). In the region, 21.2% of children are stunted, 3.4% have wasting, 3.3% have overweight and 7.6%, are suffering from underweight. Conversely, the smallest percentage (5.9%) of children aged 6-23 months are achieving the minimum acceptable diet (UBOS, 2023).

The district of Namutumba at one time experienced an outbreak of a disease among children which was “unknown” to the local population. The disease was attributed to witchcraft and often was referred to as “Lwenyanja” since affected children had developed scaly skins. However, findings by the Uganda Ministry of Health emergency response team established that, children were suffering from severe acute malnutrition with medical complications. And stunting rates were estimated as high as 44.5% (MoH, UNICEF & ACF, 2011), all were attributed to low dietary intake and prevalent childhood diseases.

Although Namutumba district has registered a significant decline in stunting levels from 44.5% (MoH, UNICEF and ACF, 2011) to 27.7% (Kuziga, Adoke & Wanyenze, 2017), the prevalence of under-nutrition is still high requiring much effort to strengthen interventions through research, policy reviews and formulation.

1.2 Problem statement

Food insecurity is a major contributor to inadequate nutrient intake by limiting dietary diversity and adequacy. Food insecurity is estimated to affect 16.4 million people in Uganda (Mwesigwa, 2023), a country with a Global Hunger

Index score of 27.3, classifying the nation to have a serious level of hunger where undernourishment stands at a rate of 36.9% of the population with insufficient caloric intake. This level of hunger and undernourishment impacts negatively on the nutrition and wellbeing of children (WHH, Concern Worldwide & IFHV., 2024). Busoga region is one of the areas experiencing elevated levels of food insecurity, with 50.0% of households indicated as food insecure (Uganda Bureau of Statistics, 2024).

Malnutrition, particularly stunting and wasting, in children aged 24-59 months continues to be a significant issue in Uganda, especially in rural areas. Recent data in Uganda indicates that among children aged 24-59 months, 27.8% are stunted, 2.2% are suffering from wasting, and 9.8% are underweight. Wasting among children under five also remains considerably higher in rural (3.4%) than urban (2.7%) settings compared to the National average of 3.2% (Uganda Bureau of Statistics 2023). Undernourished children grow inappropriately and do not realize their maximum physical and cognitive capabilities. They also have an increased risk of succumbing to childhood illnesses, including infections, owing to their reduced immunity, but also risk developing chronic diseases later in adulthood (Beyene, 2023).

Although there is a connection between food security and the nutritional status of children, no specific information has been released regarding the food security conditions in households and their related factors in Namutumba district. Based on this, the relationship between household food security and children's nutritional status was investigated in the district. Consequently, this research was undertaken to gain insight into the state of food security within households and

its determinants, while also exploring its relationship with the nutritional status of children aged 24-59 months.

The findings of the study will be useful at both local and central level governments in informing policies on effective and sustainable measures to address matters concerning food security among households and nutrition challenges among children under-five not only in the district but in the entire country especially in rural settings.

1.3 Study objectives

1.3.1 General objective

Overall, the research aimed to assess the household food security situation and nutritional status of children 24-59 months in Namutumba district along with determining factors.

1.3.2 Specific objectives

The study aimed specifically to;

- (i) Assess the prevalence of food insecurity among households with children (24-59 months) in Namutumba district.
- (ii) Establish factors that influence the food security situation of households with children 24-59 months in Namutumba district.
- (iii) Assess the prevalence of malnutrition among children 24-59 months in Namutumba district.
- (iv) Determine factors that influence the nutritional status of children 24-29 months.

- (v) Examine the relationship between household food security and the nutritional status of children 24-29 months.

1.4 Research questions

Research questions below were answered;

- (i) What is the state of food insecurity among households with children 24-59 months in Namutumba district?
- (ii) Which key factors affect HH food security of children aged 24-59 months in Namutumba district.
- (iii) Which forms of malnutrition exist among children 24-59 months in Namutumba district?
- (iv) Are there any key HH factors in Namutumba district that influence the nutritional status of children 24-29 months?
- (v) How does food security among Households relate to the nutritional status of children 24-59 months in Namutumba district?

1.5 Indicators of the study

The following indicators were measured for both independent and dependent variables;

Independent variable: food security status of Households was measured in terms of food secure; mild, moderate, and severe food insecure households.

The dependent variable was measured in terms of nutritional status of children, which included stunting, wasting and underweight. It further included children who were normal, overweight and obese.

1.6 Conceptual framework of food security and childhood nutrition

This study examined three levels of determinants of under-nutrition based on the UNICEF conceptual framework regarding the nutrition of mothers and children (1990; 2020) and a review conducted by Pangaribowo, Gerber, and Torero (2013). Primarily, the direct factors observed at the individual level are insufficient nutrient consumption and illnesses. An individual's food consumption must satisfy the body's recommended nutrient needs (both quality and quantity) and ensure proper utilization. The number of people in a household influences the quantity of food shared and eaten among its members. For large families, members receive small portions of food and diets are not unsatisfying especially among children (Badake et al., 2014).

On the other hand, diseases and infections negatively influence child health, further reducing food intake by causing loss of appetite and increased loss of nutrients through diarrheal diseases and vomiting. Infections eventually result into poor nutrition compromising the immune response whereby susceptibility to illnesses among children increases especially when not fully immunized. This also adversely impacts the nutritional status of individuals, particularly children.

Moreover, the nutritional condition of children at both the household and community levels is influenced by a range of underlying factors identified as income poverty, which encompasses household food insecurity (issues related to food availability and access), inadequate caregiving practices for mothers and children, subpar healthcare services, and WASH practices. Poverty is essential in obstructing the fundamental factors affecting the nutrition and health of mothers and children. This is when an individual or household cannot attain

sufficient essential requirements which may include water, food, shelter, health and primary education (Ghattas, 2014). Poverty hinders households' capabilities and individuals' potentials to meet food security status, attain adequate livelihood sources and sustainably utilizes resources for health. It also promotes sale of harvested food crops to earn a living leading to depletion food stocks for a household.

Adequate care practices especially feeding of children and positive behaviors towards seeking of health care services, support and care for pregnant and lactating mothers; the right of mothers to make decisions on health and nutrition related issues in a household ensures adequate nutrient intake required for optimal physiological development of children. All these may be influenced by age, gender, education level and marital status of caretakers and household heads.

Unhealthy home settings, particularly in developing nations, significantly influence under-nutrition indirectly since they lead to infections like diarrheal diseases from inadequate WASH practices and respiratory illnesses due to substandard housing. The absence of or inadequate health care services related to under-nutrition and illness has significant negative and irreversible effects on nutritional and health status, resulting in fatalities, stunting, impaired cognitive development, and reduced productivity in adulthood (UNICEF, 2021).

Lastly, the basic structural causes influence underlying determinants of food security and nutrition of mothers and children at the societal level. Among the causes include potential resources such as land available to a household for agriculture of which the natural environment and the quality of human resources

have great influence. Socio-economic characteristics impact the utilization and translation of potential resources into assets/wealth that promote food security, care, safe environments and social services (Pangaribowo, Gerber & Torero, 2013).

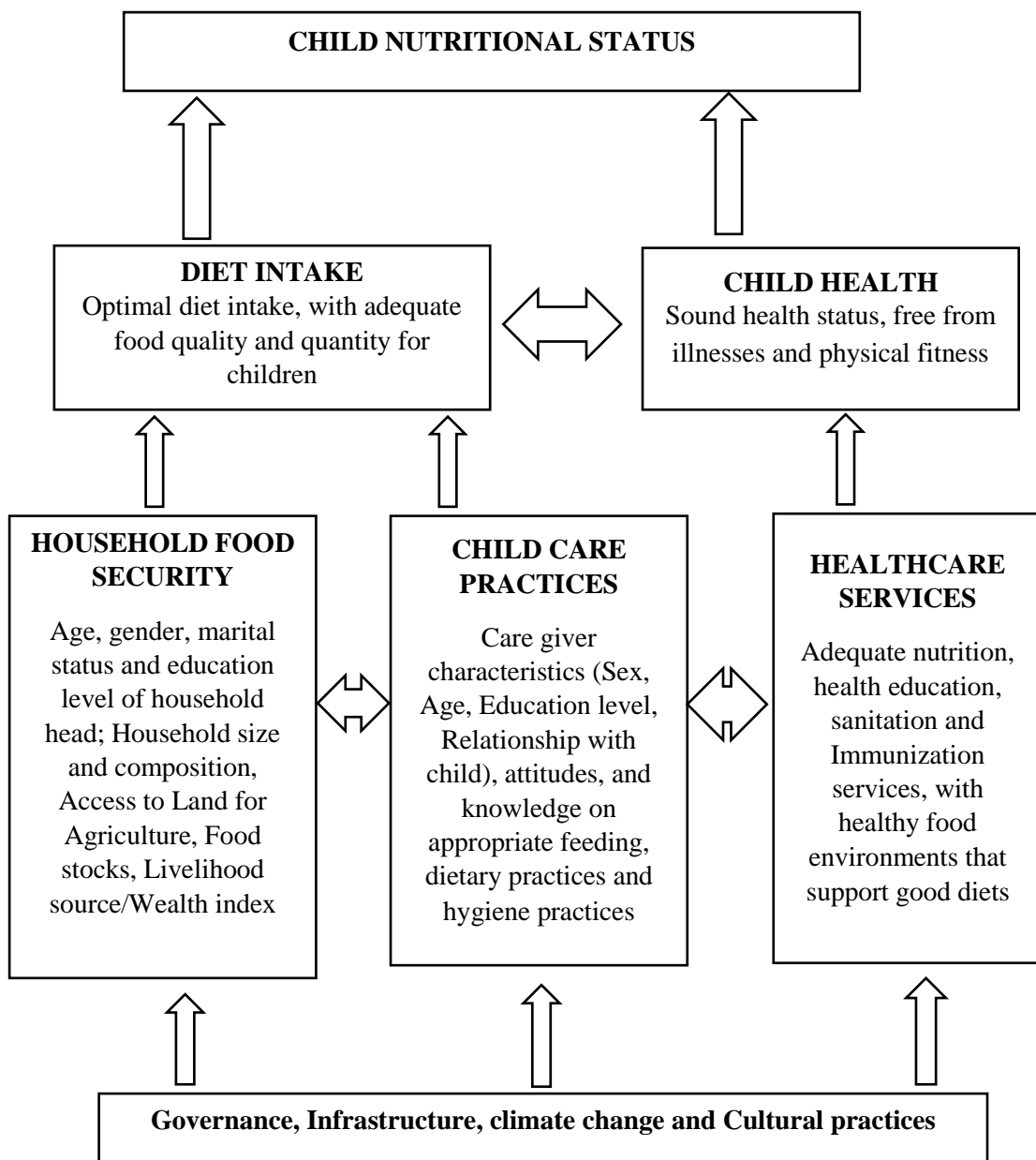


Figure 1: The conceptual framework of the study

Adopted from the UNICEF conceptual framework of determinants of household food security and childhood nutrition (UNICEF, 1990; 2020)

CHAPTER TWO: LITERATURE REVIEW

2.1 Household food security and its dimensions

Food security at the national and regional levels is influenced by the food security status of households, which is defined as the capacity of all members of a household to obtain enough food to maintain a healthy life (Napoli et al., 2011). Variations in socio-demographic traits lead to diverse food consumption patterns across households. Food security encompasses multiple dimensions, including availability, accessibility, utilization, and stability (FAO, 2008). For food security to exist, stability of the three dimensions must be realized throughout the entire period where food must be available, accessible, and utilizable at all times to meet individual's food needs (Napoli et al., 2011).

A food system becomes vulnerable when at least there is any one uncertain and insecure component of food security (FAO, 2008). Consequently, food insecurity denotes a condition in which access to safe and nutritious food is restricted (Abdullah et al., 2019). Ongoing food insecurity results in what is known as the double burden of malnutrition, where both types of inadequate nutritional status under-nutrition and over-nutrition can manifest (Ghattas, 2014; UNICEF, 2018). Inadequate dietary consumption in children under five can result in poor nutritional health, including stunting, wasting, and deficiencies in micronutrients. Then later during periods of increased energy intake, childhood stunting may result into overweight and obesity (Ghattas, 2014; UNICEF, 2018).

A number of authors identified several variables in connection with characteristics of households as determinants of food security, and such characteristics include; age, gender, academic qualification of household heads,

size of families; and economic variables also include size of household land, ownership of assets, income sources, prices of food and agricultural input (Mutiah & Istigimah, 2017; Gebre et al., 2019). Other factors of importance include roads network, agriculture extension services, marketing infrastructures and access; (Mutiah & Istigimah, 2017; Gebre et al., 2019; Joshi & Joshi, 2016; UBOS, 2018).

2.2 Socio-economic determinants of household food security

2.2.1 Age of household head

Household heads with food secure households had an average age of 47.41 years, while those with food insecure households were older at 51.45 years, suggesting that younger household heads are generally more productive than older ones, potentially contributing to a household's food security (Grobler, 2016). This was contrary to the findings of Motbainor, Worku & Kumie (2016) who established that age of household heads had a positive connection with food security which implied that as HH heads increased in age, their HHs' likelihood of food security also increased because of the experience older household heads have in obtaining food for their family members on daily basis (Motbainor, Worku & Kumie, 2016).

Moreover, this was further highlighted by results from research carried out by Mutiah and Istiqomah (2016), which revealed that numerous households led by elderly individuals were food secure. This occurred because older heads of households tended to have older children capable of aiding in the food supply for other family members, unlike many younger household heads who relied solely on their own income without any family support for food provision. Even

their spouses (of young household heads) only take care of children at home without any contribution towards food production as it is the case with older household heads supported by older children.

2.2.2 Gender of household head

In low and middle income nations, nearly half of the agricultural workforce is provided by women, yet it has been found that households led by females have high vulnerability to hunger especially when food crisis occurs and this is due to gender inequalities female household heads face in agriculture programs (Lutomia *et al.*, 2019). Although women significantly contribute to household food security, they encounter numerous substantial challenges stemming from discrimination and restricted bargaining power within society. Cultural norms that deny them land rights impact them, resulting in small plots; additionally, they encounter challenges in securing land ownership and face discrimination regarding inheritance rights. They also face challenges in accessing resources that could enhance their productivity such as credit, agricultural extension services, and inputs, leading them to resort to unpaid and precarious jobs (Botreau and Cohen, 2020). Women farmers also face exclusion from decision making and political representation through which they would socio-economically be empowered (Santos *et al.*, 2022).

When food prices rise, female household heads suffer negative consequences and they face discrimination in acquisition of formal employment opportunities which leave them with taking on less paid informal jobs. They also spend their biggest portion of family income on food unlike male household heads. Women, particularly in their reproductive years, are particularly susceptible to food

insecurity, encountering significant difficulties regarding the availability, accessibility, utilization, and stability of food supplies, consequently experiencing both macro and micronutrient deficiencies that adversely affect the development of society as a whole (Botreau & Cohen, 2019; Akadiri, Nwaka & Jenkins, 2017). Lastly, Female headed Households have higher vulnerability to food insecurity because most of them have low education, minimal chances to acquiring new technologies and low exposure to variety of income opportunities (Joshi & Joshi, 2016; Habyarimana, 2015).

2.2.3 Household head marital status and food security

Marital status indicates whether a person is married or not and encompasses being married, single, divorced, or widowed (Britannica dictionary). Marital status of Household heads significantly influences household food security by enhancing family labour and motivation among couples to work harder to ensure all dimensions of food security are attained (Tedesse Tantu et al., 2017). Marital status may influence the kind of support offered to women by their spouses especially for food acquisition in various ways. For example, ex-husbands do not give women who divorced economic support and on the other hand women who are cohabiting also are not offered financial support for their businesses to prosper because men fear that if such women are successful will leave them.

Most women acknowledge that men help them with money to procure household food or with physical food from the farm unlike divorced women who do not get such kind of help. Although married women may lack freedom but are supported by their husbands to progress in their economic and social status and also can be

supported by families of their husbands than unmarried ones with hope that they would also benefit (Dallmann *et al.*, 2019).

2.2.4 Education level of household heads

The level of education attained by household head impacts the status of household food security. Household Heads with higher academic qualifications have various work opportunities as well as high productivity as they have opportunities to get formal and higher paying jobs for example employees in institutions like hospitals, schools and factories (Agidew & Singh, 2018). Furthermore, the education of the household head enhances work efficiency, skills, and income diversification. Higher education levels also aid in adopting technologies to ensure better living condition compared to lower levels. Furthermore, household heads of low education are more vulnerable to face food shortage as they are most likely to work in the informal sector with low paying jobs such as casual labour, garden workers, potters, tire repairman, and street food traders (Mutiah & Istiqomah, 2016; Joshi & Joshi, 2016).

Education influences the uptake of Family planning services, a good measure mostly adopted by educated household heads to control the rapidly growing population. The practice can be employed to limit accumulation of household members, which decreases unfair food distribution and consumption and eventually improves household food security status (Agidew & Singh, 2018; Phami *et al.*, 2020).

2.2.5 Household size and food insecurity

Within homes, potential variations can be identified when examining food insecurity at the individual level since various factors tied to culture and social

characteristics impact how food and resources are allocated within a particular household. During times of food scarcity, discrimination against women and children may happen in food distribution, leading mothers to lessen and forgo their own portions to ensure children receive sufficient nutrition. In turn, affecting maternal nutrition with adverse consequences on their off-springs (UNICEF, 2018). Different members of a specific household can experience different food insecurity outcomes for instance men versus women, adults versus children, and even among children within the same household (Owoo & Nkechi, 2018). One of the major factors that have been shown to impact food security and optimal nutrition is the size of the household which may be categorized as small having less than 4 people, moderate with 5-6 members and large with 7 or more members (Ayu & Istigomah, 2017).

According to Adebayo & Ojo, (2012), it was noted that for each member in a large household, less food for consumption is available for them thus affecting their nutritional status. Gebre and colleagues (2019) indicated that as household size increases and as food is shared by household members, children are likely to face and experience limited food intake and hence suffer poor nutritional status. Indeed, a plethora of authors have collaborated these findings (Motbainor, worku and Kumie, 2016; Mutiah & Istiqomah, 2017; Gebre *et al.*, 2019). Several studies demonstrated that household size is negatively correlated with food security, indicating that larger family sizes exacerbate food insecurity (Agidew & Singh, 2018; Phami *et al.*, 2020; Joshi & Joshi, 2016; Mutiah and Istiqomah, 2017; Badake *et al.*, 2014; Gebre *et al.*, 2019; Bashir *et al.*, 2013; Pasder *et al.*, 2019).

A notable disparity exists between the family sizes of food secure and food insecure households, and Silvestri and colleagues (2015) indicated that smaller households, averaging 4.5 members, were deemed food secure, while larger households, averaging 5.8 members, were identified as food insecure, adversely affecting calorie availability (Silvestri et al., 2015). Bigger HHs have a higher requirement for food and when that kind of need is not met then such HHs have limited likelihood of ensuring food security (Mutiah & Istiqomah, 2017).

A rise in household members impacts the use of resources for food production, and it was found that larger household sizes consistently decrease food security levels. Consequently, larger families face a higher risk of food insecurity because numerous individuals rely on the same sources of income, which may be insufficient to supply enough food to satisfy their dietary requirements (Phami et al., 2020). Ijaz and others reported that the chances of food security in a HH reduce by 10% whenever there is an addition of one member in a HH (Ijaz et al., 2017), this is because resources are scarce such as land and any extra member increases the load on providers of the family (Joshi & Joshi, 2016).

Furthermore, Agidew and Singh (2018) supported the above findings where they established a 42.8% decrease in food security when the population of HH is increased by person indicating that large households are at higher risk of facing hunger. It was further stated that this negative connection probably is due to having a large number of unproductive dependents especially children and elderly persons who eventually increase the strain on limited resources of the HH (Agidew & Singh, 2018).

On the other hand, large population of a household is usually viewed as source of labour, thus having the capacity to produce enough food and a HH alleviates hunger. However, this can be realized in case where there is maximum productivity among reasonable number family members (Agidew & Singh, 2018). But according to Phami et al., 2020 and Silvestri *et al.*, 2015; it was more elaborated that most HHs have scarce resources where an increase in HH population contributes less to food production and the consumption rate increases.

Household size impacts food security as it influences how much food is distributed and consumed among HH members which may not be adequate due to large population resulting into unsatisfying diet especially among children and if it persists longer leads to under-nutrition with both acute and chronic malnutrition (Badake *et al.*, 2014). On the other hand, smaller households alleviate the burden of food consumption among its fewer members and have higher chances to become food secure (Mutiah & Istiqomah, 2017). The big family population is connected to the incidences of negative consequences as a result of inadequate food intake. This is because members in large HHs often get smaller portions of food in relation to those from small families and the difference in outcome is always realized in the rate of growth of children (Gholampour *et al.*, 2020).

Among children, household size and wasting were connected as those residing in families with five or more members faced an increased risk (of 2.7 times) of developing wasting compared to their fellow counterparts who lived in smaller HHs with fewer than five members. It was explained that this could be as a result of high burden many children impose on the income sources for food access and

consumption. Worse enough, food distribution is always inequitably shared among members where children may not be considered for adequate servings which exposes them to high vulnerability of suffering from poor nutritional status (Gebre *et al.*, 2019). However, according to Mahmood and friends (2016), it was established that malnutrition was not associated to HH size but instead to maternal illiteracy and HHs which had a person who special needs (Mahmood *et al.*, 2016).

2.2.6 Household food security and poverty

Poverty refers to a situation whereby an individual(s) has no ability to attain standard basic needs such as food, water, shelter or descent housing to maintain and develop a dignified life (Alemdar, 2021). Poverty can either be absolute whereby a household is unable to raise resources required for acquiring necessities basic for life for example shelter, safe drinking water, food, clothing, education and health care; or relative poverty whereby people and households have some amount of money (some income) but not enough to meet basic needs so as to facilitate a living standard which is average in a given community (Alemdar, 2021).

Production of food is sufficient and available for adequate nourishment of the whole world population and able to supply each person daily with excess calories and yet almost one billion people are faced with food shortage with hunger affecting over 737 million people (FAO *et al.*, 2023). Since globally adequate food is produced, food insecurity is threatened by distribution of food and influenced by poverty but not food shortage (Gonzalez, 2014). Chronic undernourishment is faced approximately by one billion people because they are

poor and they cannot purchase food from the market, and they are also unable to acquire land and agricultural inputs to grow and produce sufficient food implying that social and economic inequality is a great risk to hunger (Siddiqui *et al.*, 2020).

Additionally, it was observed that the largest share of food-insecure individuals globally is rural and hails from developing nations, accounting for almost 80% of the chronically undernourished population, despite the fact that they grow and generate at least seventy percent of the world's food (Gonzalez, 2014). Rural dwellers are majorly smallholder farmers relegated to small, arid and hilly plots of land and unable to irrigate their crops because of living in competition for land and water with large scale farmers. All this predispose rural poor to purchasing food throughout a practice they cannot sustain to meet their nutrient demands (Schutter, 2011).

Small holder and low income households have high consumption of food yet their production is low and always buy food to meet their dietary demands. Such households face great challenges in accessing adequate food and have increased vulnerability whenever there rise in food prices (Gassner *et al.*, 2019). On the other hand, volatile food prices may push such poor household to be trapped in the cycle of poverty with depletion of all savings and disposable income forcing them to resort to selling of assets, minimizing expenditure on health care and education of children, to enable maintain food supply. Such deprivation can have permanent effects hindering a household from getting out of poverty. In developing countries, average households spend on food nearly half of their total budget compared to households below the poverty line that are likely to spend a higher proportion of their budget on food. In addition, poor households globally

apportion beyond 60% of their total expenditure to family food for consumption. In summary, poor HHs face unrealistic adverse and unbearable consequences from unstable increasing prices of food (Kim et al., 2020).

Poverty as a result of unemployment, decline in wages and incomes which may be as a result of downturns and slowdowns of the economy affects attainment of food rich in nutrients and essential basic social services such as health care. Such nutritious food is expensive and unaffordable for the poor which therefore worsens food insecurity situation/outcomes (FAO *et al.*, 2019). Household income influences household food consumption whereby Households with high income levels have the capacity to select diverse nutritious and quality food as compared to their counterparts who have challenges with food choices and end up with less nutritious food. Therefore, HHs with better economic status are at an upper hand of meeting nutritional demands of all family members. Hence, poverty and food security of a Household have a powerful negative relationship (January, 2014; Mutiah & Istiqomah, 2016; Joshi & Joshi, 2016; Zakiri *et al.*, 2014).

2.2.7 Size of Household land and food production

Rural areas take land as the principal asset for household production. The amount of land owned by a household is positively linked to food security, as a larger area of land increases the likelihood of the household being more food secure. This occurs when the primary food source is homegrown, limiting family members' opportunities to engage in income-generating activities beyond farming. Consequently, families managing extensive land areas might boost

food production, thereby improving their chances of achieving a better food security status (Joshi & Joshi, 2016).

2.3 Food security and nutritional status of children

2.3.1 Risk factors for childhood nutrition

Food security alone is not a solely enough situation to promote optimal nutrition and hinder malnutrition. Various food and non-food elements, along with all aspects of food security—like access, availability, utilization, and stability—interact in complex ways to affect individuals' nutritional status (WHO, 2017). In developing nations, swift population expansion, social and economic changes have fostered an increase in urbanization, shifts in food systems, lifestyles, and dietary habits. These factors have led to alterations in eating habits, characterized by a rise in the intake of processed foods that are high in calories, unhealthy fats, sugars, salt, and low in fiber. These numerous alterations have resulted in various signs of inadequate nutrition, along with an increase in non-communicable diseases, creating a scenario now referred to as the double burden of malnutrition, which includes both under-nutrition appearing with (child being short for age and thin; hidden hunger) and over-nutrition (overweight and obesity) are in coexistence.

The multiple challenges of inadequate nutrition primarily impact populations in low and middle-income nations, with a higher frequency among those with lower incomes (Escamillaa et al., 2018; Ghattas, 2014). Children 24-59 months face various challenges meeting body nutrient requirements; this is because caregivers serve them together with other family members and do not offer them special diets which eventually lead to inadequate food intake exposing them to

high risk of malnutrition (Huong *et al.*, 2014). Children under five are more affected with malnutrition where boys are at a greater risk than girls (Thurstans *et al.*, 2020).

2.3.2 Household food insecurity as an underlying cause of under-nutrition

A diet lacking sufficient nutrients like calories, proteins, vitamins, and minerals hinders the growth of fetuses, infants, and children. As a result poor diets leads to maternal under-nutrition which in consequence increases the adverse outcomes of child birth such as low birth-weight. Inadequate intake of nutrients and low birth weight both in the long run are contributing elements of stunting among children. Thus, food insecurity of a household was established to be connected to low birth weight among new born babies most especially in poor settings (World Health Organization [WHO], 2018). In addition to food insecurity as an agent of wasting among children, other factors known to have impact are infections and diseases which are influenced by access to unsafe water, poor sanitation and inaccessible quality health care services. As wasting among children can also occur as a consequence of short-run upset and humanitarian catastrophe, it is a measure of acute malnutrition.

Food insecurity causes stress among affected individuals and it yields negative effects most especially among lactating mothers where the feeding of infants is compromised by affecting breast milk production and yet exclusive breastfeeding is key in promoting growth of children, preventing childhood malnutrition and obesity in adulthood. Additionally, food insecurity within households is associated with increased rates of depression and stress in women of childbearing age, which diminishes mothers' belief and confidence in infant

and young child feeding practices, ultimately harming the nutritional status of both infants and children. Consequently, the lack of food can directly (insufficient food consumption) and indirectly (impact of stress and depression on infant/child nutrition) lead to all types of malnutrition in children (WHO, 2018).

Food insecurity, defined as insufficient and reliable access to food, significantly contributes to child wasting, a type of malnutrition characterized by children being underweight for their height. In situations of food insecurity, restricted access to nutritious food can lead to insufficient intake of vital nutrients, resulting in weight loss and poor growth in children. The greater the level of food insecurity, the increased likelihood of wasting. This connection is more pronounced in low- and middle-income nations, where food insecurity is frequently associated with poverty, limited healthcare access, and unsatisfactory sanitation. A strong positive relationship exists between levels of food insecurity in a household and the probability of a child experiencing wasting. This indicates that kids from households with extreme food insecurity are more prone to being wasted compared to those from households with moderate or mild food insecurity. In scenarios of food insecurity, restricted access to healthy food may lead to insufficient consumption of vital nutrients, resulting in weight loss and impeded growth (Nepali, Simkhada, & Davies, 2020).

Lastly, important to note is that poor WASH practices and inaccessible standard health services lead to diseases for instance diarrhoea and infectious diseases; these impede the utilization of nutrients by body. Regular illnesses are significant factors that severely impact malnutrition in children. The likelihood of low birth weight and stunting in children increases. Insufficient food

availability and various forms of child malnutrition stem from numerous interrelated factors involving diverse sectors, deeply rooted in political and economic frameworks, along with ideological elements that affect resource control (UNICEF, 1990). Fundamental and root causes of malnutrition are affected by food systems, the food supply chain, the food environment, and consumer behavior (High level panel of Experts, 2017). These interlinked factors vary from context to context across regions, countries, areas within countries, and even among and within households (UNICEF, 2018).

2.3.3 The relationship between malnutrition and infection

Malnutrition compromises body's immunity making a person vulnerable to infections, and vice versa where infections can also contribute to undernutrition, thus causing a vicious cycle. Poor diets among children lead to loss of weight, compromised immune system, damage of mucus membrane, invasion of body by pathogens, and impaired growth and development. Illnesses further worsen the nutrition of an individual by decreasing intake and utilization of nutrients in number of ways; increased loss nutrients through diarrhea, mal-absorption, and urinary nitrogen loss, reduced nutrient intake through loss of appetite, diversion of nutrients to fight against infections. Furthermore, fever increases the body's requirement for energy and micronutrients (Yang et al., 2021). It is further highlighted that malnutrition and infection influence each other mutually, and to address severe acute malnutrition and reduce mortality rates, it is advised to utilize antibiotics, probiotic bacteria, and prebiotic foods (Sedigheh & Ovchinnikov, 2018).

2.3.3 Food insecurity and over-nutrition (overweight and obesity)

Food insecurity and over-nutrition are connected through dietary choices affected by the expense of healthy fresh foods. Households facing food insecurity often have limited resources for food, leading them to choose cheaper options that are lower in nutrition and higher in calories, thereby increasing the risk of overweight and obesity (WHO, 2017). As a result of globalized food markets, fresh food items like fruits, vegetables, and legumes are costly and beyond the financial reach of families facing food insecurity. Such families often emphasize inexpensive, low-quality diets that are high in calories but low in variety, micronutrients, and fiber, resulting in an excess of sugars and fats. On the other hand, food insecure households in most cases have difficulties in accessing markets where to purchase foods of good quality at prices they can afford and this further worsens the association between food insecurity and overweight (WHO, 2017).

Psychosocial factors are likely to influence the occurrence of obesity resulting from hunger, this is because the experience of having inadequate access to food leads to anxiety, stress and depression among individuals which may result into practices which increase the likelihood of becoming overweight and obese. Such behaviours include; patterns of binge eating in periods whenever food is in plenty but unsure about its continued stock, resorting to cheap, high calorie foods excess in sugars, fats, and salts (Stinson et al., 2018). The stress of living with inadequate access to food among lactating women hinders successful breast feeding and practices towards successful young child feeding increasing the risk of children becoming stunted and obesity later in life (Dinour, Rodas & Doamekpor, 2020).

Eating disorder patterns and food scarcity lead to metabolic shifts and physiological adjustments due to frequent food shortages, associated with increased body fat, decreased fat-free mass; conversely, when food availability improves, rapid weight gain follows. Foetal and early childhood “metabolic imprinting may occur as a result of maternal, infant and child food deprivation and there is an increased likelihood of the risk of obesity and diet-related non-communicable chronic illnesses in adulthood (Fall & Kumaran, 2019).

CHAPTER THREE: METHODOLOGY

3.1 Study area

The research took place in the entire Namutumba district. It is one of the rural districts located in East-central region (Busoga sub-region) of Uganda. The district is composed of 8 sub-counties and one town council as administrative units with a total population of 252,557 people (UBOS, 2016). The main occupation of the population in the entire district is mostly subsistence farming majorly in food crops which include; cassava, rice, millet, groundnuts, and maize. The coordinates of the district are: Latitude: 0° 20' 59.99"N, Longitude: 33° 02' 60.00" E. The Map of the district is shown below,

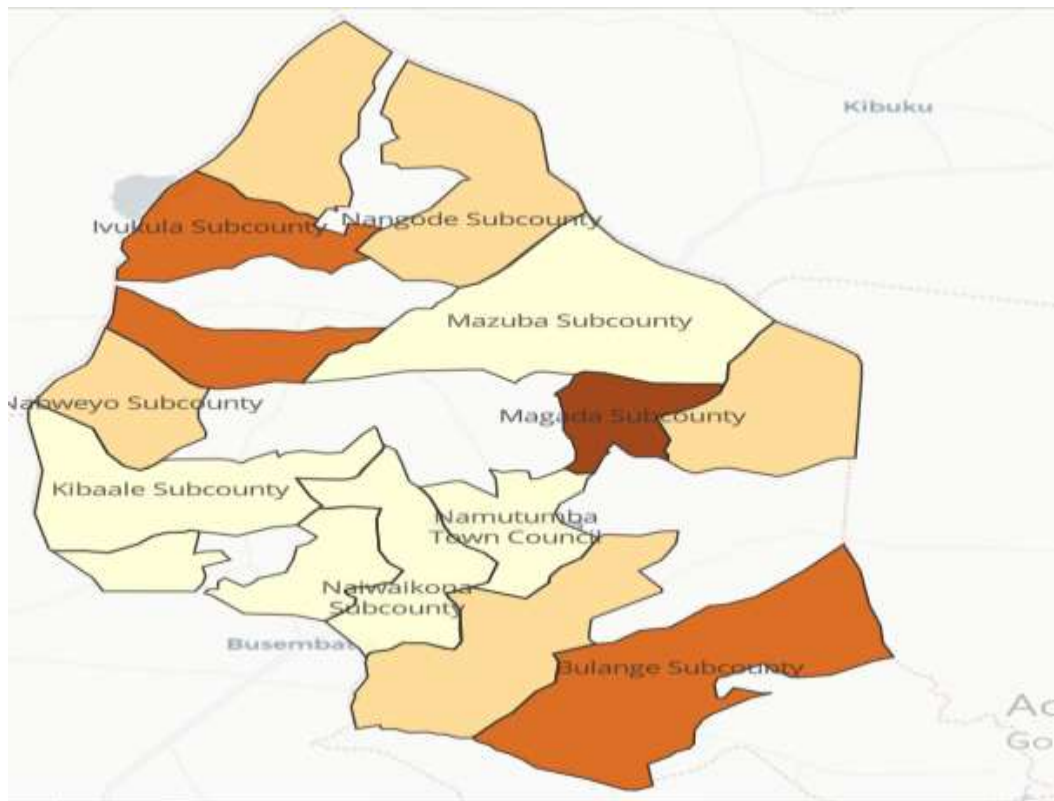


Figure 2: Map of Namutumba district

3.2 Study design

The design of the study was cross-sectional with mixed methods which involved both quantitative together with qualitative data collection. A household questionnaire focused on socio-economic traits, food security, and anthropometric measurements was employed to gather quantitative data. Groups of household heads and key informants in the district were mobilized to gather qualitative data.

3.3 Study population

Children 24-59 months were the main Participants of the study from selected households and their parents or caretakers who were male or female responsible for their care and feeding were interviewed.

3.4 Inclusion criteria

- (i) Eligible children were those aged 24 to 59 months
- (ii) Children who had stayed in such households of study in Namutumba district for not less than six months before this study.
- (iii) Children included only those solely depending on family meals as a source of nutrients.
- (iv) All children whose caretakers consented to take part in the study.

3.5 Exclusion Criteria

The exclusion criteria was children above 23 months and were still breastfeeding.

3.6 Sample size determination

The total number of participants involved in the study was calculated using the Leslie Kish formula (1964) to enable the selection of individuals whose responses represented the entire population to produce accurate and statistically significant results which were valid and reliable. The prevalence (27.7%) of malnutrition (stunting) as an outcome of HH food insecurity among children below five in Namutumba district was used (Kuziga, Adoke & Wanyenze, 2017). Sample size was determined as follows;

$$n = Z^2PQ/\delta^2$$

Where; n= sample size, Z = 1.96 (the standard deviation at 95% confidence level). P = Prevalence of stunting among children under five in the district is 27.7%, Q = 100% - P, δ = Confidence interval of 5%.

$$\text{Then; } n = 1.96^2 * 0.277 * (1-0.277) / 0.05^2$$

$$n = 308 \text{ children}$$

Therefore, the sample size was 308 children.

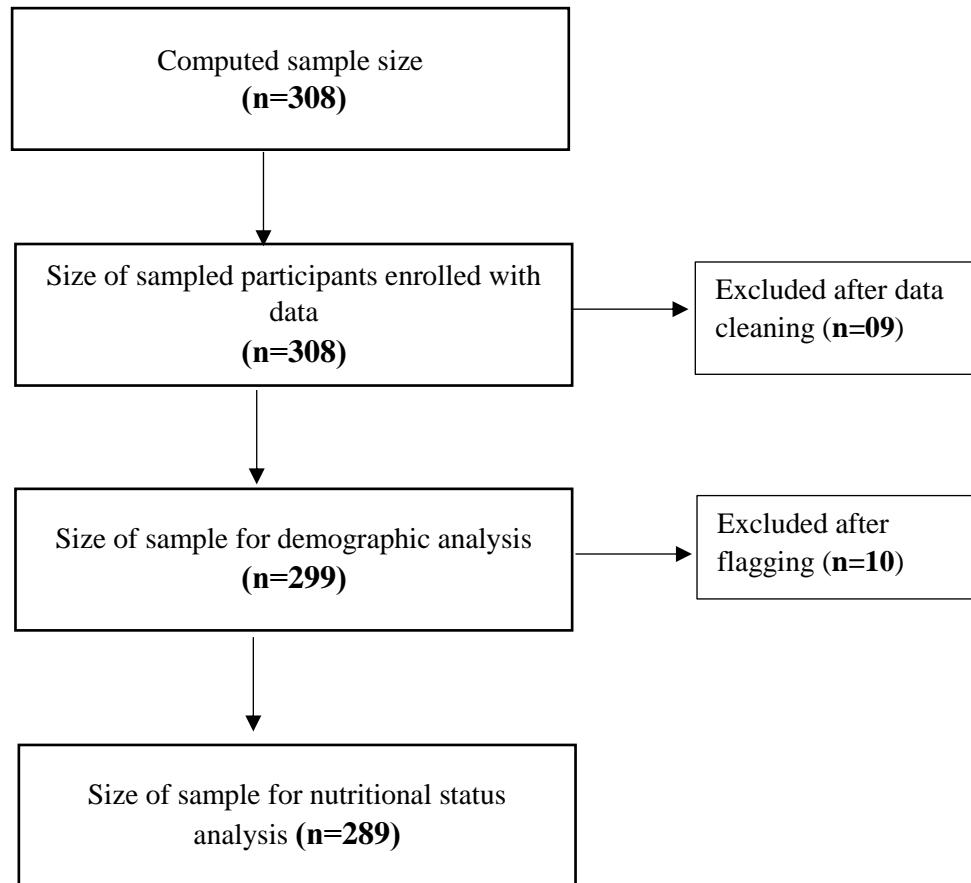


Figure 3: Exclusion and resultant sample size flow chart

3.7 Sample selection procedures

3.7.1 Quantitative sample selection

A multi-stage probability sampling approach was utilized with households as the primary sampling unit, enabling every household with children aged 24-59 months in a district to take part in the study. The multi-stage sampling was based on the hierarchy of political administrative units in Namutumba district. At the time of the study, Namutumba district had 9 Lower local governments (8 sub-counties and 1 Town councils), and 200 villages. For the case of this study, sub-counties/Town councils were stratified into 9 strata for representativeness and selection of villages, which were also referred to as clusters in the study. Four

villages per strata were enrolled for research using simple random sampling, making a total of 36 villages. A compilation of villages by sub-county was created, names of villages within each stratum were inscribed on separate pieces of paper, folded, placed in a box, and then four papers containing the names of villages were randomly selected. The villages chosen were those that took part in the study.

In every chosen village, a list of qualified households with children aged 24-59 months (sampling frame) was acquired from the corresponding Village Health Teams. Villages were numbered from Village1 (V1) to Village 36 (V36). 36 villages had a total of 4153 eligible households as seen in annex II. The households from their respective villages were numbered sequentially starting with V1H1 through to V36H4153 which enabled proportionate systematic random sampling and for easy identification of selected households during data collection.

Basing on the sample size of 308 where a household was the sampling unit, an interval of 13 was determined by dividing the total number of eligible households (4153) by the sample size (308). Research randomizer software facilitated Computer Assisted Systematic Random Sampling to choose households for the study. It initiated randomly with household V1H7, then V1H20, V1H33, and continued until 308 households were selected.

One eligible child was selected from each household but in cases where a household had two or more eligible children, one index child was randomly sampled. For every sampled child, a parent, preferably the mother, was

interviewed, and where both parents were missing, the designated caretaker was considered for interview.”

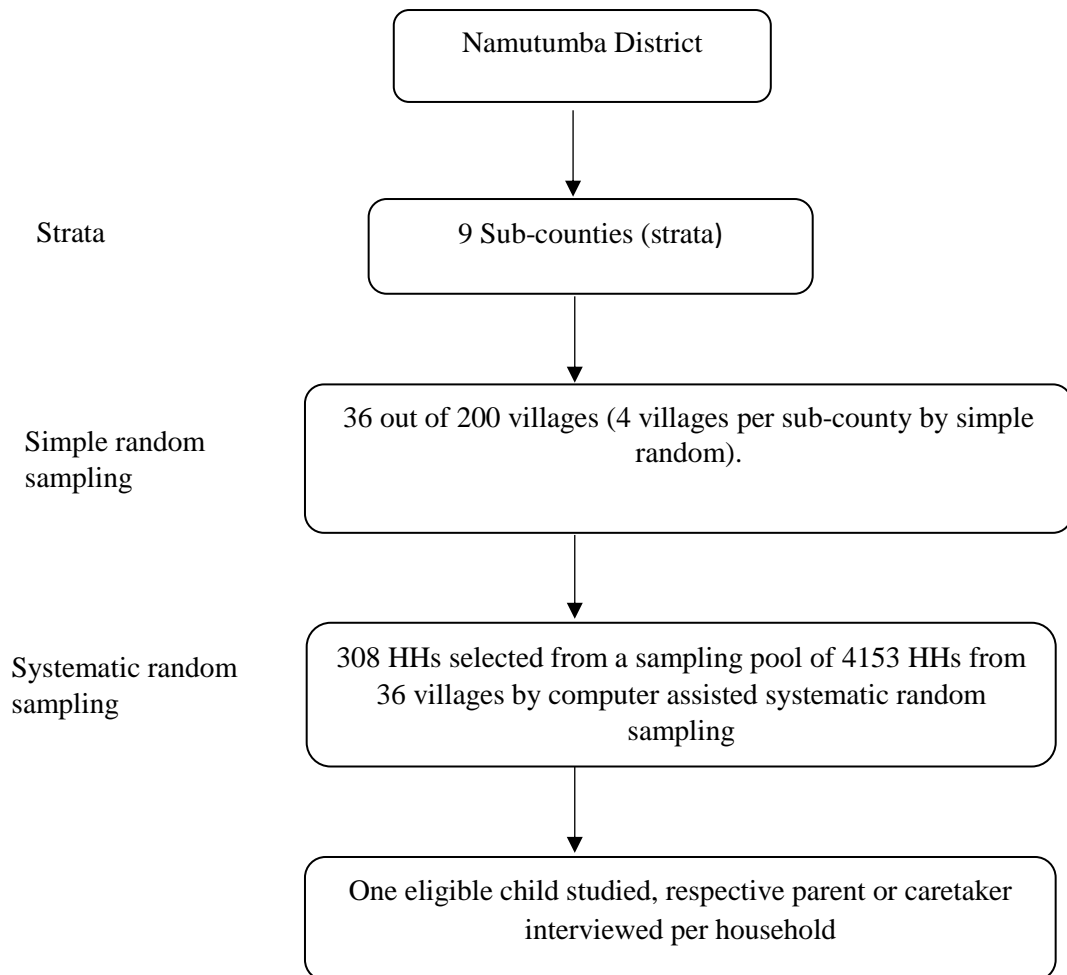


Figure 4: Flow chart for sample selection procedure

3.7.2 Qualitative sample selection

Men who were household heads were enrolled in seven focus group discussions. Household heads were purposively selected to enroll those from households of children who had participated in the study and were spending nighttime or daytime within the household. A total of 51 FGD participants from seven villages were enrolled to provide experiences and perspectives relating to household food security. Seven key informants included representatives of

DNCC, Health facility In-charges, district and sub-county leadership to give views about the food security situation among HHs and the state of nutrition among children in the district.

3.8 Data collection tools

A number of tools were used to collect data of which involved paper-based questionnaires (Annex III) to record data from respondents and Anthropometric assessments. The questionnaire comprised a number of sections which included; Socio-economic module (Adapted from Uganda National household survey 2016/2017), Water, Sanitation and Hygiene (WASH) module, Food security module which consisted Household Food Insecurity Access Scale (HFIAS) measurement (Coates, Swindale, & Bilinsky, 2007). It also consisted child health and nutrition module which included sections on access to food and nutrition interventions over the last 12 months, child Health and nutrition services and child nutritional assessment.

The anthropometric tools comprised weighing scales and height boards, utilized for measuring children's weight and height, respectively. Z-scores reference charts for Height for Age, Weight for Age, and Weight for Height were utilized to categorize and analyze the nutritional status of children.

Qualitative data collection was done using FGD and KI interview guides (Annex IV & V) which included a set of guiding questions on food security situation among HHs and nutrition among children in the district.

3.9 Data collection

3.9.1 Socio-demographic data

Collection of socio-demographic data of households was done using a structured questionnaires which were administered by interviewers to selected parents or caretakers of children. Data on WASH habits was collected following the same procedures from selected households.

3.9.2 Household Food Insecurity Data

Data on household food insecurity was evaluated using key questions from the main questionnaire, which included sections on ownership of household assets and livestock (Section B), household agricultural production, food stocks, and sources (Section C), in addition to the Household Food Insecurity Access Scale (HFIAS). The food security situation was measured using HFIAS, with an adapted HFIAS questionnaire employed to gather data regarding the household food security status (access). It was used to assess HFIAS scores which measured the severity of food insecurity within individual HH. It was also used to establish the prevalence of food insecure HHs among sampled HHs in the district. The information needed to compute this indicator was gathered utilizing the HFIAS module (Coates, Swindale & Bilinsky, 2007). The module considers 30 days recall period consisting questions of two kinds, which included nine "occurrence" and also nine "frequency of occurrence" questions. The respondents were first inquired if they experienced a given condition. If so experienced, then how many times in the last 30 days and the expected responses for each question were; Never coded 0, rarely coded 1, sometimes coded 2, or often coded 3. As a result,

responses were converted into both continuous (HFIAS score) and categorical (HFIAP) measure of food security.

By treating HFIAS as a continuous measure, each of the nine questions received scores ranging from zero to three, where 0 represented the lowest score (condition never occurred, hence no occurrence rate) and 3 indicated the greatest frequency of occurrence (condition was frequently experienced). The sum of scores for all condition in a particular HH was attained. The entire HFIAS score ranged from zero to twenty seven, showing the grade of food insecurity (access) within a HH. As a categorical variable using HFIAP, HHs were classified into food secure, mild, moderate, or severe food insecure based on the number of households that experienced occurrence and their rate of food insecurity conditions.

3.9.3 Anthropometry of children

Measurements of each child's weight (kg) and height (cm) were taken and recorded not less than thrice and the average figures were considered for the final measure. Thereafter, their measurements were compared to WHO HFA, WFA and WFH Z-score reference charts which helped to determine the nutritional status of children which included stunting, underweight and wasting.

3.9.4 Focus Group Discussion and Key Informant interviews

The focus group discussions (FGDs) and key informant (KIs) interview guides were employed to collect qualitative data for the research, which was of a descriptive nature. A collection of inquiries regarding HH food security and nutrition in children, compiled in interview guides, was presented to

respondents, and a moderated discussion produced insights. Responses were recorded in a book as well as on an Android phone.

3.10 Study variables

The research analyzed both independent and dependent variables. The independent variable of household food security status was evaluated using the Household Food Insecurity Access Scale, which measured access as a key dimension of household food security. Four classifications of food security levels were examined to group households as food secure, mildly insecure, moderately insecure, or severely insecure. Conversely, the study's dependent variable was the children's nutritional status, which was evaluated through anthropometry, involving the measurement of height and weight, along with the determination of each child's age and sex. The primary objective was to determine the extent of stunting, wasting, underweight, overweight, and obesity in the children involved in the study.

3.11 Quality assurance and control

3.11.1 Training of research assistants

Team of study assistants were purposively selected from among health professionals in the district who had prior knowledge on nutrition and this was done to minimize on errors during data collection. Specifically, they included nutritionists and health workers who were trained for a period of two days. The training was done to orient the data collection teams and strengthen on their knowledge and skills on conducting interviews and taking anthropometry of children. This also enabled them to get familiar and hands on experience with

the paper based questionnaire and equipment that were employed during the course of the exercise.

3.11.2 Pre-testing

The questionnaire and equipment were pre-tested for one day in one of the villages among which it was not enrolled in the study in the district. The intention of this exercise was to identify and rectify any possible mistakes that might have been made during the structuring of the questionnaire. It was also to ensure validity and reliability of the results of the study.

3.11.3 Field editing of data

To enable editing of data in the field, interviewers used pencils and rubbers whenever the need arose and also minimized the risk of data from being unclear.

3.11.4 Missing data

Codes and contacts of respondents from respective households were kept with confidentiality in cases of any missing data in a given questionnaire, such respondents were contacted or revisited for clarity.

3.12 Data management

Questionnaires (308) that were filled every close of business of each day during field exercises, were scrutinized for completeness, meeting the inclusion and exclusion criteria especially children and any other possible error. They were coded before cleaning and 299 questionnaires met the criteria and were analyzed.

3.13 Data analysis

3.13.1 Household and caregiver characteristics

STATA version 16.1 (StatCorp, College Station, TX, USA) and Microsoft Excel 365 version 2401 (Microsoft Corp., Redmond, Washington, USA) were employed to analyze HH and caretaker features. These software enabled to generate and express data in form of frequencies, percentages, means (with corresponding standard deviations) and ranges which were used to summarize the baseline household, caregiver, and child characteristics.

3.13.2 Household Food Security Status

The HFIAS score was calculated as a continuous metric to assess the level of food insecurity in a household. The individual family score was calculated by summing the codes for each question regarding the level of food insecurity experienced, with these codes ranging from 0 to 3. The overall score for a HH varied between 0-27. A total of 27 was the highest for a household where answers to all 9 frequency of occurrence questions were frequently given and each marked with 3. Consequently, 0 represented the lowest score for a HH in cases where answers to all 9 occurrence questions were No, and all frequency of occurrence questions were omitted, resulting in a code of 0. The HH with higher result, experienced food insecurity to a great extent and vice versa.

Four grades of food insecurity were used to describe households which included:

- (i) Food secure households of which did not experience any circumstance related to food shortage or they rarely worried about food access;

- (ii) Mildly food insecure households which sometimes or often worried about not having sufficient food, and/or they could not eat foods of their preferences, and/or ate undesired regular repetitive diets and/or hardly ate any food they did not want. Nevertheless they did not reduce its amount and never experienced any of the extreme situations of food insecurity (food stock out, missing supper, or starving the whole day and night);
- (iii) Moderately food insecure households which regularly sacrificed food values, ate repetitive diets or occasionally or frequently ate unwanted foods, and/or had hardly or sometimes begun to reduce on the amount by cutting down the portion sizes or frequency of meals, However, they did not encounter any of the serious states of food insecurity and;
- (iv) Severely food insecure households, these had qualified to reduced portions or frequency of meals regularly, and/or experienced any of the three extreme situations (food stock outs, missing supper, or starved a whole day and night), even as infrequently as rarely. Therefore, a HH that experienced one of the three extreme circumstances even once in the last four weeks was regarded severely food insecure.

HHs were classified according to the intensity of food insecurity as they indicated agreement with severe conditions and/or frequently encountered HFIA scenarios. The HFIA category variable was calculated for each household and assigned a code corresponding to its specific food insecurity (access) category. Before categorization, the food security condition rate was recorded as either 0, indicating that the frequency of occurrence question was omitted because the household had not encountered such a condition, or 1 = Rarely (when a

household experienced once or twice in the last 30 days), or 2 = Sometimes (three to ten times in the last 30 days) or 3 = Often (above ten times in the last 30 days). This was performed for all instances where the response to the related occurrence query was "No, or Yes accordingly"

The food insecurity status was serially classified into four categories basing on their extreme reply. Food Insecurity Access category of individual household was calculated and classified basing on the following responses to the food insecurity (access) conditions as below;

HFIA category 1 (food secure) if [(Q1a=0 or Q1a=1) and Q2=0 and Q3=0 and Q4=0 and Q5=0 and Q6=0 and Q7=0 and Q8=0 and Q9=0].

HFIA category 2 (Mildly Food Insecure Access) if [(Q1a=2 or Q1a=3 or Q2a=1 or Q2a=2 or Q2a=3 or Q3a=1 or Q4a=1) and Q5=0 and Q6=0 and Q7=0 and Q8=0 and Q9=0].

HFIA category 3 (Moderately Food Insecure Access) if [(Q3a=2 or Q3a=3 or Q4a=2 or Q4a=3 or Q5a=1 or Q5a=2 or Q6a=1 or Q6a=2) and Q7=0 and Q8=0 and Q9=0].

HFIA category 4 (Severely Food Insecure Access) if [Q5a=3 or Q6a=3 or Q7a=1 or Q7a=2 or Q7a=3 or Q8a=1 or Q8a=2 or Q8a=3 or Q9a=1 or Q9a=2 or Q9a=3].

Ultimately, as per Chakona and Shackleton (2018), households were divided into four categories of food security status based on their overall scores, which included food secure (HFIA score = 0-1), mildly food insecure (HFIA score = 2-7), moderately food insecure (HFIA score = 8-11), and severely food insecure

(HFIAS score = 12-27). In this criterion, the number of HHs within each food security category was computed and divided by the sum total of households in the sample, and later expressed as a percentage. Therefore, the Household Food Insecurity Access Prevalence (HFIAP) status as a categorical measure was employed to determine the prevalence of food scarcity (access) among HHs in the district.

Analysis of Variance (ANOVA) was used to establish mean differences in HFIAS scores across different socio-demographic characteristics. This was only applicable for comparisons of HFIAS scores of variables which had three groups and student t-test was applied to some variables with two groups for example sex (male vs female).

3.13.3 Household food security according to the three domains of HFIAS

An analysis was conducted to determine HHs that exhibited at least a behavior in all categories indicated in the HFIAS, namely, anxiety and uncertainty, inadequate quality of food, and insufficient food intake with resulting substantial impact. This classification indicated the seriousness of hunger and deep understanding of the perceptions of respondents about their susceptibility or worry and the new practices to deal with food insecurity.

Categories of HH food insecurity as per the domains included;

- (i) Anxiety and uncertainty where HHs were categorized for any member who was worried about their HH not having enough food
- (ii) Insufficient quality where HHs were classified for their members who ate kind of un-preferred food of limited variety and of undesirable choice due to shortage of livelihood sources.

(iii) Insufficient food intake and its physical consequences where HHs whose members ate smaller and fewer meals, at times the HH lacked food of any kind to eat, some members went to bed at night without eating anything and others went starved a whole day and night.

Households that experienced any condition of any gravity in all domains was computed as percentage of households which responded “Yes” to any of the conditions in a specific domain divided by total HHs that responded to such conditions.

3.13.4 Factors associated with severe food insecurity among households

To assess factors associated with severe food insecurity among households of children 24-59 months, crude and adjusted prevalence rate ratios (PRR) were computed via multi-level mixed effects generalized linear models using family (Poisson) and link (Log) at the 95% confidence interval. The multi-level model was chosen due to presence of clustering at the sub-county level (intra-class correlation coefficient=0.104), meaning that there were likely significant variations in food security across different sub-counties in the district but not within sub counties themselves. All covariates with a $p < 0.2$ at bivariate level were considered candidates for the multivariable model.

3.13.5 Nutritional status of children aged 24-59 months

To evaluate the nutritional status of children aged 24-59 months, three nutrition indices were employed, which included Weight for Height Z scores to measure wasting/acute malnutrition, Weight for Age Z scores to evaluate underweight, and Height for Age to assess stunting. Cut-off values were determined according

to the WHO reference standards (WHO, 2017). Scores were calculated employing the WHO Anthro software version 3.2.2.

Table 1: Z-scores reference cut-offs for child nutritional status

Nutritional status	Indicator	Z-score cut-off value (SD of the median)
Obese	Weight for height	>3 SD
Overweight	Weight for height	>2 SD & ≤3 SD
Moderate underweight	Weight for age	<-2 SD & ≥-3 SD
Severe underweight	Weight for age	<-3 SD
Moderate acute malnutrition	Weight for height	≤-2 SD & ≥-3 SD
Severe acute malnutrition	Weight for height	<- 3 SD or bilateral pitting oedema
Moderate stunted (moderate chronic malnutrition)	Height for age	≤-2 SD & ≥-3 SD
Severe stunted (severe chronic malnutrition)	Height for age	<-3 SD
Moderate wasted	Weight for height	≤-2 SD & ≥-3 SD
Severe wasted	Weight for height	<-3 SD

To determine the prevalence of children's nutritional status, the total number of children in each category, such as normal, mild, moderate, and severe, was calculated and divided by the overall sample of children in the study, then expressed as a percentage. The prevalence of malnutrition was also computed for each age group category and results presented on a bar graph.

3.13.6 Factors associated with malnutrition among children

Factors related to nutritional status were assessed solely in stunted children, as few participants in the study were classified as wasted or underweight. To evaluate factors linked to stunting in children, both crude and adjusted prevalence rate ratios (PRR) were calculated using multi-level mixed effects

generalized linear models, applying family (Poisson) and link (Log) at the 95% confidence interval. The multi-level model was chosen due to presence of clustering at the sub-county level (intra-class correlation coefficient=0.104), meaning that there were likely significant variations in stunting across different sub-counties in the district but not within sub counties themselves. All covariates with a $p < 0.2$ were considered candidates for the multivariable model.

3.13.7 Association between Household food security and nutritional status

To evaluate the relationship between household food security and nutritional status, simple and multiple linear regression were utilized with HFIAS scores as the independent variable and the Z scores for various nutritional status indicators (weight for height, weight for age, and height for age) as the dependent variables/outcomes. The various linear regression models were modified for the age and sex of the child. P-values below 0.05 were regarded as statistically significant in all analyses.

3.13.8 Qualitative data analysis

Audio data recordings were transcribed verbatim. Transcripts within the local language were translated into English. The steps outlined by Braun and Clarke (2006) were utilized for thematic analysis. This sought to identify, analyze, and describe patterns and contexts that characterize experiences, views, and perspectives of participants concerning the dynamics of household food insecurity related to childhood nutrition and wellbeing. Manual coding was used in the coding of transcripts and in identifying emerging themes from the data. Main themes and subthemes, along with their meaning units, were

derived from the data and reported with anonymised excerpts from participants.

The qualitative data analysis process involved the following:

- (i) Familiarisation with the transcripts: this involved reading and working through the transcripts multiple times to systematically capture thoughts, ideas, comments and picking relevant lines that will be marked or highlighted to inform the next stage of generating codes.
- (ii) Generating initial codes: after familiarisation with data transcripts, it was scanned through to take notes on content and items of interest within the transcripts. These were highlighted about practices, beliefs, opinions, and perspectives using respective colour codes. Codes were manually generated under each item. Each code was sufficiently defined and well-demarcated to avoid overlap with other codes. Excerpts extracted from the data were collated with respective codes at the end of the coding process.
- (iii) Searching for themes: this stage involved examining collated data extracts and codes to identify potential themes that would provide meaning to the data and are aligned with the research objective. The themes were constructed by mapping, critically analysing, and comparing how the different codes relate. The appropriateness of theme labels was verified with the engagement of my supervisor.
- (iv) Reviewing themes: this involved revisiting the coded data to assess and ensure it adequately supported the assigned codes and respective themes. Coherence of the data extracts under each code and theme

was assessed, as well as broadness and diversity of each assigned theme so as to ensure the themes and codes were distinctly defined. This stage was repeated until a satisfactory set was achieved and agreed upon.

- (v) Defining and naming of themes: upon reviewing themes and updating the theoretical map, a definition and narrative description for each theme were created in line with the objective of the study. During this stage, data extracts were reviewed to ensure the most appropriate were selected to respectively represent associated themes while describing findings at the write-up stage.

3.14 Ethical considerations

Approval for ethical clearance to carry out the study in Namutumba district was granted by an accredited institutional review board (IRB) of the Mbale Regional Referral Hospital Research and Ethics Committee under reference number UG-REC-011. The study was subsequently authorized and recorded by the Uganda National Council for Science and Technology under registration number HS2088ES. The District Health Officer approved the request to carry out research in the district. Consent was obtained from each participant prior to starting the interview. Research assistants experienced in managing medical information were hired in order to maintain the confidentiality of respondents' data. Furthermore, participants were given anonymous codes instead of names to enhance confidentiality.

CHAPTER FOUR: RESULTS

4.1 Household and caregiver characteristics

This study analyzed data of 299 children aged 24-59 months who met the eligibility criteria, after excluding those who were above and below the target age group (n=9). Table 2 displays the characteristics of households and caregivers for children aged 24 to 59 months. Findings indicated that the average age of the household heads (HHHs) from whom the sample children were drawn was 40.5 years (SD: 11.1), ranging from 18 to 75 years. Most household heads were male (91.6%), married (89.3%), and had completed primary education (71.2%). On average, households had 6 members (mean \pm SD = 6.07 \pm 2.31) with a range of 2-15 HH members. On the other hand, almost all child caregivers were females (99.0%) with a mean age of 32.4 years (SD: 9.6) and a range of 15-65 years. Child caregivers mainly had their highest level of education as primary (78.3%).

Table 2: Household and Caregiver characteristics

Parameter	Frequency	Percentage
Household characteristics		
Age group of Household Heads (HHHs), years		
20 -35 years	114	38.13
36 -45 years	90	30.10
46 years and above	95	31.77
Sex of HHHs		
Male	274	91.64
Female	25	8.36
Marital status of HHHs		
Married	272	89.30
Not married	27	10.70
Education level of HHHs		
Primary or below	213	71.24
Secondary or above	86	28.76
Household wealth index		
Poorest (<25 th percentile)	75	25.17

Medium (25 th -75 th percentile)	151	50.67
Richest (> 75 th percentile)	72	24.16
Access to agricultural land		
Yes	282	94.31
No	17	5.69
No. of HH members who earn income		
None	98	32.78
One	154	51.51
Two or more	47	15.72
Availability of HH food stocks		
Yes	110	36.79
No	189	63.21
HH hand washing point		
Observed	133	44.48
Not observed within yard/not permitted to see	166	55.52
HH drinking water treatment		
Yes	234	78.26
No	65	21.74
Caregiver characteristics		
Caregiver Sex		
Male	3	1.00
Female	296	99.00
Education level of caregiver		
Primary Level	234	78.26
Ordinary Level or Above	65	21.74
Caregiver relationship with child		
Mother or Father	261	87.29
Other relative	38	12.71

All data in the table are presented as frequencies and percentages unless otherwise specified. HHH=household head; HH=household; SD=standard deviation

4.2 Child characteristics

Results presented showed the average age for children in the study sample was 40.9 months (SD: 10.8; Range 24-59 months) with a slight female predominance (53.5%). The majority (44.9%) of children had been immunized with their cards present during the interviews while 15.7 % were not immunized according to information got from the care givers. Findings indicated that nearly three-quarters (75.6%) of the children experienced at least one illness two weeks prior to the study interview date, as shown in Table 3.

Table 3: Characteristics of sampled children 24-59 months

Parameter	Frequency (n=299)	Percentage
Child sex		
Male	138	46.15
Female	161	53.85
Immunization status		
Yes, with a card	135	44.97
Yes, without a card	117	39.26
No/don't know	47	15.77
Child morbidity in the last 2 weeks		
Yes, one illness	226	75.59
Yes, two or more illnesses	35	11.71
No or don't know	38	12.71

4.3 Prevalence of household food insecurity

According to the Household Food Insecurity Access Scale (HFIAS), the average HFIAS score among all households was 12.79 (SD: 5.47; Range 0-26) from a maximum score of 27. In total, 99% of households experienced food insecurity, where the findings showed further that a significant number of households faced severe food insecurity (n=180, 60.2%), while only a minimal number were food secure (n=3, 1%), as seen in Table 4.

Table 4: Status of food security among households based on HFIAS

Food security category (HFIAS score)	Frequency (n=299)	Prevalence (%)
Food secure	3	1.00
Mildly Food Insecure	8	2.68
Moderately Food Insecure	108	36.12
Severely Food Insecure	180	60.20

4.4 Household food security according to the three domains of HFIAS

The findings in figure 5 indicated that 90% of the households felt anxiety and uncertainty about their household and food supply in the 30 days leading to the

interview. Moreover, more than 95% of the households were eating food of inadequate quality, which was undesirable and lacked diversity. Additionally, 92% of the households were facing shortage of food and dealing with the associated physical consequences.

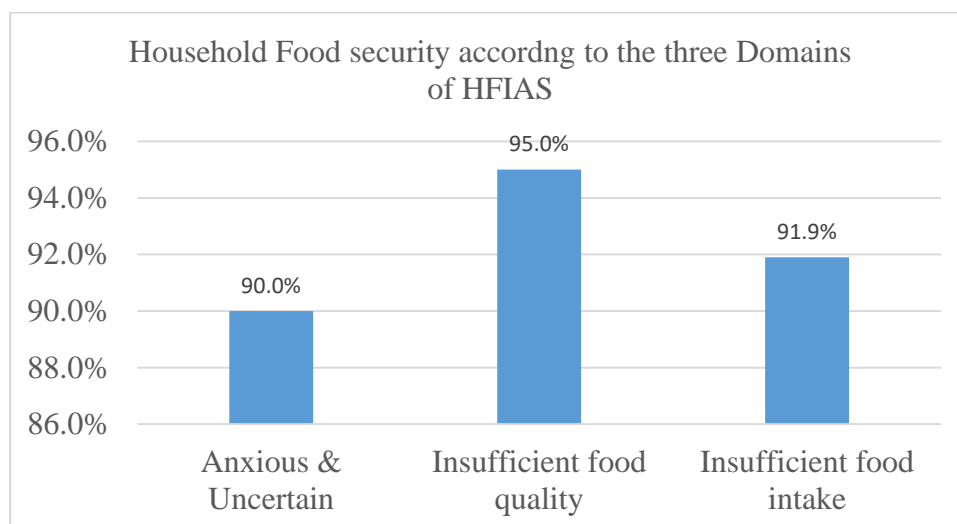


Figure 5: Household food security according to the 3 domains HFIAS

4.5 Mean differences of food insecurity by socio-demographic factors

Table 5 shows mean differences across all variables with significant mean differences in household food insecurity noted among factors which included; low household wealth index, lack of access to agricultural land (p-value=0.008), lack of household food stocks (p-value <0.001) and not treating household drinking water (p-value=0.003). However, this analysis did not bring any difference in the interpretation of results illustrated in table 6 below.

Table 5: Mean differences of food insecurity by socio-demographic factors

Parameter	HFIAS Scores Mean (SD)	P value [†]
Household characteristics		
Age group of HHH, years		
20 -35 years	12.675 (5.69)	0.968
36 -45 years	12.622 (4.97)	
46 years and above	13.115 (5.71)	
Sex of HHH		

Male	12.828 (5.43)	0.761
Female	12.480 (6.02)	
Marital status of HHH		
Married	12.767 (5.48)	0.774
Not married	13.062 (5.54)	
Education level of HHH		
Primary or below	13.098 (5.43)	0.137
Secondary or above	12.058 (5.54)	
Household wealth index[#]		
Poorest (<25 th percentile)	14.573 (5.39)	0.002*
Medium (25 th -75 th percentile)	12.549 (5.43)	
Highest (> 75 th percentile)	11.458 (5.28)	
Access to agricultural land		
Yes	12.592 (5.46)	0.008*
No	16.235 (4.68)	
No. of HH members who earn income		
None	12.969 (5.44)	0.986
One	12.896 (5.66)	
Two or more	12.127 (4.95)	
Availability of HH food stocks		
Yes	10.990 (5.34)	0.001*
No	13.851 (5.28)	
HH hand washing point		
Observed	12.451 (5.35)	0.326
Not observed within yard/not permitted to see	13.078 (5.58)	
HH drinking water treatment		
Yes	12.311 (5.66)	0.003*
No	14.553 (4.34)	
Caregiver characteristics		
Caregiver Sex		
Male	12.797 (5.47)	0.949
Female	13.000 (7.00)	
Education level of caregiver		
Primary Level	13.025 (5.61)	0.175
Ordinary Level or Above	11.984 (4.89)	
Caregiver relationship with child		
Mother or Father	12.911 (5.49)	0.3528
Other relative	12.026 (5.41)	

[†]*P values for comparisons across three groups were obtained by one-way ANOVA and those for two groups were obtained by student t-test.*

ANOVA p-values were adjusted for multiple group comparisons to avoid inflated type I error rate by using Bonferroni adjustment.

4.6 Factors associated with severe food insecurity among households

Since most of the households were severely food insecure, further analysis using both bivariable and multivariable models was conducted to understand the key factors associated with this indicator.

At bivariate analysis, results showed that households with a household head possessing at least a secondary level qualification (Crude PRR: 0.73; 95% C.I: 0.57, 0.93; $p=0.011$), those within the medium (Crude PRR: 0.78; 95% C.I: 0.65, 0.95; $p=0.014$) or highest (Crude PRR: 0.63; 95% C.I: 0.47, 0.83; $p=0.001$) wealth groups, those with one household member earning an income (Crude PRR: 0.82; 95% C.I: 0.68, 0.99; $p=0.045$) and those which treated drinking water (Crude PRR: 0.38; 95% C.I: 0.16, 0.65; $p<0.001$) were less likely to be severely food insecure compared to their respective counterparts. On the contrary, households without access to agricultural land (Crude PRR: 1.50; 95% C.I: 1.23, 1.84; $p<0.001$) and those without food stocks (Crude PRR: 1.69; 95% C.I: 1.33, 2.15; $p<0.001$) were more likely to be severely food insecure (Table 6).

In the multivariable model (Table 6), every covariate with a $p<0.2$ in the bivariate model was viewed as a candidate for the multivariable analysis. Findings indicated a direct relationship between household size and food insecurity, with each extra household member leading to a 4% rise in the rate of severe food insecurity (Adjusted PRR: 1.04; 95% C.I: 1.01, 1.08; $p=0.005$). A positive link was found between severe food insecurity and inadequate access to agricultural land (Adjusted PRR: 1.26; 95% C.I: 1.07, 1.49; $p=0.005$) as well as insufficient household food reserves (Adjusted PRR: 1.52; 95% C.I: 1.20, 1.92; $p<0.001$). Conversely, households in the highest wealth category experienced a 29% lower rate of severe food insecurity than those in the lowest wealth category (Adjusted PRR: 0.71; 95% C.I: 0.52, 0.96, $p=0.027$). No caregiver characteristics were linked to household food insecurity.

Table 6: Factors associated with severe food insecurity

Household characteristics	Crude PRR (95% C.I)	p-value	Adjusted PRR (95% C.I)	p-value
Age group of HHH, years				
20 -35 years	1		1	
36 -45 years	1.07 (0.85, 1.34)	0.530	1.24 (0.71, 1.96)	0.621
46 years and above	1.05 (0.84, 1.32)	0.643	0.85 (0.63, 1.49)	0.092
Sex of HHH				
Male	1		1	
Female	0.71 (0.45, 1.12)	0.144	0.88 (0.29, 2.62)	0.821
Marital status of HHH				
Married	1		1	
Not married	0.87 (0.61, 1.22)	0.423	1.12 (0.53, 1.38)	0.711
Education level of HHH				
Primary or below	1		1	
Secondary or above	0.73 (0.57, 0.93)	0.011*	0.81 (0.60, 1.08)	0.164
Household size, members	1.02 (0.99, 1.07)	0.133	1.04 (1.01, 1.08)	0.005*
Household wealth index				
Poorest (<25 th percentile)	1		1	
Medium (25 th -75 th percentile)	0.78 (0.65, 0.95)	0.014*	0.83 (0.64, 1.08)	0.176
Highest (> 75 th percentile)	0.63 (0.47, 0.83)	0.001*	0.71 (0.52, 0.96)	0.027*
Access to agricultural land				
Yes	1		1	
No	1.50 (1.23, 1.84)	<0.001*	1.26 (1.07, 1.49)	0.005*
No. of HH members who earn income				
None	1		1	
One	0.82 (0.68, 0.99)	0.045*	1.04 (0.87, 1.24)	0.614
Two or more	0.73 (0.53, 1.00)	0.052	0.95 (0.69, 1.29)	0.755
Availability of HH food stocks				
Yes	1		1	
No	1.69 (1.33, 2.15)	<0.001*	1.52 (1.20, 1.92)	<0.001*
HH hand washing point				
Observed	1		1	
Not observed within yard/not permitted to see	1.07 (0.88, 1.29)	0.470	1.30 (0.70, 1.56)	0.511
HH drinking water treatment				
No	1		1	
Yes	1.38 (1.16, 1.65)	<0.001*	1.29 (0.98, 1.71)	0.068
Caregiver characteristics				
Sex of caregiver				
Female	1		1	
Male	1.10 (0.49, 2.48)	0.802	1.71 (0.83, 2.80)	0.147
Education level of caregiver				
Primary Level	1		1	
Ordinary Level or Above	0.80 (0.62, 1.04)	0.107	0.88 (0.64, 1.20)	0.423

Age of caregiver, years	1.00 (0.99, 1.01)	0.978	083 (0.69, 1.52)	0.902
Caregiver relationship with child				
Parent	1		1	
Other relative	0.81 (0.58, 1.13)	0.216	1.38 (0.77, 2.08)	0.190

* Significant association; *HHH*=household head; *HH*=household; n=299.

4.7 The nutritional status of children 24-59 months

Table 7 shows the nutritional status of the sampled children among HHs. Overall, the prevalence of wasting, underweight and stunting were 3.1%, 9.7% and 28.0%. However, overweight and obesity contributed to 2.8%.

Table 7: Prevalence of malnutrition among children 24-59 months

Nutrition status category	Frequency	Percentage (%)
Wasting (WHZ) (n=289) †		
Normal	272	94.12
Moderate	7	2.42
Severe	2	0.69
<i>Moderate & Severe (GAM)</i>	9	3.11
Over-nutrition (WHZ) (n=289) †		
Overweight	6	2.08
Obese	2	0.69
Underweight (WAZ) (n=289)		
Normal	261	90.31
Moderate	20	6.92
Severe	8	2.77
<i>Moderate & Severe</i>	28	9.69
Stunting (HAZ) (n=289) †		
Normal	208	71.97
Moderate	51	17.65
Severe	30	10.38
<i>Moderate & Severe</i>	81	28.03

Z score cut offs: Severe < -3; Moderate < -2 and ≥ -3; Moderate & Severe < -2; Mild < -1 and ≥ -2; Normal < 2 and ≥ -1; Overweight < 3 and ≥ 2; Obese: ≥ 3; †Some children (n=10) excluded due to flagging; GAM=Global Acute Malnutrition.

4.8 Distribution of malnutrition among children by sex

Table 8 shows nutritional status of the sampled children stratified by sex and it was established that for all forms of malnutrition, boys demonstrated a higher

prevalence compared to girls (wasting: 3.7% vs 2.5%, underweight: 10.5% vs 8.9% and stunting: 31.5% vs 25.0%).

Table 8: Nutritional status of the sampled children stratified by sex

Nutrition status category	Boys, n (%) (n=133)	Girls, n (%) (n=156)
Wasting (WHZ) (n=289) †		
Normal	123 (92.48)	149 (95.51)
Moderate	5 (3.76)	2 (1.28)
Severe	0 (0.00)	2 (1.28)
<i>Moderate & Severe (GAM)</i>	<i>5 (3.76)</i>	<i>4 (2.56)</i>
Over-nutrition (WHZ) (n=289) †		
Overweight	4 (3.01)	2 (1.28)
Obese	1 (0.75)	1 (0.64)
Underweight (WAZ) (n=289) †		
Normal	119 (89.48)	142 (91.03)
Moderate	10 (7.52)	10 (6.41)
Severe	4 (3.01)	4 (2.56)
<i>Moderate & Severe</i>	<i>14 (10.53)</i>	<i>14 (8.97)</i>
Stunting (HAZ) (n=289) †		
Normal	91 (68.42)	117 (75.00)
Moderate	28 (21.05)	23 (14.74)
Severe	14 (10.53)	16 (10.26)
<i>Moderate & Severe</i>	<i>42 (31.58)</i>	<i>39 (25.00)</i>

Z score cut offs: Severe < -3; Moderate < -2 and ≥ -3; Moderate & Severe < -2; Mild < -1 and ≥ -2; Normal < 2 and ≥ -1; Overweight < 3 and ≥ 2; Obese: ≥ 3; †Some children (n=10) excluded due to flagging; #One child had missing data; GAM=Global Acute Malnutrition

4.9 Comparison of nutritional status of children by age group

Figure 6 shows the comparison of child nutritional status by age group. Findings indicate that the occurrence of wasting is greatest in both the youngest (24-35 months) and oldest children (48-59 months) at 3.2%. Underweight was also highest among the oldest age group of children (48-59 months) at 14.5% and lowest in the middle aged (36-47 months) at 4.2%. Stunting was highest among the youngest children (24-35 months) at 34.4%.

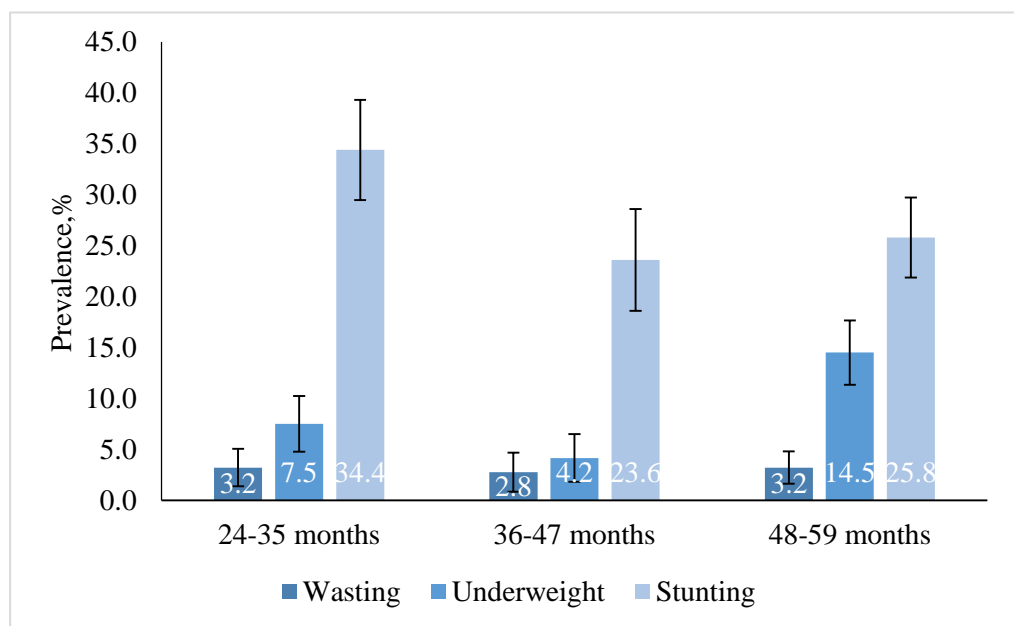


Figure 6: Prevalence of malnutrition among children 24-59 months by age-group

4.10 Factors associated with malnutrition among children 24-59 months

Due to the elevated stunting rates observed in the children of this study, additional analysis was performed to identify the main factors related to this measurement. Tables 9 and 10 present an analysis of various factors (household, caregiver, and child) associated with stunting. Results from the bivariate analysis did not find any household, caregiver, or child factors to be associated with stunting. The two variables (i.e. 'Number of household members who earn

income' and 'child morbidity') that met the $p < 0.2$ cut-off for multivariable analysis were modelled but were also not found significantly associated with stunting.

Table 9: Household and caregiver factors associated with stunting

Parameter	Crude PRR (95% C.I)	p- value	Adjusted PRR (95% C.I)	p- value
Household characteristics				
Age group of HHH, years				
20 -35 years	1		1	
36 -45 years	0.83 (0.52, 1.31)	0.440	0.74 (0.32, 1.07)	0.094
46 years & above	0.88 (0.57, 1.37)	0.591	1.12 (0.71, 1.83)	0.603
Sex of HHH				
Male	1		1	
Female	1.21 (0.66, 2.20)	0.533	1.27 (0.58, 1.85)	0.590
Marital status of HHH				
Married	1		1	
Not married	0.91 (0.48, 1.71)	0.774	2.13 (1.07, 3.20)	0.988
Education level of HHH				
Primary or below	1		1	
Secondary or above	1.00 (0.66, 1.50)	0.996	0.73 (0.49, 1.22)	0.781
Household size, members	1.03 (0.95, 1.12)	0.428	0.92 (0.74, 1.66)	0.083
Household wealth index				
Poorest (<25 th percentile)	1		1	
Medium (25 th - 75 th percentile)	1.10 (0.71, 1.73)	0.647	1.07 (0.42, 1.49)	0.633
Highest (> 75 th percentile)	0.82 (0.46, 1.45)	0.503	0.61 (0.46, 1.077)	0.081
Access to agricultural land				
Yes	1		1	
No	0.49 (0.13, 1.82)	0.292	0.33 (0.17, 1.48)	0.741
No. of HH members who earn income†				
None	1		1	
One	0.76 (0.52, 1.12)	0.178	0.73 (0.51, 1.05)	0.094
Two or more	0.55 (0.28, 1.05)	0.073	0.55 (0.28, 1.07)	0.081
Availability of HH food stocks				
Yes	1		1	
No	0.84 (0.57, 1.22)	0.369	0.62 (0.27, 1.53)	0.443
HH hand washing point				
Observed	1		1	
Not observed within yard/not permitted to see	0.82 (0.56, 1.18)	0.295	1.07 (0.83, 2.01)	0.907
HH drinking water treatment				
No	1		1	

Yes	1.01 (0.64, 1.59)	0.953	1.34 (0.93, 2.41)	0.741
Caregiver characteristics				
Sex of caregiver				
Female	1		1	
Male	1.19 (0.23, 5.98)	0.831	1.20 (0.90, 2.40)	0.991
Education level of caregiver				
Primary Level	1		1	
Ordinary Level or Above	0.74 (0.45, 1.24)	0.263	0.41 (0.23, 1.17)	0.087
Age of caregiver, years	0.99 (0.97, 1.01)	0.756	0.78 (0.43, 1.22)	0.950
Caregiver relationship with child				
Mother or Father	1		1	
Other relative	1.10 (0.64, 1.88)	0.715	1.07 (0.26, 1.83)	0.631

HHH= household head; HH= household; †Adjusted for child morbidity; Adjusted PRR adjusted for listed characteristics.

Table 10: Child factors associated with stunting

Parameter	Crude PRR (95% C.I)	p-value	Adjusted PRR (95% C.I)	p-value
Child sex				
Male	1		1	
Female	0.79 (0.54, 1.14)	0.216	0.91 (0.42, 1.60)	0.520
Age of child, months	0.99 (0.97, 1.01)	0.241	0.79 (0.82, 1.13)	0.088
Immunization status				
Yes, with card	1		1	
Yes, without card	0.91 (0.59, 1.38)	0.666	1.09 (0.63, 1.57)	0.706
No/don't know	1.24 (0.76, 2.02)	0.373	1.15 (0.80, 2.34)	0.567
Child morbidity in last 2 weeks[†]				
Yes, one illness	1		1	
Yes, two or more illnesses	0.95 (0.54, 1.68)	0.882	1.03 (0.52, 2.04)	0.911
No or don't know	0.55 (0.26, 1.19)	0.133	0.55 (0.24, 1.25)	0.157

†Adjusted for “number of household members who earn income”.

4.11 Association of Household food security and child nutritional status

Table 11 displays both simple and multiple linear regression analysis for the relationship between HFIAS scores and various nutritional status indicators.

Results from simple linear regression showed a significant negative association of both WHZ scores ($\beta=-0.75$, $p=0.011$) and HAZ scores ($\beta=-0.38$, $p=0.035$)

with HFIAS scores. In the multiple linear regression models, after controlling for child sex and age, the findings continue to show a negative correlation of WHZ scores ($\beta=-0.81$, $p=0.007$) and HAZ ($\beta=-0.37$, $p=0.039$) with HFIAS scores, whereas WAZ scores had no significant relationship with HFIAS scores.

Table 11: Association of household food security and nutritional status

HFIAS scores	Nutrition status indicators		
	WHZ scores	WAZ scores	HAZ scores
Crude β (95% C.I), p-value	-0.75 (-1.32, -0.87), p=0.011	-0.04 (-0.57, 0.49) p=0.885	-0.38 (-0.73, -0.02) p=0.035
Adjusted β (95% C.I), p-values [†]	-0.81 (-1.12, -0.92) p=0.007	0.001 (-0.54, 0.54) p=0.998	-0.37 (-0.73, -0.02) p=0.039

[†]Models adjusted for child sex and child age

4.12 Qualitative results of household food security and nutrition situation

4.12.1 Introduction

FGDs and KI interviews collected responses reflecting knowledge, perceptions and ideas of household heads and community resource persons about food security and nutrition situation among households and children in Namutumba district. Responses were analyzed into five thematic areas which included; 1) Perception about the state of food security among households; 2) Awareness about the causes of food insecurity among households; 3) Knowledge about nutrition situation among children; 4) knowledge about the causes of malnutrition among children and 5) Awareness about the link between household food security and nutritional status of children

4.12.2 Perception of the state of food security among Households

From the FGDs and key resource persons, food security was said to be a situation where members in a home are able to eat enough amount of food during every meal to their satisfaction. That one knows a household is food secure when children eat and have left over food to be eaten later in evening or morning.

“My opinion about a home with adequate food, is when children eat to their satisfaction and leave some food on the plate, left over is kept for them by their mother to eat afterwards when they comeback from playing and supper leftover is eaten by all my family members in the morning when they come back from digging as they wait for lunch.” (Household head, FGD3)

The situation of food security among the households surveyed was reported by all 7 FGDs and 7 KIs to be generally poor because their family members cannot eat at their wish whereby food servings are restricted in terms of portion sizes, numbers of meals and variety.

“I don’t have enough food for my family members because most times I just buy food and children are served small portions which they eat and complete all with no leftover.” (Household head, FGD1)

But only one of the respondents in FGD 6 from Nawantale Village, Kagulu sub-county confidently reported his household to be food secure because they have food in their gardens and stores, along with greens around their home. However, the majority of respondents in the same FGD expressed concerns about the lack

of adequate food in their stores and gardens, resulting in shortages concerning access and availability of food to their household members.

“For me at my home, we have all kinds of food and is enough for my people, I have food like dry maize and millet in my small store, and even I have gardens of both mature and young cassava and potatoes. I also have some beans and ground nuts in the house for eating at home.”

(Household head, FGD6)

4.12.3 Awareness about the causes of food insecurity among households

Household food insecurity was due to several reasons as reported by household heads and key informants, which included poor yield caused by pests, climate changes and natural calamities like hailstones and drought affecting crops, infertile soils, lack of knowledge and resources for modern farming methods. Depletion of food stocks due to sale of foods to earn a living and pay for medical bills was also reported as another reason for food insecurity among the households.

“I don’t have any other source of income whereby when my child is sick, I sale some or all of my harvested food to pay for transport and the required hospital costs and at the end I remain with nothing to feed my people at home.” (One of the Household head in FGD 1)

In addition, other factors mentioned influencing food security among households are: Large families requiring more food and limited land size due to land fragmentation as a result of increase in population as reported by all respondents (FGDs and KIs).

“We were born many boys in a family but we are all having wives and children but our father gave us very small pieces of land each which cannot be enough for us to grow various food crops.” (One of the Household head FGD4)

Poverty and low-income levels was noted by all FGDs and key informants being a major factor where household heads have insufficient income for hiring land for planting crops. They lack of money to buy seeds and agricultural inputs for modern farming. In addition, they noted high school fees leading to the sale and depletion of food stocks, selling household food or immature crops while still in the garden as a source of income to address various issues and this challenge was emphasized further by FGD 7 from Kiwanyi sub-county.

“Most of us this side we sale immature crops while still in the garden to get money to solve pressing needs and after harvest the money lender come and pick most of the harvested food and you either remain with nothing or very little for the family.” (One of the Household in FGD7)

Planting crops late off season or even missing the whole season due to frequent illnesses among children divert caretakers' time from gardening to caring for the sick.

“For example last season, me and my wife we missed planting crops early because we had two sick children who kept us in the hospital one after the other and we planted crops late and the harvest was very low due to sunshine of July.” (One of the Household head in FGD4)

Other mentioned factors included; theft of crops from gardens and livestock, crops destroyed by grazing animals and Poor storage facilities leading to food damage by weevils and rodents. Group 5 and 6 stressed the issue of witchcraft practices believed to cause low harvests and poor yielding seeds. FGD 2 from Budatu village, Nabweyo sub-county and FGD 7 from Mulama village, Kiwanyi sub-county reported that the yield of their crops were negatively affected by a weed known as ‘striger’ (in Lusoga is known as Kayongo). All respondent also reported that Gender based violence, diseases among productive members and loss of loved ones weaken and render such family members unproductive, thus increasing the possibility of food shortage in a household.

“Can you imagine, I have a small piece of land but I have a problem of a type of weed known as ‘Kayongo’ (Lusoga) which kills my crops and if I plant maize, I completely get nothing?” (One of the Household head in FGD2)

In summary, the factors affecting food security in these households are diverse and encompass issues related to land shortage and infertility, pests, poor farming methods, climate change, low income, high costs of medical care, lack of food storage facilities, high school fees, and cultural beliefs, among others. Addressing these factors is crucial to improving food security in these communities.

4.12.4 Knowledge about Nutritional status among children 24-59 months

The nutrition status of children (24-59 months) among the households surveyed was also reported to be generally poor by all FGDs and KIs. All participants stressed that due to the prevailing food insecurity among families, children often

go to sleep without eating a meal. They stated that due to inadequate food, children have only 1-2 meals, do not get satisfied as they eat and finish everything with no leftovers which they can eat whenever the need arises. They all noted that children have limited access to food, with a limited variety in their diet, as they are often fed only one type of food. They also added that as children grow older, the quality of attention and care to their feeding reduces, as they stop breastfeeding. They noted that the food situation being inadequate and the nutritional status of the children also being poor, has led to unhappiness among them.

“When children eat enough food, they spend the whole day happy but my children are always miserable because I do not have sufficient food for all of them that is why I say their feeding status is poor.” (One of the Household head from FGD5)

During discussions and interviews of household heads and key resource persons in the district, it was reported that the common forms of malnutrition among children include: they lack enough blood (Anaemia), convulsions, weight loss (wasting), body swelling (oedema), being too short for their age (stunting), worm infestations, weakness among children, diarrhoea and sickle cell disease.

“My wife left for me a child who is now 4 years but is disturbing me every time with sickness, the child is not growing well, weak and looks shorter than my neighbor’s child whom they were born in the same period.” (One of the Household head from FGD3)

These malnutrition indicators suggest a variety of nutritional deficiencies and health issues affecting the children, including anemia, underweight, stunting,

and various infections caused by malnutrition. Also other mentioned non-specific forms of malnutrition such as worm infestations, convulsions and sickle cell disease reveal knowledge gap among community members on presentations and identification of malnutrition but it reports existing high burden of a variety childhood illnesses in the community. Addressing these forms of malnutrition and improving knowledge on the manifestations of the condition is vital to improve the health and well-being of children in these households.

4.12.5 Knowledge about the causes of malnutrition among children

The dietary practices for children (24-59 months) in the households surveyed showed some common patterns, all respondents unanimously reported that children are fed only 1-2 meals a day, leading to limited food intake, the variety of foods in their diet is restricted, resulting in a lack of essential nutrients, children are given dilute porridge, which may not provide sufficient nutrition, the first meal of the day is served as late as 2 pm, which may not be timely for proper nourishment.

“In my home, children who stopped breastfeeding they get the first meal together with all other members at around 2pm.” (One of the Household head in FGD 1)

It was report that most households do not treat water for drinking and home use which poses a health risk leading to waterborne diseases which was also attributed to inconsistent availability of chlorine dispensers at all boreholes. It was also further noted that most households lack hand washing facilities and do not use soap when washing hands at critical times especially after visiting toilets/latrines, making it a challenge to maintain good hygiene practices. It was

further emphasized that children do not wash or their hands are not washed with soap after visiting pit latrines/ defecation, which can lead to hygiene-related diseases.

“In my home to be sincere, nobody cares about children washing hands after defecation and even I do not have a hand washing facility at my pit latrine.” (One of the Household head from FGD 6)

Lastly, it also noted that some households do not use mosquito nets, leaving them vulnerable to mosquito-borne illnesses.

In summary, the dietary practices for children in these households generally lack variety and are limited in both amount and frequency with poor WASH practices potentially impacting the children's overall nutrition and health. Improving dietary diversity, frequency, and hygiene practices can help address these concerns and enhance the nutritional well-being of the children.

4.12.6 An understanding of the association between Household food security and nutritional status of children 24-59 months

The responses from all group discussions and resource persons in the community highlighted the positive relationship between food security and the nutritional status of children. They defended their ideas by stating that food security ensures good feeding with a variety of foods leading to healthier children with improved blood levels. It was further explained that food security helps children eat their meals on time and prevent anemia.

“Adequate food in a Household make children to eat different types of foods and enable them to get enough blood and stay healthy.” (One of the Household head from FGD6)

That good feeding boosts children's immunity and prevents diseases which result from poor nutrition, that having enough food saves money that would otherwise be spent on treating sickness and thus increasing household resources. That it also contributes to children's proper growth and brain development as they are able to get all required foods.

“I saw it among my own children, the time I was feeding them well all of them were growing well and health but when the situation became hard for me, I lost my business and stopped buying milk for my children, the youngest (3 years now) started falling sick frequently.” (One of the Household head from FGD3)

That It allows children to settle at home reducing their need to wander around the neighborhood in search of food. Adequate food at home makes children happy and satisfied after eating. It was also elaborated that adequate food at home reduces gender-based violence and improves the care of children.

“The day I have food for lunch at home, all my children keep around but when I they don't see their mother preparing food most of them will not stay at home.” (One of the Household head from FGD1)

Poor feeding on the other hand, was reported to lead to frequent diseases among children which interrupts resources, productivity and concentration of family on sound food access and availability. Overall, these responses emphasized the

critical importance of both food and nutrition security in ensuring the health and well-being of children. Thus the effect on each other is interlinked and hence in a vicious cycle.

4.12.7 Awareness about accessible community interventions promoting food and nutrition security

In the community, respondents reported that there are limited food security and nutrition interventions directly accessible by households and that some of the available interventions include: community members helping each other by sharing seeds, potato vines, and cassava cuttings for planting, which promotes agricultural productivity and food security.

“When I see my neighbor or a friend with good breed of potato vines, I wait when they start harvesting then I tell my wife to go and request for us also to plant. That is the easiest way we get to help each other with good breed of crops.” (One of the Household head from FGD5)

In addition, that farmer groups receive training through schools to grow and consume micronutrient-rich foods aiming to improve nutrition. Lastly, that sensitization efforts are carried out to educate the community on good feeding practices and immunization services for children by health workers and VHTs.

“When health workers come to our village to immunize our children, we get chance and they teach us on how to feed our children well.” (One of the Household head from FGD2)

However, there are several limitations to these interventions: There is no comprehensive food security intervention covering the entire population, leaving

some vulnerable households without support. It was also reported that access to seeds from the government is limited to only those who are well-off and/or well-connected, disadvantaging others in need. They also noted that the availability of adequate health supplies for nutrition interventions is lacking, affecting the implementation and effectiveness of programs.

“Haaaaa, in our parish here, for me who is poor and not known by district leaders, I cannot get free seeds and even cassava cuttings, I have never got anything from government to boost my food production.” (One of the Household head from FGD7)

In summary, while there are some community-led initiatives and sensitization efforts in place, there is a need for more comprehensive, inclusive, well researched and evidence based interventions to address food security and nutrition challenges in this community effectively.

4.12.8 Household heads and key Informants recommendations to address food and nutrition insecurity

Responses above show that the community is aware about their food and nutrition security challenges and they suggested a number of interventions believed to improve the situation among their households which included: Conduct regular sensitization programs in the village on proper feeding practices for children, emphasizing dietary diversity and nutrition. Train farmers and village members on improved farming methods and sustainable agricultural practices with the support of agriculture officers. Provide resistant seeds, pesticides, and irrigation tools to enhance crop production and reduce losses due to pests and drought. Sensitize communities on food production and agricultural

practices through agricultural extension workers and Village Health Teams (VHTs).

“I wish if officers concerned with agriculture from the district always come and teach us on good ways of planting crops such that we increase on our harvests but we cultivate big portions and get small harvests.”
(One of the Household head from FGD3).

Government support in providing drought-resistant crops and promoting climate-resilient agriculture practices. Increase the supply of agricultural inputs such as seeds, fertilizers, and access to credit for hiring land to improve farming productivity. Improve access to farming tools such as hoes, oxen, and tractors at the community level to enhance agricultural productivity.

“I request government to supply us with seeds which take a short period to mature to avoid dry season, fertilizers because we have over used our land and now it is infertile.” *(One of the Household head from FGD2)*

Provide support and resources for poultry rearing, promoting animal protein intake and income generation for households.

Health workers should conduct home visits to identify malnourished children and provide food and cooking demonstrations to improve nutritional intake. Strengthen the capacity of village health workers to effectively screen and identify sick children, facilitating early intervention and treatment. Investigate the root causes of childhood illnesses and develop targeted interventions to address them.

“I suggest health workers to be moving from home to home teaching our wives on how to prepare and feed our children with good food because I have never seen such happening my village.” (One of the Household head from FGD6)

Strengthen By-laws and ordinances to promote the construction of pit latrines in every household, improving sanitation and reducing disease transmission. Increase the supply of medicines and medical supplies in health facilities to ensure prompt and adequate treatment of children's illnesses. Strengthen immunization activities to reduce the prevalence of preventable diseases and improve overall child health. Bring laboratory services closer to the community to facilitate early diagnosis and treatment of illnesses. Regularly sensitize communities on disease preventive measures to enhance health awareness and reduce the burden of illnesses.

“I appeal to our government to stock health facilities with enough medicines and testing kits for early treatment and prevention of severe illnesses among our children.” (One of the Household head from FGD4)

Putting these suggestions into action can enhance food security, nutrition, and the overall welfare of children in families, aiding in the disruption of the poverty and malnutrition cycle within the community.

CHAPTER FIVE: DISCUSSION

5.1 Food security situation of households with children (24-59 months)

The study established that almost all households in Namutumba district were facing a problem of Food insecurity (Access) at a prevalence of 99% and the highest proportion (60.2%) were severely food insecure. Households with severe food insecurity frequently had smaller meals or less frequent dining, and/or encountered at least once in the past four weeks (30 days) any of the three most critical issues like depleting food supplies, sleeping on an empty stomach, or enduring a full day and night without food.

These study results were far higher than the regional prevalence of household food insecurity (56%) of the population in Busoga region (UBOS, 2021). In addition, findings on severe food insecurity in the district were also extremely higher than the National prevalence of 11% (Atamanov et al., 2022). The results aligned with the views of key informants and FGDs (household heads), who indicated that the food security situation across the district was largely inadequate due to several factors, such as low yields from pests, extended drought, and the selling of food crops for income. Furthermore, majority of respondents added that they lacked food reserves in their stores and gardens, resulting in shortages concerning access and availability of food to their households.

Household members, including children 24 to 59 months in the district, faced uncertain and restricted access to sufficient, nutritious, and safe food (Zhou et al., 2019). As a result, these findings indicate that most household members did not consistently have physical and economic access to enough safe, nutritious

food that satisfied their dietary requirements and food preferences for a healthy and active life (Shaw, 2007). Therefore, children were at high risk of suffering from irreversible poor nutritional outcomes such as poor growth and development and have high chances of not reaching their full potential in adult life (Ghattas, 2014; UNICEF, 2018).

5.2 Household food security according to the three domains of HFIAS

Household food security was classified based on the three areas of HFIAS, which showed the intensity of food insecurity and contributed to a better understanding of respondents' views on food vulnerability or stress and their behavioral reactions to food insecurity. The study findings established that the highest percentage (95%) of household members had insufficient food quality whereby they consumed un-preferred kinds of food which lacked variety and not of their desired choice. This situation may heighten the likelihood of experiencing a dual burden of malnutrition (both under and over-nutrition) among family members, particularly children (Perez-Escamilla et al., 2018; Ghattas, 2014).

Additionally, a greater proportion (92%) of those surveyed indicated facing inadequate food consumption and its physical effects, leading to some individuals in the household consuming smaller and fewer meals, at times having no food at all, while others went to bed hungry, and some spent entire days and nights without any food. This situation predisposes them to high chances of wasting and stunting among household members (Thurstans et al., 2020; Perez-Escamilla et al., 2018; Ghattas, 2014). Finally, a significant percentage (nearly 90%) of household members felt anxious and uncertain about the food supply, with members concerned and unsure about having sufficient food.

Consequently, based on all the results regarding the three areas of HFIAS, a critical food insecurity condition is present among households in the district, with severe food insecurity prevailing. Such a situation exposes the population to adverse consequences of food insecurity such as continuous cycle of both poverty and malnutrition (Kohnet, 2025; Berroukche, 2024; Mutiah & Istiqomah, 2016; Joshi & Joshi, 2016).

5.3 Factors associated with severe household food insecurity

Among the multiple factors analyzed that could affect household food security, the study indicated a positive link between severe food insecurity and factors such as having a large household size, insufficient access to agricultural land, inadequate household food reserves, and a low wealth index. The study's results aligned with observations from several authors who noted, for instance, that the size of a household has a negative impact on its food security status (Agidew & Singh, 2018; Phami *et al.*, 2020; Joshi & Joshi, 2016; Mutiah & Istiqomah, 2017; Badake *et al.*, 2014; Gebre *et al.*, 2019; Nasir *et al.*, 2022; Pasder *et al.*, 2019).

Moreover, additional researchers reported similar results to this study regarding the impact of household income levels, highlighting that a higher wealth index facilitates economic access to sufficient nutritious and safe food for a healthy lifestyle (Bratspies, 2021; Gonzalez, 2014; Gebre, 2012; Nasir *et al.*, 2022; Agidew & Singh, 2018; Mutiah & Istiqomah, 2016; Joshi & Joshi, 2016). Namutumba is a rural district where land is a key resource for food production within households, and having sufficient land increases the

chances of better food supplies, thus enhancing household food security (Joshi & Joshi, 2016).

In comparison with findings from FGDs and KIs interviews on views about the factors that impact household food security concurred with all the four significant factors (household size, wealth index, access to agricultural land and food stocks). The FGDs and KIs, further revealed other factors which were noted to affect food security status in the district and these included; soil infertility, climate changes, poor farming methods, pests and household member(s) illnesses which lead to selling of food items to meet medical bills.

According to a number of authors (Grobler, 2016; Lutomia et al., 2019; Botreau & Cohen, 2020; Felker-Kantor & Wood, 2012; Botreau & Cohen, 2019; Akadiri, Nwaka & Jenkins, 2017), factors such as Age, gender, education level and Marital status of household heads are known to influence household food security however, the findings of the study revealed that they were not significant in impacting on household food security in the district.

5.4 The nutritional status of children 24-59 months

Under-nutrition in children aged 24-59 months in Namutumba district remains a challenge, and this study found a higher prevalence of acute malnutrition (wasting) at 3.1%, in comparison to the national average of 2.2%. The study area being a rural district, the findings were almost similar to results of UDHS 2022 where wasting was more pronounced in rural settings at a rate of 3.4% compared to 2.7% in urban settings (UBOS, 2023). Given the fact that the district was faced with high burden of food insecurity, overweight and obesity among children still

existed at rate of 2.08% and 0.69% respectively. This was most likely because food insecure households usually have scarce resources for food whereby, they prioritize less expensive foods which are less nutritious and high in calories which increase the risk of becoming overweight and obesity (WHO, 2017).

Among the study children, chronic malnutrition (stunting) was established at a prevalence of 28.0% almost similar to the national prevalence of 27.8% (UBOS, 2023). The results on stunting were consistent with the findings of Kuziga, Adoke and Wanyenze (2017) who established high level of stunting at 27.7% among under five in Namutumba district. This means that for over a period of five years despite several interventions, stunting levels have persistently remained high in the district exposing such children to adverse irreversible effects of malnutrition like poor cognitive ability and low productivity in adult life. Underweight among children was at a rate of 9.7% similar to the national prevalence of 9.8% (UBOS, 2023).

Across all forms of undernutrition, boys were more affected compared to girls (wasting at 3.8% vs 2.6%, Stunting at 31.6% versus 25.0% and underweight at 10.5% versus 9.0%). These results align with a study conducted by Thurstans and associates (2020) in South Asia, indicating that children below five experience a significant prevalence of under-nutrition, with boys being more vulnerable than girls. Although the exact contributors to this difference is idiopathic but probably is due to differences in both biological and social mechanisms between boys and girls. (Thurstans et al, 2020).

These findings about the existence of all forms malnutrition in the district concur with the opinions from KIIs and FGDs of household heads who stated that

various forms of under-nutrition were common among their children such as weight loss (wasting), body swelling (SAM with oedema) and short for age (stunting).

According to Sedigheh and Ovchinnikov (2018), given this high burden of malnutrition in the district, children face high morbidity rates whereby households sale food and livestock to pay for medical bills to treat their sick children. Childhood illnesses also limit time for parents to concentrate on garden work and deplete resources that could be used for adequate food production. This in turn therefore, escalates the level of poverty and food insecurity in the district (as reported by all KIs and household heads during FGDs).

5.5 Comparison of nutritional status of children by age group

The study established wasting being more prevalent among both the youngest (24-35 months) and the oldest children (48-59 months) at 3.2% among each age category and such children may present with medical complications which increase their chances of morbidity and deaths if not treated early (Sedigheh and Ovchinnikov, 2018). Underweight was seen highest at 14.5% among the oldest children 48-59 months and such children are most likely to experience negative consequences of poor growth and development such as delayed milestones (Fall & Kumaran, 2019; Semazzi & Kakungulu, 2020).

Lastly, stunting was worst seen among the youngest children 24-35 months and results are in contrary with the findings of Huong (2014) who did not observe a significant difference on stunting prevalence among age groups (24-35 months, 36-47 months and 48-59 months). Such children suffering from chronic malnutrition may result into attaining permanent negative effects and fail to

reach their potential in life such as poor education outcomes (Fall & Kumaran, 2019; Semazzi & Kakungulu, 2020). Consequently, all types of undernutrition are present in children aged 24-59 months in the district, likely resulting from insufficient dietary intake amid significant food insecurity in households (Ghattas, 2014).

In addition, as reported by KIs and household heads, childhood malnutrition is influenced by frequent illnesses and a number of factors such as poor access to health services, poor care by their mothers due to poor child spacing and compromised water, sanitation and hygiene practices.

5.6 Factors associated with malnutrition among children

Since high stunting rates among children in this study was established, both bivariate and multivariate analysis were conducted to understand the key factors associated but none of the factors (household, caregiver and child characteristics) was found to be significant with stunting. This indicates that malnutrition among children (24-59 months) is attributed to others exposures such as poor dietary practices and lack of access to quality health services. Other factors may include long term shocks and humanitarian crises (UNICEF, 2020). But findings from FGDs and KIIs discovered various factors associated with malnutrition among their children. They reported that, poor feeding practices where children (24-59 months) among their households are fed only on one to two meals a day and served with small portions of food which lacks variety in their diet without essential nutrients.

In addition, it was noted that children are also served with dilute porridge which may not provide sufficient nutrition, and the first meal of the day is served as

late as 2 pm, which is not timely for proper nourishment of a growing child thus affecting their nutritional status. Therefore, this calls for further research especially longitudinal cohort studies to enable establish exact factors that contribute to such high levels of malnutrition among such children in the district.

5.7 Association of Household food security and child nutritional status

The study's results showed a negative correlation between HFIAS scores and WHZ scores, indicating that a one-unit rise in food insecurity leads to a decrease of 0.81 SD in WHZ scores. This suggests that greater household food insecurity increases the risk of child wasting in those households. This aligned with the research done in Nepal in South Asia by Nepali, Simkhada & Davies (2020), which showed a significant positive link between food insecurity and wasting in children under five. This indicates that children lack adequate ongoing access to safe and nutritious food, restricting their intake of essential nutrients and leading to wasting.

A negative association was also established between HFIAS scores and HAZ scores where a very unit increase in food insecurity, reduces HAZ scores by 0.37 SD which means that the more food insecure the households are, the higher the chances of children from such households developing stunting. This resonates with a report by UNICEF (2018) which stated that household food security influences dietary intake of children in terms of quality and quantity of diets and thus known to have a strong influence on nutritional status of children. These results were also consistent with findings from discussions with household heads and KIs where they reported a strong relationship between household food security and nutritional status of their children.

Conversely, no link existed between household food insecurity and underweight in children, suggesting that food security by itself solely does not affect children's growth and development, but is also influenced by additional factors like inadequate child care practices, infections, and diseases typically stemming from insufficient access to safe water, sanitation, and quality health services (UNICEF, 2020). Consequently, tackling childhood under-nutrition necessitates a multisectoral strategy, with both nutrition-specific and sensitive interventions needing to be simultaneously enhanced throughout the entire district.

5.8 Strengths and Limitations of the study

The study had various Strengths which included; the study was cross-sectional in nature, which made it relatively quick and inexpensive to conduct. It involved a small sample size of 308 which enabled to attain high response rate of 100% (Wang & Cheng, 2020). The study also involved mixed methods (quantitative and qualitative) of data collection which enabled to acquire a wider view on the subject matter (Wasti *et al.*, 2022). HFIAS and WHO reference Z scores (WHZ, HAZ, and WAZ) are internationally recognized tools and techniques which were employed to produce reliable and valid results on household food security (access) and nutritional status of children, respectively (Gebreyesus *et al.*, 2015 & Corsi *et al.*, 2017). Adjusted prevalent rate ratio for multivariate analysis was employed to identify confounders related to food insecurity and children's nutritional status in the research

Nonetheless, the research encountered certain limitations, including the inability to determine cause-and-effect relationships between food insecurity and child malnutrition, as data was gathered at a single moment (Wang &

Cheng, 2020). The research was vulnerable to both recall and response biases where participants were requested to provide information on food insecurity situations from the past 30 days, and the results may have been influenced by memory constraints. Moreover, participants may not have accurately revealed their food insecurity status due to social desirability in expectation of advantages (Wang & Cheng, 2020).

The study provided a limited view of food insecurity (snapshot in time) because it did not track long term trends of food insecurity among households. It did not capture changes over time because data was collected once during a weeding period of the second season (October) where most households had limited food stocks (Gebreyesus *et al.*, 2015). Anthropometry could not tell which children were affected by external factors like infections which could impair growth even with adequate diet. In addition, lack of flat surfaces in the field for proper positioning of weighing scales and height boards might have affected accurate measurements of children's weight and height which might have affected the results (Corsi *et al.*, 2017).

CHAPTER SIX: CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion of the study

The study found out that almost all households in the district were food insecure with the majority facing the severe form of food insecurity. In addition, a positive relationship was revealed where a rise in household food insecurity increases the likelihood of both wasting and stunting among children. On the other hand, there was no significant association with underweight among children which implies that other factors such as ill health impact optimal growth and development of children.

Based on the aforementioned relationship and concerning levels of food insecurity in a district, children aged 24-59 months were experiencing various types of malnutrition (including under-nutrition and over-nutrition), with stunting being the most prevalent. Malnutrition in the area is probably linked to inadequate child feeding practices and prevalent childhood diseases. These issues possibly originate from poor child feeding practices, poor health services and inadequate WASH practices among caregivers. The prevalence of such malnutrition affects child growth and development hindering attainment of their maximum potential with increased risk of acquiring non communicable diseases later in life.

The research also identified four main socioeconomic factors that are likely to impact food insecurity in the district: household size, limited access to agricultural land, absence of household food reserves, and a low wealth index. Large Household size may be due to knowledge gap on child birth spacing

among parents which could be due to inadequate access to family planning services. Inadequate of access to agricultural land by households is likely to be as a result of land fragmentation as a consequence of population increase and inadequate implementation of policies that govern clan land. Limited household food stocks is probably as a result of low harvests as an effect of infertile soils, climate changes and due to poor farming methods. All these possibly are because of not supporting farmers with affordable farm inputs (fertilizers, improved seeds), modern farming techniques, inadequate trainings and supervision by extension workers and storage facilities. Low wealth index as characterized by poor housing/living conditions, limited access to assets, reduced access to social services especially health and education, poverty and inequality and increased risk to illnesses and poor nutrition. Probably is contributed by knowledge gap on income generation, dependence to government, limited access to credit and social safety nets resulting from lack of trainings on income generating activities, low coverage of livelihood government support programs like Parish Development model (PDM) and youth and women empowerment programs.

However, none of the factors (household, caregiver and child) was found to be associated with stunting implying it is most likely to be due to poor dietary intake resulting from food insecurity and poor caring practices.

If these significant levels of food insecurity and child under-nutrition are not tackled, the district will continue to experience negative consequences of malnutrition impacting children's growth and development, and the community will stay trapped in a continuous cycle of poverty.

6.2 Recommendations of the study

Basing on the findings of the study, the following recommendations were made;

There is need to sensitize and mobilize communities on block farming especially using clan land to avoid fragmentation

Empower households with climate smart agriculture to address challenges of climate changes for increased food production

Develop and enforce by-laws and ordinances to promote household food storage to maintain adequate food stocks by supporting every household to own a granary.

Strengthen interventions to prevent and treat under nutrition through increased access to and utilization of health and nutrition services.

Scale up family planning services to control household sizes to ensure maximum utilization of available limited household resources to ensure adequate food intake.

Mobilize communities into farmer groups, train them on income generating activities and enable access to affordable credit and social safety nets to improve on the wealth indicators among households.

Further research is recommended especially on longitudinal cohort studies to establish the causal factors of malnutrition among children in the district.

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ANNEXES

Annex I: Budget

Activities and Outputs	Amount (Ushs)	Time frame (2022)
1. Obtain Ethical Clearance	400,000	Jan-Feb
2. Training of research assistants	1,500,000	March
3. Pretesting and validation of data tools	1,000,000	March
4. Data collection	3,000,000	March
5. Data cleaning, coding and analysis	1,500,000	April
6. Reporting	200,000	May
7. Dissemination of study findings	1,000,000	June
8. Publication of study findings	500,000	June
Total	9,100,000	

Annex II: Eligible Households and the Sampling Interval

Village	No. Households	No. eligible households	Sample size	Interval
Village 1	213	97	308	13
Village 2	199	82		
Village 3	284	108		
Village 4	306	191		
Village 5	273	129		
Village 6	182	91		
Village 7	244	88		
Village 8	338	189		
Village 9	322	164		
Village 10	184	69		
Village 11	242	136		
Village 12	271	148		
Village 13	355	211		
Village 14	326	197		
Village 15	266	143		
Village 16	179	84		
Village 17	250	134		
Village 18	277	100		
Village 19	265	90		
Village 20	208	81		
Village 21	304	196		
Village 22	230	92		
Village 23	211	87		
Village 24	324	128		
Village 25	255	94		
Village 26	302	148		
Village 27	177	69		
Village 28	233	78		
Village 29	258	91		
Village 30	222	81		
Village 31	241	90		
Village 32	303	111		
Village 33	231	82		
Village 34	192	59		
Village 35	266	126		
Village 36	271	89		
Total	9204	4153		

Annex III: Questionnaire

Determinants of household food security and nutritional status of children aged 24-59 months questionnaire

Seeking consent from interviewee:

"My name is _____, I am part of a team of research assistants for an academic research project for a student (**Kizito Ndegeya**) of Kyambogo University offering Master of Science in Human nutrition. We are collecting data to enable him establish factors influencing household food security and nutritional status of children aged 24-59 months in Namutumba district. I would like to ask you some questions which will take about 30 minutes.

I will not record your name and any information that you provide is confidential but will be analyzed with information provided in the same way by others participating in this study so that the outcome will not be attributed to you or others who take part in the survey.

Your participation is voluntary, but we hope you will participate since your views are important.

Do you have any question? Give appropriate answer(s) in case of any question May I begin the interview now?" (If response is "yes", proceed with the interview; if response is "NO", go to the next Household)

GENERAL INFORMATION		
District:	Sub-county:	Parish:
Village:	Cluster ID:	Household ID:
Code of household head:	code of the interviewee if not household head:	Tel. no. of household head:
Date of Interview (dd/mm/yyyy):		

SOCIO-ECONOMIC MODULE (ADAPTED FROM UGANDA NATIONAL HOUSEHOLD SURVEY 2016/2017)

SECTION A: HOUSEHOLD INFORMATION		
A.1	What is the sex of the interviewee (preferably mother/caregiver of the study child)?	<input type="checkbox"/> Male <input type="checkbox"/> Female
A.2	What is the age of the interviewee?	_ _ _
A.3	What is the education level of the interviewee?	1=Primary, 2=O-level, 3=A level, 4=Tertiary, 5=University
A.4	What is the marital status if the interviewee?	1= Married 2=Not married

A.5	What is the relationship of the interviewee with the household head?	1=Head of household, 2=Wife/Husband, 3=Daughter/son, 4=Mother/Father, 5=Mother/Father in law 6=Sister/brother in law 7=Other
A.6	What is the relationship of the interviewee with the child under study?	1=Father, 2=Mother, 3=Sister/Bother, 4=Aunt/Uncle, 5=Maid 6= Other
A.7	What is the gender of the head of the household?	<input type="checkbox"/> Male <input type="checkbox"/> Female
A.8	What is the age of the household head?	_ _ years
A.9	What is the marital status of the household head?	1= Married (if married.....go to A.8) 2=Not married
A.10	Household head staying with a partner?	1=Yes 2=No
A.11	What is the education level of the household head?	1=Primary, 2=O-level, 3=A level, 4=Tertiary, 5=University
<i>Note: A household is defined as a group of people who routinely eat out of same pot and live in the same compound (or physical location). It is possible that they may live in different structures</i>		
A.12 and A.13	Please record the number of people currently living in the household in each category.	A.12 Male A.13 Female
	0-5 months	
	6-23 months	
	24-59 months	
	6-17 years	
	18-49 years	
	50-64 years	
	Elderly (+ 65 years)	
	TOTAL	

SECTION B: HOUSEHOLD ASSET AND LIVESTOCK OWNERSHIP							
B.1	Does anyone in your household own any of the following assets? 1 – Yes, 2- No WHILE ASKING, ALSO OBSERVE <i>(Enter '1' for yes, '2' for no)</i>	1.	Bed	1=yes 2=no	11.	Tele vision	1=yes 2=no
		2.	Table	1=yes 2=no	12.	Axe	1=yes 2=no
		3.	Chairs	1=yes 2=no	13.	Panga/ Mac hete	1=yes 2=no
		4.	Mattress	1=yes 2=no	14.	Hoe	1=yes 2=no
		5.	Radio/Tape	1=yes 2=no	15.	Ox-plough	1=yes 2=no
		6.	Cell Phone	1=yes 2=no	16.	Water tank	1=yes 2=no

		7.	Sewing Machine	1=yes 2=no	17.	Seed store	1=yes 2=no
		8.	Bicycle	1=yes 2=no	18.	Food store	1=yes 2=no
		9.	Motor vehicle	1=yes 2=no			
		10.	Motorcycle	1=yes 2=no			
B.2	Does your household own any of the following livestock? If 'No' skip to section D. If 'Yes', how many of the following livestock does your household currently own?			1=yes 2=no	Number of livestock		
		1.	cattle	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		2.	Sheep	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		3.	Goat	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		4.	Pig	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		5.	Poultry	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		6.	Donkey	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	7. Other: Specify				<input type="checkbox"/>	<input type="checkbox"/>	
B.3	What are the main constraints for livestock and livestock production for your household? <i>Circle the main three that apply</i>	Main constraints codes					
		1=Poor breed			7=Insecurity		
		2=Parasites/diseases			8=Theft		
		3=Inadequate labour			9=Raiding		
		4=Shortage of pasture/feed			10=Lack of market for livestock		
		5=Shortage of water			11=Other (specify)		
		6=Lack of veterinary services					

SECTION C: HOUSEHOLD AGRICULTURAL PRODUCTION, FOOD STOCKS & SOURCES			
C.1.0: HOUSEHOLD AGRICULTURAL PRODUCTION			
C.1.1	Does your household have access to land for agricultural activities?	<input type="checkbox"/> Yes <input type="checkbox"/> No	Size of land in acres <input type="checkbox"/>
C.1.1.1	If no, what are the main reasons? Circle all that apply	1=Insecurity 2=I have been prohibited by the clan 3=I have been prohibited by my husband 4=The land is infertile/marginal 5=I have been prohibited by the government 6=Sickness or physical inability	

		<p>7=I did not have adequate seeds and tools</p> <p>8=I do not have sufficient family/household labour</p> <p>9=We are not agriculturalists</p> <p>10= Land conflicts</p> <p>11= Drought/Low rainfall</p> <p>12=Other. Please specify:</p>	
C.1.2	If yes, what type of land have you cultivated this season?	1=Flatland	
		2=Up land for cultivation	
		3=Swamp	
		4=Other (specify)	
C.1.3	Compared to last season, is the land you cultivated	<p>1=larger 2=Same 3=Less 4=I did not cultivate this season</p> <p><i>(if answer is 4, go to D.3.1.1)</i></p>	
C.1.4	If you cultivated Less or you did not cultivate, what are the reasons?	<p>1=Insecurity</p> <p>2=I have been prohibited by the clan</p> <p>3=I have been prohibited by my husband</p> <p>4=The land is infertile/marginal</p> <p>5=I have been prohibited by the government</p> <p>6=Sickness or physical inability</p> <p>7=I did not have adequate seeds and tools</p> <p>8=I do not have sufficient family/household labour</p> <p>9=We are not agriculturalists</p> <p>10= Land conflicts</p> <p>11= Drought/Low rainfall</p> <p>12=Other. Please specify:</p>	
C.1.5.1	What type of crops did you cultivate this agricultural season?	1. Maize	1=yes 2=no
		2. Bean	1=yes 2=no
		3. Cassava	1=yes 2=no
		4. Millet	1=yes 2=no
		5. Sorghum	1=yes 2=no
		6. Potato	1=yes 2=no
		7. Banana	1=yes 2=no
		8. Rice	1=yes 2=no
		9. Other (specify)	1=yes 2=no
C.1.5.2	For each crop compared to last season, what is the expected yield/harvest?	1=Larger, 2=same, 3=less	

C.1.5.3	If less or did not cultivate the crop, what are the reasons?	1=Insecurity 2=I have been prohibited by the clan 3=I have been prohibited by my husband 4=The land is infertile/marginal 5=I have been prohibited by the government 6=Sickness or physical inability 7=I did not have adequate seeds and tools 8=I do not have sufficient family/household labour 9=We are not agriculturalists 10= Land conflicts 11= Drought/Low rainfall 12=Other. Please specify:
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SECTION C.2.0: Household Food Stocks & Sources		
C.2.1	Do you have any maize or other food stocks in your household now? <i>(NB, this can be from own production, markets, food assistance, etc)</i>	1=Yes 2=No If No, skip to Q8
C.2.2	How many bags (50kg) of food (specify) are still available in your stock? <i>(NB, this can be from own production, markets, food assistance, etc)</i>	1=Less than 1 bag 2=1 to 2 bags 3=3 to 5 bags 4=More than 5 bags
C.2.3	What are the main sources of these food stocks	1= NGO/Partner food distribution 2= Own production 3= Gifts 4= Markets 5= Other. Please specify:
C.2.4	How many days will these food stocks (specify) last your household?	1 = Less than one month 2=Enough for 1 month 3 = Enough for 2-3 months 4 = Enough for 4+ months
C.2.5	If none in stock, how many days/months has your household spent without any food stock?	1 = one to two weeks ago 2=one month ago 3=two to three months ago 4=four months ago and more

SECTION D – MAIN INCOME SOURCE		
D.1a	How many members of the household earn an income?	___
D.1b	Has any member of the household left the household in the last six months in	1=Yes 2=No

	search of job opportunities and has not returned?	
D.1c	If yes, where did they migrate to?	1. Main town in the district 2. Neighboring district 3. Other district/town within Uganda 4. foreign country 5. Other. Please specify:
D.1d	Are you receiving any money from this person(s) who migrated?	1=Yes 2=No
D.2	During the past 30 days, what were your household's most important livelihood sources? (<i>use income source codes, up to 3 activities</i>) Using proportional piling or 'divide the pie' methods, please estimate the relative contribution to total income of each source (%)	
A	Most important	□□□
B	Second (<i>leave blank if none</i>)	□□□
C	Third (<i>leave blank if none</i>)	□□□
Income source codes:		
<i>1 =Food crop production/sales (e.g. maize...); 2=Cash crop production/sale (e.g. coffee); 3 = Income derived from sale of livestock and / or animal products; 4=sale of alcoholic beverages/beer; 5=casual labour related to agricultural activities; 6=casual labour related to construction; 7=other non-agricultural casual labour (porter, domestic labour etc); 8=skilled labour-masonry, mechanic, tailoring etc; 9=salaried work; 10 = Sale of firewood/charcoal; 11=sale of grass; 12=fishing and sale of fish; 13=other petty trading (tea seller, kiosk, sale of handicraft etc); 14=kinship/gifts from family friends; 15=Remittances; 16=Gifts/begging; 17=hunting to sell; 18=sale of food assistance (received from NGOs, WFP, Government); 19=borrowing; 20 = Pension, government allowances; 21=other, specify</i>		

WATER, SANITATION AND HYGIENE MODULE

SECTION A: WATER SOURCE AND USE		INSTRUCTION	
Ws1.	What is the main source of drinking water for members of your household?	PIPED WATER:	
		PIPED INTO DWELLING.....11	11⇒WS5
		PIPED INTO COMPOUND, YARD OR PLOT.....12	12⇒WS5
			13⇒WS5
		PIPED TO NEIGHBOUR.....13	14⇒WS3
		PUBLIC TAP / STANDPIPE.....14	21⇒WS3
		TUBE WELL, BOREHOLE..21	
		DUG WELL:	31⇒WS3
		PROTECTED WELL.....31	32⇒WS3
		UNPROTECTED WELL..32	
		WATER FROM SPRING:	41⇒WS3
PROTECTED SPRING...41	42⇒WS3		

		<i>UNPROTECTED SPRING..42</i>	51⇒ws3
		<i>RAINWATER COLLECTION..51</i>	61⇒ws3
		<i>SURFACE WATER (RIVER, STREAM, DAM, LAKE,</i>	71⇒ws3
		<i>POND, CANAL, IRRIGATION CHANNEL).....61</i>	81⇒ws3
		<i>BOTTLED WATER.....71</i>	
		<i>OTHER (SPECIFY).....81</i>	
		<i>DK98</i>	
Ws2.	What is the main source of water used by your household for other purposes such as cooking and hand washing?	<i>PIPED WATER</i> <i>PIPED INTO DWELLING ...11</i> <i>PIPED INTO COMPOUND, YARD OR PLOT.....12</i> <i>PIPED TO NEIGHBOR....13</i> <i>PUBLIC TAP / STANDPIPE..14</i> <i>TUBE WELL, BOREHOLE..21</i> <i>DUG WELL</i> <i>PROTECTED WELL....31</i> <i>UNPROTECTED WELL..32</i> <i>WATER FROM SPRING</i> <i>PROTECTED SPRING41</i> <i>UNPROTECTED SPRING42</i> <i>RAINWATER COLLECTION...51</i> <i>SURFACE WATER (RIVER, STREAM, DAM, LAKE,</i> <i>POND, CANAL, IRRIGATION CHANNEL).....61</i> <i>OTHER (SPECIFY)71</i> <i>DON'T KNOW98</i>	11⇒ws5 12⇒ws5 13⇒ws5
Ws3.	Where is that water source located?	<i>IN OWN DWELLING.....1</i> <i>IN OWN YARD / PLOT....2</i> <i>ELSEWHERE.....3</i>	
Ws4.	How long does it take to go there, get water, and come back?	<i>NUMBER OF MINUTES ___ __</i> <i>DK98</i>	
Ws5.	Do you do anything to the water to make it safer to drink?	<i>YES.....1</i> <i>NO.....2</i> <i>DON'T KNOW98</i>	2⇒ws7 98⇒ws7
Ws6	What do you usually do to make water safer to drink? Probe anything else? Record all items mentioned.	<i>BOIL.....1</i> <i>ADD BLEACH / CHLORINE...2</i> <i>STRAIN IT THROUGH A CLOTH...3</i> <i>USE WATER FILTER (CERAMIC, SAND, COMPOSITE, ETC.)....4</i> <i>SOLAR DISINFECTION.....5</i> <i>LET IT STAND AND SETTLE.....7</i> <i>OTHER (SPECIFY).....96</i> <i>DON'T KNOW98</i>	
Ws7.	In the last month, has there been any time when your	<i>YES.....1</i> <i>NO.....2</i> <i>DON'T KNOW.....98</i>	

	household did not have sufficient quantities of drinking water when needed?		
SECTION B: HAND WASHING			
Hw1.	We would like to learn about the places that households use to wash hands. Can you please show me where members of your household <u>most often</u> wash their hands?	<i>OBSERVED.....1</i> <i>NOT OBSERVED</i> <i>NOT IN DWELLING / PLOT / YARD.....2</i> <i>NO PERMISSION TO SEE.3</i> <i>OTHER REASON (SPECIFY).....96</i>	2 ⇨HW3 3 ⇨HW3 96 ⇨HW3
Hw2.	Observe the presence of water at the place for handwashing. Verify by checking the tap/pump, or basin, bucket, water container or similar objects for presence of water.	<i>WATER IS AVAILABLE....1</i> <i>WATER IS NOT AVAILABLE.....2</i>	
Hw2a.	Check the distance of the handwashing place from the toilet in feet and circle appropriate code.	<i>LESS THAN 10 FEET.....1</i> <i>10 FEET OR MORE2</i> <i>TOILET NOT IN DWELLING / PLOT / YARD.....3</i>	
Hw2b.	Is soap, detergent or ash/mud/sand present at the place for handwashing? Please observe	<i>YES, PRESENT.....1</i> <i>NO, NOT PRESENT.....2</i>	2⇨hw3
Hw2c.	RECORD YOUR OBSERVATION. Circle all that apply.	<i>BAR SOAP.....A</i> <i>DETERGENT (POWDER / LIQUID / PASTE).....B</i> <i>LIQUID SOAP.....C</i> <i>ASH / MUD / SAND.....D</i>	
Hw3.	Do you have any soap or detergent or ash/mud/sand in your house for washing hands?	<i>YES.....1</i> <i>NO.....2</i>	
Hw4a.	Can you please show it to me?	<i>YES, SEEN.....1</i> <i>NO, NOT SEEN.....2</i>	
HW5B.	<i>Record your observation.</i> CIRCLE ALL THAT APPLY.	<i>BAR SOAP.....A</i> <i>DETERGENT (POWDER / LIQUID / PASTE).....B</i> <i>LIQUID SOAP.....C</i> <i>ASH / MUD / SAND.....D</i>	

Hw6.	<p>We would like to learn about critical times for hand washing.</p> <p><i>When do you wash your hands?</i></p>	<p>AFTER GOING TO THE TOILET.....1 AFTER HANDLING CHILDREN EXCRETA.2 BEFORE EATING FOOD (OR FEEDING A CHILD).....3 BEFORE FOOD PREPARATION.....4 AFTER TENDING TO ANIMALS.....5 OTHER (SPECIFY).....96</p>	
SECTION C: TOILET FACILITY AND USE			
TF.1	<p>What kind of toilet facility do you use or have within your household?</p>	<p>FLUSH OR POUR FLUSH TOILET: <i>FLUSH TO PIPED SEWER SYSTEM.....11</i> <i>FLUSH TO SEPTIC TANK.....12</i> <i>FLUSH TO PIT LATRINE.....13</i> <i>FLUSH TO SOMEWHERE ELSE.....14</i> FLUSH, DON'T KNOW WHERE.....15</p> <p>PIT LATRINE: <i>VENTILATED IMPROVED PIT LATRINE21</i> <i>PIT LATRINE WITH SLAB.....22</i> <i>PIT LATRINE WITHOUT SLAB/OPEN PIT23</i></p> <p>COMPOSTING TOILET.31 BUCKET TOILET.....41 HANGING TOILET.....51 NO FACILITY/BUSH/FIELD.....61 OTHER (SPECIFY)....96</p>	
TF.2	<p>DO YOU SHARE THIS TOILET FACILITY WITH OTHER HOUSEHOLDS?</p>	<p><i>YES.....1</i> <i>NO.....2</i></p>	<p>2..... Go to TF.4</p>
TF.3	<p>INCLUDING YOUR OWN HOUSEHOLD, HOW MANY HOUSEHOLDS USE THIS TOILET FACILITY?</p>	<p><i>NUMBER OF HHS IF <10</i> <input type="text"/> <input type="text"/></p> <p><i>10 OR MORE HHS.....95</i> <i>DON'T KNOW.....98</i></p>	
TF.4	<p>WHERE IS THAT TOILET FACILITY LOCATED?</p>	<p><i>IN OWN DWELLING.....1</i> <i>IN OWN YARD / PLOT.....2</i> <i>ELSEWHERE.....3</i></p>	

SECTION A: Household Food Insecurity Access Scale (HFIAS) Measurement
(Adapted from HFIAS for measurement of food access: Indicator guide. Version 3. FANTA, 2007)

No.	Question	Response option	Code
1	In the past four weeks, did you worry that your household would not have enough food?	0 = No (skip to Q2) 1=Yes <input type="checkbox"/>
1a	How often did this happen?	1 = Rarely (once or twice in the past four weeks) 2 = Sometimes (three to ten times in the past four weeks) 3 = Often (more than ten times in the past four weeks) <input type="checkbox"/>
2.	In the past four weeks, were you or any household member not able to eat the kinds of foods you preferred because of a lack of resources?	0 = No (skip to Q3) 1=Yes <input type="checkbox"/>
2a.	How often did this happen?	1 = Rarely (once or twice in the past four weeks) 2 = Sometimes (three to ten times in the past four weeks) 3 = Often (more than ten times in the past four weeks) <input type="checkbox"/>
3.	In the past four weeks, did you or any household member have to eat a limited variety of foods due to a lack of resources?	0 = No (skip to Q4) 1 = Yes <input type="checkbox"/>
3a.	How often did this happen?	1 = Rarely (once or twice in the past four weeks) 2 = Sometimes (three to ten times in the past four weeks) 3 = Often (more than ten times in the past four weeks) <input type="checkbox"/>
4.	In the past four weeks, did you or any household member have to eat some foods that you really did not want to eat because of a lack of resources to obtain other types of food?	0 = No (skip to Q5) 1 = Yes <input type="checkbox"/>
4a.	How often did this happen?	1 = Rarely (once or twice in the past four weeks) 2 = Sometimes (three to ten times in the past four weeks) 3 = Often (more than ten times in the past four weeks) <input type="checkbox"/>
5.	In the past four weeks, did you or any household member have to eat a smaller meal than you felt	0 = No (skip to Q6) 1 = Yes <input type="checkbox"/>

	you needed because there was not enough food?		
5a.	How often did this happen?	1 = Rarely (once or twice in the past four weeks) 2 = Sometimes (three to ten times in the past four weeks) 3 = Often (more than ten times in the past four weeks) <input type="checkbox"/>
6.	In the past four weeks, did you or any other household member have to eat fewer meals in a day because there was not enough food?	0 = No (skip to Q7) 1 = Yes <input type="checkbox"/>
6a.	How often did this happen?	1 = Rarely (once or twice in the past four weeks) 2 = Sometimes (three to ten times in the past four weeks) 3 = Often (more than ten times in the past four weeks) <input type="checkbox"/>
7.	In the past four weeks, was there ever no food to eat of any kind in your household because of lack of resources to get food?	0 = No (skip to Q8) 1 = Yes <input type="checkbox"/>
7a.	How often did this happen?	1 = Rarely (once or twice in the past four weeks) 2 = Sometimes (three to ten times in the past four weeks) 3 = Often (more than ten times in the past four weeks) <input type="checkbox"/>
8.	In the past four weeks, did you or any household member go to sleep at night hungry because there was not enough food?	0 = No (skip to Q9) 1 = Yes <input type="checkbox"/>
8a.	How often did this happen?	1 = Rarely (once or twice in the past four weeks) 2 = Sometimes (three to ten times in the past four weeks) 3 = Often (more than ten times in the past four weeks) <input type="checkbox"/>
9.	In the past four weeks, did you or any household member go a whole day and night without eating anything because there was not enough food?	0 = No (questionnaire is finished) 1 = Yes <input type="checkbox"/>
9a.	How often did this happen?	1 = Rarely (once or twice in the past four weeks) 2 = Sometimes (three to ten times in the past four weeks) 3 = Often (more than ten times in the past four weeks) <input type="checkbox"/>

SECTION A: ACCESS TO FOOD AND NUTRITION SECURITY INTERVENTIONS OVER LAST 12 MONTHS		
I.2	Has any member of your household benefited from any of the following humanitarian and/or government support in the last 12 months?	1=Yes 2=No
I.2.1	School Feeding	1=yes 2=No
I.2.2	Mother & Child Health and Nutrition (Food)	1=yes 2=No
I.2.3	Mother & Child Health and Nutrition (other than food)	1=yes 2=No
I.2.4	Food for Asset/work	1=yes 2=No
I.2.5	Cash for asset/work	1=yes 2=No
I.2.6	Voucher for asset/work	1=yes 2=No
I.2.7	General Food Distribution	1=yes 2=No
I.2.8	Water and sanitation (give examples here?)	1=yes 2=No
I.2.9	Health services (give examples)	1=yes 2=No
I.2.10	Income generating activities/Household income diversification	1=yes 2=No
I.2.11	Access to credit	1=yes 2=No
I.2.12	Agricultural inputs	1=yes 2=No
I.2.13	Farmers training	1=yes 2=No
I.2.14	Livestock related interventions	1=yes 2=No
I.2.15	Any other (specify).....	1=yes 2=No
I.3.	How long (in months) have you/your household been receiving this support? (<i>restrict to 12 months</i>)	_____ months

SECTION B: HEALTH AND NUTRITIONAL STATUS OF THE CHILD					
B.1	Sex of [NAME]	1=Male 2=Female			
B.2	Date of birth (Day/month/year)	_ _ / _ _ / _ _			
B.3	Age of [NAME] (in completed months)	_ _			
B.4	Was child (name) fully immunized with de-worming and Vit A supplementation? Use the following codes 1= Yes with card 2= Yes without card 3= No with card 4= No without card 5= Don't know	Measles	DPT3	Deworming from 6 months	Vit A supplementation from 6 months
B.5	Mention the diseases [NAME] has suffered in the last 2 weeks. <i>Circle all that apply</i>	1 = Fever/malaria 2 = Measles 3 = Diarrhea 4 = ARI/cough 5 = Skin diseases 6 = Eye disease 7 = Other (specify)			

		8 = No Illness 9 = Don't know		
B.6	Did [NAME] sleep under a mosquito net last night? CIRCLE	1= YES 2= NO 3= Don't know		
B.7	Is [NAME] enrolled in any of the feeding programs? <i>Circle one</i>	1 = OTC (Plumpy Nut, red sachet, RUTAFa) 2 = ITC 3 = SFP (CSB++) 4 = MCHN (CSB++) 5 = Any other (Specify.....) 6 = None		
B.8	If child (name) is eligible but not enrolled, ask the mother the main reasons why the child is not enrolled in any feeding program?	1= I did not know about the programme 2= Too much time required to participate 3= The distribution site was too far 4= No transportation to reach distribution site 5= I had other commitments that prevented enrolling the child 6= Others [specify.....]		
SECTION C: CHILD NUTRITIONAL ASSESSMENT				
C.1	Does [NAME] have bilateral pitting oedema? Please observe.	1 = YES 0 = NO		
C.2	Anthropometry			
C.2.1	Weight (Kg) of [NAME]	Wt1= _____ kg	Wt2= _____ Kg	Wt3= _____ Kg
C.2.2	Height (cm) of [NAME]	Ht1= _____ cm	Ht2= _____ cm	Ht3= _____ cm
C.2.3	MUAC (cm) of [NAME]	MUAC1= _____ cm	MUAC2= _____ cm	MUAC3= _____ cm

Annex IV: Focus Group Discussion guide

Focus group discussion guide on determinants of household food security and nutritional status of children aged 24-59 months

Introduction

Food security: “a situation that exists when all people, at all times, have physical, social, and economic access to sufficient, safe, and nutritious food that meets their dietary needs and food preferences for an active and healthy life” (FAO, 2008). Households in your district are known to have issues with food security and your children are at higher risk of suffering from malnutrition. As a group of household heads in this village, may you please discuss the following questions

Questions

1. Describe the food security and nutrition situation of children (24-59 months) among your households
2. Explain the relationship between food security and nutritional status of children
3. What is your main livelihood activities for your households?
4. Explain the factors that influence food security in your households (PROBE)
5. How does each factor mentioned above affect nutritional status of children aged 24-59 months?
6. What forms of malnutrition are common among children in your households?
7. Explain the dietary practices for children (24-59 months) in your households (PROBE)
8. How does Disease affect food security among households and nutritional status of children
9. Discuss the WASH practices among your household members (PROBE)
10. Discuss the available food security and nutrition interventions accessible in this community (PROBE)
11. Give recommendations to improve food security and nutritional status of children among your households



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Annex V: Key Informant Interview guide

Key informants interview questions on determinants of household food security and nutritional status of children aged 24-59 months

Introduction

Food security: “a situation that exists when all people, at all times, have physical, social, and economic access to sufficient, safe, and nutritious food that meets their dietary needs and food preferences for an active and healthy life” (FAO, 2008). Namutumba is one of the districts known to be experiencing effects of food and nutrition insecurity especially among children under five. As an influential leader, may you please give your view on the following questions

Questions

1. Describe the household food security and nutrition situation among children aged 24-59 months in your district/sub-county
2. Explain the relationship between food security and nutritional status of children
3. What are the main livelihood activities of people in your community?
4. Explain the factors that influence household food security in your area (PROBE)
5. How does each factor mentioned above affect nutritional status of children aged 24-59 months?
6. What forms of malnutrition are common among children in your area?
7. Explain the dietary practices for children (24-59 months) in your community (PROBE)
8. How does Disease affect food security among households and nutritional status of children?
9. Discuss the WASH practices among household members in your area (PROBE)
10. Discuss the available food security and nutrition interventions accessible in this community (PROBE)
11. Give recommendations to improve food security and nutritional status of children in your community



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Annex VI: Information and Consent form

Study Information Sheet & Informed Consent for mothers/caregivers

Title of the study: Determinants of household food security and nutritional status of children aged 24-59 months in Namutumba district

Investigator: Kizito Ndegeya, Kyambogo University, Department of Human nutrition and Home economics, Graduate school

Email: ndegeyak@gmail.com, **Tel. 0776 701810**

Introduction

Hello, my name is I am part of the team from Kyambogo University, Graduate school conducting a study on **Determinants of Household food security and nutritional status of children aged 24-59 months in Namutumba district.**

Background and rationale of the study

Food and nutrition insecurity is one of the key causes of poor nutritional outcomes among children leading to chronic malnutrition with irreversible consequences. Malnourished children do not develop to their full potential and hence become less productive adults. This in turn results into poor socio-economic development and if not addressed, the vicious cycle continues. As of 2017, prevalence of stunting among children under 5 years in Namutumba district was estimated at 27.7% (Kuziga, Adoke and Wanyenze, 2017). However, there is no documented study in the district on determinants of household food security in relation to nutritional status of children. This study therefore aims at gaining a clear understanding of the determinants of household food security and nutritional status of children (24-59 months). Findings will be key in informing policy formulation and review to design effective and sustainable interventions to reduce the prevalence of malnutrition among under-five children in Namutumba District and in the entire country.

Purpose of your participation

You are being asked to participate in this study because you are a mother/caregiver of a child who has been randomly selected for the study and we believe you better understand his/her dietary practices. The information you provide will help us to learn about the determinants of household food security and nutritional status of children in your district and your views also will inform stakeholders at different levels to respond and address food and nutrition issues accordingly. Therefore, I request you to respond to questions to the best of your knowledge and answers to any of your questions concerning this particular subject will be given.

Procedure for the study

A structured questionnaire on determinants of household food security and child nutritional intakes will be used to capture your responses. Later, your child's weight and height will be assessed using a weighing scale and height board to determine nutritional status. The interview will take approximately half an hour in an open quiet convenient place within your household compound. You are requested to give honest responses to the best of your knowledge during this interview period.

Study participants

The study intends to involve 320 households with children aged 24-59 months and their respective mothers/caregivers will be interviewed in the entire Namutumba district. One eligible child per household will be assessed for their nutritional status.

Risks/discomforts

This is a non-invasive study where no human sample (specimen) collection is required, and therefore no major risks. The only major discomfort associated with the study is the length of time (approximately more than 30 minutes) spent on the interview and anthropometric measurement of the children. A child who is unable to stand may experience some discomfort during height measurement as he/she will be required to lie down with the back on the height/length board.

All recommended standard operating procedures (SOPs) for the prevention of COVID-19 transmission including wearing of masks, social distancing and sanitization of both hands and anthropometry equipment will be observed at all times during the interview.

Confidentiality

The information collected will be kept anonymous and confidential in accordance to the national ethical standards governing research involving humans as research participants. Your identity will be concealed and your name will not appear anywhere on the coded forms. The study team will be the only one with the authority to access the collected data. The filled questionnaire will be kept under strict lock and key and information on computers will be kept confidential with password protection. Although the authorized personnel (the study team) will have access to collected data but will not be able to directly trace this information back to you since your name will not appear on any documentation.

Compensation for participating in the study

For the time set aside to participate in this study, mothers/caregivers of children will be offered a token of appreciation in form of half a bar of soap. This is a small token compared to your time but we request to kindly accept it.

Voluntary consent and withdrawal from the study

Your participation in this research is voluntary. You are not obliged to answer any question you may not be comfortable with and you are free to withdraw from the study at any time without any penalty or loss of any service to you. Your withdrawal from the study will not lead to hindering or denying you or any of your family members from accessing any of the available social services (including but not limited to health or education services) by any service provider.

Questions on the study and Participant Rights

In case of any question, concerns and complaints about this study, contact the investigator Ndegeya Kizito on Tel. +256 776 701810 or email: ndegeyak@gmail.com. For further clarification and satisfaction on any concern about the study and you want to discuss with someone outside the research team, you may contact the study supervisor Dr. Jacent Asiimwe Kamuntu on Tel. +256 784 092788. If you have any concern about your welfare and rights as a research participant, you can address your questions to the chairperson Mbale regional referral hospital research and ethics committee on telephone number +256 754566352/+256 414671162/+256 393280584.

Approval of the research study

The study was approved by Mbale regional referral hospital research and ethics committee which is an accredited Ugandan based institutional review board (IRB) by Uganda National Council for Science and Technology (UNCST).

Do I have your permission to continue with the interview?

If yes, continue. If no, stop and go to the next household

Statement of informed consent

..... has described to me the purpose and procedures of the study, the risks, benefits involved and my rights as a participant. I voluntarily agree to take part in this study. In the use of this information, I am aware that my identity will be concealed and that I may withdraw at any time during the course of interview. I understand that by signing this form, I do not waive any of my legal rights but merely indicate that I have been informed about the study in which I am voluntarily agreeing to participate.

I have read and understood the above consent. I hereby do agree to participate in this study and a copy of this form will be provided to me.

Name of respondent (Optional) Research Assistant

Signature/thumbprint.....

Date of interview (DD/MM/YY).....

Witness (for Illiterate participants)

Signature/thumbprint Date (DD/MM/YY):

Questions on the study and Participant Rights

In case of any question, concerns and complaints about this study, contact the investigator Ndegeya Kizito on Tel. +256 776 701810 or email: ndegeyak@gmail.com. For further clarification and satisfaction on any concern about the study and you want to discuss with someone outside the research team, you may contact the study supervisor Dr. Jacent Asijimwe Kamuntu on Tel. +256 784 092788. If you have any concern about your welfare and rights as a research participant, you can address your questions to the chairperson Mbale regional referral hospital research ethics committee on telephone number +256 754566352/+256 414671162/+256 393280584.

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Do I have your permission to continue with the interview?

If yes, continue. If no, stop and go to the next household

Statement of informed consent

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I have read and understood the above consent. I hereby do agree to participate in this study and a copy of this form will be provided to me.



Version 1.0 23/04/2022 English version

Name of respondent (Optional) Research Assistant

Signature/thumbprint

Date of interview (DD/MM/YY).....

Witness (for Illiterate participants)

Signature/thumbprint Date (DD/MM/YY):



Version 1.0 23/04/2022 English version

Annex VII: Introduction letter to conduct research



11th October, 2021

To Whom It May Concern

RE: LETTER OF INTRODUCTION

Dear Sir/Madam,

This is to introduce **Ndegeya Kizito** Registration Number **19/U/GMHN/19029/PD** who is a student of Kyambogo University pursuing a Masters Degree.

He intends to carry out research on **"Determinants of House Hold Food Security and Nutritional Status of Children Aged 24 - 59 months in Namutumba District."** as partial fulfillment of the requirements for the award of the Master of Science in Human Nutrition.





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

Any assistance accorded to him will be highly appreciated.

Yours sincerely,


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

Annex VIII: Research and Ethics Committee approval letter

Telephones: General Line: 039-3280584 041-4671162		MINISTRY OF HEALTH MBALE REGIONAL HOSPITAL P.O. BOX 921 Mbale – Uganda						
E-mail: mrrhrec@gmail.com								
THE REPUBLIC OF UGANDA								
In any correspondence on this								
Subject, please quote: MRRHREC-OUT- 011/2022		Date: 26 th May 2022						
MRHREC ACCREDITED BY THE UNCST, REGISTRATION NUMBER UG-REC-011								
REC APPROVAL NOTICE								
Kizito Ndegeya Department of Human nutrition and home economics Kyambogo University 0776701810								
Principal Investigator. Our Ref: MRRH-116-2021: DETERMINANTS OF HOUSEHOLD FOOD SECURITY AND NUTRITIONAL STATUS OF CHILDREN AGED 24-59 MONTHS IN NAMUTUMBA DISTRICT								
Type: <input type="checkbox"/> Initial Review <input type="checkbox"/> Protocol Amendment <input checked="" type="checkbox"/> Letter of Amendment (LOA) <input type="checkbox"/> Continuing Review <input type="checkbox"/> Material Transfer Agreement <input type="checkbox"/> Other, Specify _____	<div style="border: 2px solid blue; padding: 5px;"><p style="text-align: center;">OFFICE OF THE CHAIRPERSON APPROVED</p><table border="0" style="width: 100%;"><tr><td style="text-align: center;">APPROVED DATE</td><td style="text-align: center;"></td><td style="text-align: center;">EXPIRY DATE</td></tr><tr><td style="text-align: center;">26 MAY 2022</td><td></td><td style="text-align: center;">04 FEB 2023</td></tr></table><p style="text-align: center;">MBALE REGIONAL REFERRAL HOSPITAL RESEARCH & ETHICS COMMITTEE (MRRH- REC)</p></div>		APPROVED DATE		EXPIRY DATE	26 MAY 2022		04 FEB 2023
APPROVED DATE		EXPIRY DATE						
26 MAY 2022		04 FEB 2023						
<p>Thank you for your application to Mbale Regional Referral Hospital-REC (MRRH-REC) for ethical approval. Your application was received on the 23rd April 2022. All the information submitted to the committee (as shown in Table I) was considered during the 17th expedited review meeting of 26th May 2022</p> <p>I am pleased to inform you that in line with the documents and response as requested by UNCST you submitted on the 23rd April 2022 (as shown on table 1), MRRH-REC approved the above referenced application.</p> <p>Approval of the research is for the period of twelve months as indicated in the stamp (26th May 2022-04th February 2023)</p> <p>You are responsible for fulfilling the following requirements of approval:</p>								
<ol style="list-style-type: none">1. All Co-investigators must be kept informed of the status of the research.2. Changes, amendments, and addenda to the current protocol version or the consent form must be submitted to the REC for review and approval prior to the activation of the changes. The REC application number (MRRH-116-2021) assigned to the research should be cited in any correspondence.3. Reports of unanticipated problems involving risks to participants or other must be submitted to the REC. New information that becomes available which could change the risk: benefit ratio must be submitted promptly for REC review.4. Only approved (stamped) consent forms are to be used in the enrolment of participants. An Original copy of the consent forms signed by subjects 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. Regulations require review of an approved study not less than once per 12-month period. **Therefore, a continuing review application must be submitted to the REC eight weeks prior to the above expiration date 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, at which point new participants may not be enrolled and currently enrolled participants must be taken off the study.
6. The following (in table I) is the Final list of all documents approved in this application by Mbale Regional Referral Hospital Research and Ethics Committee.

Table I: Final list of documents reviewed and approved by the MRRH-REC is as follows

Table 1: Documents Received and Reviewed.

DOCUMENTATION	Section	VERSION	DATES
Letter of Introduction and requesting for review from the institution of affiliation and Principal investigator. Dated 23 rd April 2022	English	NA	23 rd April 2022
Protocol / Proposal Determinants of Household Food Security and Nutritional Status of Children Aged 24-59 Months in Namutumba District.	English		
Amendments			
1. CV was initialled and dated on every page.	English	N/A	09 th April 2022
2. A letter from the DHO was attained.	English	N/A	23 rd April 2022
3. A detailed risk management plan.		N/A	23 rd April 2022
4. The clean protocol	English	1.0	23 rd April 2022
5. In all informed consent forms (for mothers, KIs and FDGs) the mobile telephone contact for the chairperson was added.	English	1.0	23 rd April 2022
6. Re-attached Key Informant guide for the study	English	1.0	23 rd April 2022
7. Re-attached the FDG guide	English	1.0	23 rd April 2022
8. Attached ICF for the FDG of household heads'	English	1.0	23 rd April 2022
9. Attached ICF for the Key Informant interviews-influential leaders.	English	1.0	23 rd April 2022
10. Translated ICFs	Lusoga	1.0	23 rd April 2022



7. You are required to register this study with Uganda National Council for Science and Technology (UNCST).

I wish you the best in your study.

Yours sincerely,


**OFFICE OF THE CHAIRPERSON
APPROVED**
APPROVED DATE EXPIRY DATE
26 MAY 2022 04 FEB 2023

**MBALE REGIONAL REFERRAL HOSPITAL
RESEARCH & ETHICS COMMITTEE
Chairperson MRRH-REC (MRRH-REC)**

Annex IX: Uganda National Council for Science and Technology Approval



Uganda National Council for Science and Technology

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

Our Ref: HS2088ES

14 June 2022

Kizito Ndegeya
Kyambogo University
Kampala

Re: Research Approval: **DETERMINANTS OF HOUSEHOLD FOOD SECURITY AND NUTRITIONAL STATUS OF CHILDREN AGED 24-59 MONTHS IN NAMUTUMBA DISTRICT**

I am pleased to inform you that on 14/06/2022, 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 14/06/2022 to 14/06/2023.

Your research registration number with the UNCST is **HS2088ES**. 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.

Please note that this approval includes all study related tools submitted as part of the application as shown below:

No.	Document Title	Language	Version Number	Version Date
1	Questionnaire	English	QUESTIONNAIRE	28 January 2022
2	Informed Consent forms	English	FACT SHEET AND CONSENT FORM	05 December 2021
3	Data collection tools	English	QUESTIONS FOR FOCUS GROUP DISCUSSIONS AND KEY INFO	05 December 2021
4	KI guide	English	1.0	23 February 2022
5	Project Proposal	English	PROPOSAL	
6	Approval Letter	English		
7	Administrative Clearance	English		
7	ICF for mothers with contacts of chairperson REC	English	Version1.0	23 April 2022
8	KI interview guide	English	Version1.0	23 April 2022
9	FGD guide	English	Version1.0	23 April 2022
10	ICF for FGD	English	Version1.0	23 April 2022
11	ICF for KI	English	Version1.0	23 April 2022
12	Translated ICF for mothers	Lusoga	Version1.0	23 April 2022
13	Translated ICF for KIs	Lusoga	Version1.0	23 April 2022
14	Translated ICF for FGD	Lusoga	Version1.0	23 April 2022

Yours sincerely,



Hellen Opolot

For: Executive Secretary

UGANDA NATIONAL COUNCIL FOR SCIENCE AND TECHNOLOGY

LOCATION/CORRESPONDENCE

*Plot 6 Kimera Road, Ntinda
P.O. Box 6884
KAMPALA, UGANDA*

COMMUNICATION

TEL: (256) 414 705500
FAX: (256) 414-234579
EMAIL: info@uncst.go.ug
WEBSITE: <http://www.uncst.go.ug>

Annex X: Permission to conduct research in Namutumba district

NAMUTUMBA DISTRICT LOCAL GOVERNMENT

In any correspondence on this subject:

Please quote No. CR/Health/204



REPUBLIC OF UGANDA

Office of the District Health Officer,

P.O. Box 53,

Busembatia.

Website: www.namutumba.ua.oo

Date: 20th April, 2022

Ndegeya Kizito,
(19/U/GMHN/19029/PD),
Kyambogo University.

Re: Permission to conduct research in the District.

This serves to inform you that you have been granted permission to carry out your research on "Determinants of Household Food Security and Nutritional Status of Children Aged 24-59 months" in Namutumba district.

Any required assistance during your research period will be rendered.

Yours faithfully,


Dr. Kiinya James
District Health Officer-Namutumba

