

**THE CONTRIBUTION OF WOMEN TO HOUSEHOLD FOOD AND
NUTRITION SECURITY IN CHAMWINO DISTRICT,
DODOMA, TANZANIA**

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**A DISSERTATION SUBMITTED IN PARTIAL FULFILMENT FOR THE
REQUIREMENTS OF THE MASTER DEGREE OF SCIENCE IN
AGRICULTURAL AND APPLIED ECONOMICS OF THE
SOKOINE UNIVERSITY. MOROGORO, TANZANIA.**

ABSTRACT

Despite economic growth and improvements in living standards, food and nutrition security are still major socio-economic problems in Tanzania. In Tanzania, food and nutrition security are achieved through agricultural production where women are main participants. However, their contribution is underestimated due to social barriers and gender biases. This study was conducted to assess the contribution of women to household food and nutrition security in Chamwino District, Dodoma region. Cross sectional research design was used. Primary data was collected using a semi-structured questionnaire. Multistage sampling technique was used to select the study area and simple random sampling was used to select the respondents. Data was analyzed using descriptive statistics, food consumption score (FCS-N) and linear regression. The major findings were the women's awareness of food security was limited to only one dimension of food security being food availability. Nevertheless, the women understood household nutrition security as the consumption of enough food regardless of the food nutrient adequacy. The food consumption score for the households surveyed was 16.1 indicating poor diet consumption. The FCS-N showed that most household's consumption patterns and dietary diversity relied on single food groups such as staples, pulses and fruits, which does not constitute a balanced diet. Results further show that age, education, income, household size and economic activities significantly influenced women's contribution to household food and nutrition security. Therefore, the study recommends on the importance of improving food supply chains in the study area so as to enhance nutritious food accessibility. The women's awareness of the concepts should be advanced through conducting trainings. Other household members should be educated on the importance of food and nutrition security so as to consider consumption of balanced diet. The women should also be trained on modern techniques to improve performance of their food roles thus prevention of nutrient loss.

DECLARATION

I, JANETH NELSON NGILANGWA do hereby declare to the Senate of Sokoine University of Agriculture that this dissertation is my own original work done within the period of registration and that it has neither been submitted nor concurrently being submitted in any other institution.

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Date

The above declaration is confirmed by;

Dr. Zenna Mpenda
(Supervisor)

Date

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ACKNOWLEDGEMENTS

First, I thank God for His love, His provisions, and His guidance also for keeping me in good health throughout my study duration. Without Him nothing could be possible. Also to my parents Mr and Mrs Nelson Ngilangwa for their advice, financial support and encouragement to study hard and accomplish this educational goal.

Secondly, I would like to heartfully thank my supervisor Dr. Zena Mpenda for her tireless guidance and support in spite of her other heavy responsibilities and commitments. She worked closely with me and devoted her time patiently. She also gave me useful suggestions and encouragement. It was upon her that the shape of this dissertation and completion on time depended.

I would like to extend my special thanks to Professor Peter Gillah the Deputy Vice Chancellor in Academics of the Sokoine University of Agriculture (SUA) for his fatherhood, concern, guidance and mentorship. Also Dr. Adam Akyoo the Dean of the School of Agricultural Economics and Business Studies (SAEBS). His counsel and guidance have contributed greatly to the accomplishment of my studies.

I further extend my appreciation to Professor Reuben Kadigi, Professor Gilead Mlay, Professor Aida Isinika, Dr Christopher Magomba, Dr Roselyne Alphonse, Dr Damas Philip, Dr. Betty Waized, Ms. Judith Valerian, Ms. Innocensia Pato and other members of the Department of Agricultural Economics and Business studies (SAEBS). They gave me useful comments, encouragements and criticism during the early stages of proposal development and dissertation completion.

Sincere appreciations goes to Engineer Francis R Mbuya for his friendship, financial support and constant prayers; Dr Eliaza Mkuna for his word of encouragement and prayers; Dr Safari Mafu for his assistance in language edition; my brother Bernard Mlilile for his tireless guidance; my spiritual guardians Alfred Mugonzibwa, Bishop Zephaniah Ryoba, Emmanuel Shemdoe, David Nywage and Paul Mwangosi for their constant prayers, guidance, mentorship and word of encouragement; Mama Irene and Mama Zainabu for their stationery and secretariat assistance and services and Mr Lusingi Sitta, The Director of CRDB Bank Morogoro for his financial support at the beginning of my studies.

I also thank Joseph Mugula, Joachim Ferdinand, Elias Kweka, Cyril Chimilila, Bonkes Safari, Divine Itika, Peter Ngowi, Million Sileshi, Gerard Kanza, Kenneth Nabora, Tiri Gyaang, Doreen Mowo, Edna Ndau, Gladys Lendii, Stephen Nyaki, Ezekiel Swema, Elias Muhikambele, Nelson Ngalya, Njile Isack, Joseph Kangile, Evelyne Ngilangwa, Eric Ngilangwa, Happy Ngilangwa, Tatu Mustafa and other friends and family for their prayers, encouragement, support, love and patience throughout the study.

Not the same as lastly, but not least, acknowledgements are extended to all individuals who in one-way or another made this study a success, it would be very difficult to mention them all by names.

Lastly, I appreciate the contributions of all Chamwino District administrative officers, village leaders and extension officers Antony Moshi and Grace Nyamwanji who in one-way or another assisted me during the survey work. The cooperation I received from the respondents at household level enabled me to gather data required especially for discussions in my study. Thus, I sincerely thank all the respondents and especially the

women farmers in the study areas. Acknowledgements are extended to all individuals who in one-way or another made this study a success. I further acknowledge all my failures and rejections, great lessons came from them. To God be the Glory.

DEDICATION

This study is dedicated to my parents Mr. Nelson Ngilangwa and Mrs. Amkauane Ngilangwa who laid down the foundation for my education and who have lived to witness this achievement. Remain Blessed.

I also dedicate this study to the United Republic of Tanzania and her citizens, for it is God's original idea destined for her welfare.

And lastly to all women who desire to be the change the world awaits, with their desirable abilities and capabilities. Stay Motivated.

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LIST OF ABBRIVIATIONS

CRDB	Cooperative Rural Development Bank
FAO	Food And Agriculture Organization of United Nations
FAOSTAT	Food and Agriculture Organization Statistical Database
FCS	Food Consumption Score
FCS-N	Food Consumption Score and Nutritional Quality Analysis
FGD	Focus Group Discussion
GHI	Global Hunger Index
HFNS	Household Food and Nutrition Security
ICT	Information and Communication Technology
IFAD	International Fund for Agricultural Development
IFPRI	International Food Policy Research Institute
NBS	National Bureau of Statistics
OLS	Ordinary Least Square
PCI	Project Concern International
SAEBS	School of Agricultural Economics and Business Studies
SPSS	Statistical Package for Social Sciences
SUA	Sokoine University of Agriculture
UN	United Nations
URT	United Republic of Tanzania
VIF	Variance Inflated Factor
WB	World Bank
WHO	World Health Organization
WFP	World Food Program
WFPSR	World Food Program Strategic Review

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background of the Study

Agriculture is an important engine for economic growth and poverty reduction (World Bank, 2009). According to Food and Agriculture Organization, FAO (2018) 68% of Tanzania's workforce in both rural and urban areas engage in agriculture, 83 % being small family farmers. They therefore add to 31% of the national Gross Domestic Product (GDP) and 24.9 % of annual export earnings (FAO, 2018). The agricultural sector however, face challenges such as women who are often crucial resources in agriculture and the rural economy face setbacks such as lack of access to productive resources, decision making in the households, extension services, and labour market opportunities which in return makes their households face severe food insecurity and poverty persistence (Ibnouf, 2009; Liru, 2014). These restraints affect their productivity in agriculture which in turn affects household food and nutrition security (FAO, 2011).

According FAO (2015) food and nutrition security 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. Where household food and nutrition security is the application of this concept to the family level, with individuals within households as the focus of concern (FAO, 2010). Women's participation in agricultural production directly links them to household food and nutrition security achievement (Mehta and Palacios, 2011). Apart from engaging in agricultural production, women are also linked to household food and nutrition security through participating in off-farm activities (Ombakah, 2014). The off-farm activities act as a source of income which enable them to purchase nutritious food. Off-farm activities also

act as a source of income to women for purchasing agricultural inputs and food items that cannot be produced locally (Liru, 2014; Ombakah, 2014).

In sub Saharan Africa women contribute to more than 50% of the labour force in agriculture (FAO, 2011). This implies that they have a significant contribution to household food and nutrition security which is therefore achieved through agricultural production (Ibnouf 2009; FAO, 2011). However, their contribution is less recognized due to the fact that most of their labour products are directed towards household consumption and rarely considered for commercial purposes (Ibnouf, 2009; Braimah *et al.*, 2013 and Liru, 2014, Kalansooriya and Chandrakumara, 2014).

In Tanzania women play a fundamental role towards household food and nutrition security through engaging in agricultural production activities and to some extent participating in off farm activities (Nyamwanji, 2016). Though, food insecurity still persists as the number of undernourished people increased from 23% to 40% in the last decade with the average daily per capita calorie supply of 2054 against the world average of 2709 (Mhina, 2004). Despite having literature focusing on women's roles and impact on agriculture in Tanzania, literature focusing on women's roles and contribution to household food and nutrition security in Tanzania is still scanty. However, according to Chinery (2011), in most developing countries women produce between 60% and 80% of food especially in the rural areas. This enables women to become key players in attaining each of the four pillars of food security being availability, accessibility, utilization and stability (FAO, 2011).

Most researchers have argued on the impact of women's contribution in agriculture. However, the empirical evidence to support women's contribution to household food and

nutrition security is still scanty. Therefore, women's contribution to household food and nutrition security cannot be underestimated since they have proved to be resourceful and hardworking to ensure food and nutrition security within the households (Chinery, 2011; Braimah *et al.*, 2013). This calls for this dissertation to focus on assessing the contribution of women and the challenges faced by them towards achieving household food and nutrition security in Chamwino District, Dodoma, Tanzania.

1.2 Problem Statement and Justification

Despite economic growth and improvements in the people's living standards, food and nutrition security are still major economic and social problems in Tanzania. Women are the crucial contributors to the national development and the economy as a whole. Despite women's contribution being recognized in agriculture, their contribution on household food and nutrition security has been invisible for a long time. Therefore, not recorded in national statistics neither mentioned in reports (FAO, 2011). Women are also given less attention due to social barriers and gender biases since the society considers the roles performed by them to be part of their duties as a wife, a mother or a sister rather than being considered as an occupation (Liru, 2014).

Literature (Matunga, 2008; Mazengo, 2011 and Nyamwanji, 2016) though emphasized on household food security, have put less emphasis on household nutrition security. While Matunga, (2008) and Mazengo, (2011) emphasized on food security indicating that all household members have same choices and preferences on food consumed and all household resources such as income, land and labour are directed towards coping with household food insecurity; Nyamwanji (2016), emphasized on intra- gender relations and its effect on household food security. The author targeted women's contribution to

household food security through participation in decision making without talking about household nutrition security.

Also there is a government initiative called 'Boresha Lishe' which focus on improving household food and nutrition security in the study area. The initiative involves conducting seminars and public campaigns by the nutrition officers and village leaders to the villagers on how to achieve food and nutrition security through practising proper farming methods and modern food preservation techniques (Chuwa A, Personal Communication, 2018). Together with the government, Save the Children International has also applied efforts to improve food and nutrition security in the study area. Save the Children International's target is to establish nutrition programs to women as infant caretakers and reproductive agents. This organization's mainly focus is on infants of 0-1000 days. Despite its emphasis on the mentioned activities, Save the Children International have neglected women as key players in achieving food and nutrition security for other adult members of the household (Ibnouf, 2009).

From the literature (Matunga, 2008; Mazengo, 2011; and Nyamwanji, 2016) and the study area's report, less emphasis was put on addressing the contribution of women per se and addressing household nutrition security. This calls for this dissertation to focus on the gap identified. That is how women contribute to ensure food and nutrition security particular at household level assessing their awareness of the concepts, the factors affecting their contribution to the status of household food and nutrition security. Also by exploring the challenges the women are likely to face as they attempt to achieve household food and nutrition security in the study area.

The study is expected to firstly provide insight about women's awareness of household food and nutrition security in the study area. Secondly to give insight about the determinants of women's overall performance and contribution towards household food and nutrition security in the study area. Thirdly, to provide a base for the interventions on women empowerment so as to improve household food and nutrition security in the study area and lastly the study is expected to provide food and nutrition status information of the households in the study area.

1.3 Objectives of the Study

1.3.1 General objective

The general objective of this study is to assess the women's contribution to household food and nutrition security in Chamwino District, Dodoma, Tanzania.

1.3.2 Specific objectives

In order to address the study's main objective, the specific objectives were to;

- i. Assess women's awareness of household food and nutrition security in the study area.
- ii. Determine the status of household food and nutrition security in the study area.
- iii. Determine the factors which influence women's contribution to household food and nutrition security in the study area.

1.4 Research Questions

1. Are women in the study area aware of household food and nutrition security?

What are the challenges facing women towards achieving household food and nutrition security in the study area?

2. What is the status of household food and nutrition security in the study area?
3. What are the factors that influence women's contribution on household food and nutrition security in the study area?

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Operationalization of Key Terms

2.1.1 The concept of food security

The concept of food security has been evolving in the last thirty years to imitate changes in official policy thinking (Heidhues *et al.*, 2004). According to World Food Summit (1996), Food security exists when all people, at all times, have physical and economic access to adequate, safe and nourishing food that meets their dietary needs and food preferences for an active and healthy life. Food security can also be defined based on quality and quantity of the food, food safety, social acceptability and adequate consumption by all individuals at all times to have a healthy and a happy life (Bokeloh *et al.*, 2009). Andersen, (2009) also defined food security as a measure of household and individual welfare in food acquisition and allocation, where Ibnouf (2009) highlighted the concept focusing on sustainability of food access and value based on quality and nutrition in the absence of increasing food prices and riots.

From these definitions it can be seen that other authors defined the concept not including all the four dimensions of food security as described by FAO, (2015) that is food availability, food accessibility, food utilization and food stability. However, WFS (1996) definition of the concept aligns with FAO (2015). Both definitions include all the four food security dimensions suggesting that for an individual, a household, a nation or the globe to be considered as food secured; food must be physically available through agricultural production, food aid or food importation in sufficient quantity and quality. Food should also be economic accessible through income and resources that allow the purchase or acquisition of appropriate food items. Also food must be adequately utilized

by the human body. The human body utilizes various nutrients present in the food which have a direct influence on the nutrition status of an individual of a household. Finally, food stability that strives to secure the mentioned three dimensions sustainably over time so that the population is in a position to have adequate food at all times irrespective of consequences such as sudden shocks on prices, climatic conditions, and economic fluctuations (Ibnouf, 2009).

Therefore, to achieve food security all the four dimensions must be achieved simultaneously. However, adequate food supply does not at all the time guarantee household or individual level of food security. This is because lack of economic access is among the greater problems of food security than food availability to most individuals and households (Hwalla *et al.*, 2016).

2.1.2 The concept of nutrition security

According to World Food Program WFP (2015) nutrition security is an essential component of food security. Therefore, should be embedded within all four of its dimensions that is food availability, accessibility, utilization, and stability (Hwalla *et al.*, 2016). Nutrition security mainly focus on food nutritional components and nutritious requirements in terms of proteins, energy, vitamins, and minerals of the food for the consumption of an individual at all times, therefore an extension of food security (Quisumbing, 1995). Food and nutrition security is therefore claimed to exist when all people, at all times, have physical, social, and economic access to food which is consumed in sufficient quantity to meet their dietary needs and food preferences, and is supported by the environment of adequate sanitation, health services and care, allowing for a healthy and active life (Committee on World Food Security, 2012).

2.1.3 The concept of household, and household food and nutrition security

A Household consists of one or more individuals who undertake joint or coordinated decisions, co- residence, and share a meal (Beaman and Dillon, 2012). It further extends to the ability of the household members to not only be physically living under the same roof but are also socially interdependent (Morris *et al.*, 2000). It is through the household that interaction of physical, natural, human, financial and social assets and its accessibility can be investigated.

Household food and nutrition security (HFNS) is the expanding availability and accessibility of nutritional food at sustainable basis by household members within the households (Ibnouf, 2009). Liru (2014) defined household food security based on the number of mouths to feed; that is the size of population in the household through birth while Ibnouf (2009) who defined HFNS focusing on the expanding availability and accessibility of nutritional food on a sustainable basis within the household. This implies that household food and nutrition security is making available all foodstuffs in sufficient quantities with adequate food qualities regardless of food origin whether produced, imported or donated as food aid for members of the household (Sasson, 2012). Household Food and Nutrition Security (HFNS) is therefore the ability of the household to secure either from its own production or through purchases or food aid; adequate food for meeting the dietary needs of all members of the household (FAO, 2010).

2.2 The Status of Food and Nutrition Security

2.2.1 Food and nutrition security status in the sub Saharan Africa

Across the world there are sufficient resources for food acquisition to feed everyone, yet the number of people who are unable to secure healthful food keeps on increasing (FAO, 2014). In the Sub Saharan Africa, food and nutrition security are the most pressing

challenges to a rapidly growing population as the number of the malnourished keeps on increasing despite efforts applied. This is due to a number of reasons amongst which being higher population growth rate. The high population growth rate in the sub Saharan-Africa marks for slower progress in hunger reduction as compared to other parts of the globe such as Latin America, Northern Africa, Central and Eastern Asia (FAO *et al.*, 2015). The trend show that by 1990-92; 1011 million people were food insecure of which 991 million people are from developing countries of Africa and Latin America, and 20 million people from developed countries such as United States, European countries (FAO *et al.*, 2015). This shows that food and nutrition security is still a major problem worldwide and especially in the Sub Saharan Africa (Project Concern International, 2009).

It is therefore argued that, food security calls for primary responsibility of all organizations and governments to ensure that every man, woman and child under their jurisdiction, individually or in community with others, have physical and economic access at all times to sufficient, nutritious food despite the shock and growths of population (United Nations, 2014).

2.2.2 Food and nutrition security status in Tanzania

Despite great food harvests and the government's efforts to improve agricultural production; food and nutrition security are still major economic and social problems in Tanzania (Matunga, 2008; Mukungu, 2016; World Food Program Strategic Review, 2016). The country ranked 62 out of 78 countries on the 2013 Global Hunger Index (GHI) with a score of 20.6 categorized as alarming (International Food Policy Research Institute, 2013). Although the prevalence of undernourishment has fallen since its peak in 2002-2003 (above 37%), food insecurity has increased since the 1990s, from an

undernourishment rate of 24.2% in 1992 to 35.7% in 2012 (WFPSR, 2016). In 2013, 15.7 million Tanzanians were still food and nutrition insecure, representing 33 % of the population (FAOSTAT, 2014).

2.3 Contribution of women to Agriculture and Household Food and Nutrition Security

2.3.1 Contribution of women to agriculture

Participation of women in agriculture is unavoidable. They comprise of more than 50% of the world's agricultural labor force (FAO, 2011). In the rural economies where agriculture is dominantly performed, women play a major significant role especially in agricultural production. In Sub-Saharan Africa, for example, micro-level studies have shown that women contribute greatly in many aspects of agricultural production such as weeding, transplanting, post-harvest work and, in some areas, land preparation and both take part in seeding and harvesting. Moreover, Sub-Saharan and near Eastern women also play a major role in household animal-production enterprises, where they tend to have the primary responsibility for the husbandry of small animals and ruminants, but also take care of large-animal systems, herding, providing water and feed, cleaning stalls and milking. In all types of animal-production systems, women have a predominant role in processing, particularly milk products and are commonly responsible for their marketing (Ibnouf, 2009; Liru, 2014).

Women are therefore, the pillar of development in rural and national economies (Mmasa, 2013). Despite the time consumed, hardworking and roles played by women in the agricultural sector, women's contribution is less appreciated as compared to men and most of their labors go unpaid (Ibnouf, 2009). In most cases it is considered as just a help rather than an occupation or an important contribution to the agriculture sector. If the

women's unpaid work was properly valued, they would have emerged as major bread winners in most societies (Liru, 2014). This is because, women are claimed to work longer hours than men due to their multiple roles in agricultural production, income activities and house chores. Ibnouf (2009) contend that unvalued economic contribution of women if reasonably calculated, would lead to a fundamental change in the context in which today's social, economic and the political policies are framed.

2.3.2 Contribution of women to household food and nutrition security

Research in Africa, Asia and Latin America has found that improvements in household food and nutrition security are associated with women's access to income and their role in household decisions on expenditure. Women tend to spend a significantly higher proportion of their income than men on food for the family (Ombakah, 2014). Women greatly contribute to household food and nutrition security, but the recognition of this contribution is lower because there is no gender-disaggregated data to show separate information of the women's performance of roles that contribute to household food and nutrition security (FAO, 2011).

2.4 Gender Perspectives

Gender Perspective is a framework that articulates the construction of relationship in the society. It assesses the implications for men and women interaction for any planned action. Unlike other approaches like the feminism which views women as victims of oppression and ill treatment against men, gender perspectives views women as agents of change. It therefore focus on how women and men can interact so as to access resources and opportunities within their communities (Nyamwanji, 2016).

In the four food security dimensions, gender perspective can be expressed with respect to food availability, food accessibility, food utilization and food stability. Women are constrained by inaccessibility to ownership and control of livelihood assets, which has a direct impact on their contribution to food production and other food roles that contribute to household food and nutrition security. This results to lower investment by women in the agriculture sector. Therefore compromises future production potential and increases food and nutrition insecurity.

Women are also responsible to ensure food accessibility in the household through food purchase (Adepoju *et al.*, 2015). Food purchase is especially practiced for food types that are not locally produced; are out of season or for households that have not harvested in that current year. Food purchase is only possible when women are able to secure money from sources such as engaging in off farm activities or resale of the produced agricultural products.

Food stability is affected especially in times of natural disasters and harvest failures. It is in these times that men who are more responsible in making ends meet at home leave homes in search of fast paying jobs letting the responsibility of feeding families and making ends meet be upon the women (Kalansooriya and Chandrakumara, 2014). Women also play a critical role to food utilization since they are mostly involved in food portioning and dietary diversity decisions within their household as compared to men. Women are typically responsible for food roles in the households therefore are crucial to the achievement of food and nutrition security within their households.

2.5 Theoretical Approach

2.5.1 The classical theory of balanced diet

The classical theory of a balanced diet is a theory that has evolved from the theory of nutrition. This theory was developed by the ancient Aristotle and Galen between the end of 19th Century and 20th Century. The classical theory of balanced diet mainly focuses on food composition, such that food should contain proteins, fats, carbohydrates, vitamins, minerals and water so as to better meet the body needs. Also to know how much energy is being consumed on a daily basis since utilization of the food which is among the dimensions of food and nutrition security is carried out by the body. Proper balanced diet promotes working capacity especially for adults which enables them to properly engage in other economic activities and maintain good health status.

2.5.2 The human capital theory

The human capital theory traces its origin from the macroeconomic development theory in the 1960's. Its emphasis was such that people's learning capabilities are of comparable values with other resources involved in the production process. Human capital theory traces its roots to the early 1960's by Schultz, who proposed that human capital should consist of knowledge, skills and abilities, of the people in an organization, a firm, a village etc. According to Bontis (1999), human elements are those that are capable of learning, changing, innovating and providing the creative push which if properly motivated can ensure the long term survival and sustainability of an organization, a project or a lifestyle. This theory therefore suggests that if people invest on education and training they will increase their ability and skill level and be more productive than those who have no or less education and skills. Therefore to ensure sustainable household food and nutrition security people are to go through education and trainings especially on

household nutrition security so as to build their awareness and capacity in order to ensure sustainable household food and nutrition security in the study area.

2.5.3 Utility maximization theory

Utility theory is a positive theory that seeks to explain the individuals' observed behavior and choices. It has based its beliefs upon individuals' preferences. It is a theory advanced in economics to explain behaviors of individuals based on the premise that people can consistently rank in order their choices based on preferences. The theory is applicable under the following assumptions;

- a) **Completeness:** Individuals can rank in order all possible bundles. This means that, no matter how many combinations of consumption bundles are placed in front of the individual, each individual can always rank them in some order based on preferences. This can be related at a household level where one can have a bundle of food items. The consumption of one food item and non-consumption of the other food item is based on the order of preferences a consumer has set for oneself.
- b) **More-is-better:** Assume an individual prefers consumption of bundle A of goods to bundle B. Then he is offered another bundle, which contains more of everything in bundle A, that is, the new bundle is represented by αA where $\alpha = 1$. The more-is-better assumption says that individuals prefer αA to A, which in turn is preferred to B, but also A itself. This means that if an individual chooses a certain food item or group would prefer to consume more and more of that food item/group as compared to other bundles that are offered.

- c) **Mix-is-better:** The “mix-is-better” assumption about preferences says that a mix of the two, say half-week of food mixed with half-week of clothing, will be preferred to both stand-alone choices. Thus, a glass of milk mixed with Milo (Nestlé’s drink mix), will be preferred to milk or Milo alone. The mix-is-better assumption is called the “convexity” assumption on preferences, that is, preferences are convex. This means that household members would prefer to consume a mixed bundle of food items so as to either be food secured, nutrition secured or both. For example a mix of staples with vegetable or meat.
- d) **Rationality:** Under this assumption of rationality, individuals’ preferences avoid any kind of circularity; that is, if bundle A is preferred to B, and bundle B is preferred to C, then A is also preferred to C. Under no circumstances will the individual prefer C to A. It assumes that the innate preferences (rank orderings of bundles of goods) are fixed, regardless of the context and time. This implies that sometimes a person’s consumption choice remain fixed regardless of availability of other food choices due to factors such as tastes and personal preferences.

2.6 Review of Empirical Studies

2.6.1 Review of evidence from similar studies

Similar studies have been conducted across the globe on the contribution of women to household food security in semi-arid farming systems. Among the discussed factors that determine household food security and welfare were such as income of the farmers, age of the farmers, involvement on the risk sexual behaviors, the size of land owned by the farmers and the post-harvest activities that contributed to food losses (Palacio and Mehta, 2011; Ojo and Wuran, 2013; Adebayo and Mateete, 2014; McCoy *et al.*, 2014). Also it was argued that; greater portion of women’s income is consumed on household welfare

as compared to men's income; food being first followed by other needs such as clothing, education, health and house rents (Mehta and Palacios, 2011).

Households where men have more power in production decisions and work more on the fields were said to be more food secured as compared to female headed households (Mehta and Palacios, 2011). This prior argument is contrary to that of Ibnouf (2009), she argued that in the rural areas women are more capable than men especially on the ability to use and allocate the available resources for the purpose of improving household food security. According to Ojo and Wuran (2013) women have control over the nutrition status of food consumed since they prepare and process the food products and determine the quantity and quality of food to provide for the families. In the semi-arid farming systems the productivity and involvement of women in food production and food security is higher as compared to men because men engage more in animal pastoralism (Mlambo and Mapiye, 2015).

According to the FAO (2014), if women had the same opportunities in terms of access to productive resources (seeds, fertilizers, tools, loans, etc.) as men, they could increase their yields by 20-30%. This would mean an increase in the production of agro-food of between 2.5 and 4%, thus reducing the number of people affected by malnutrition by around 12-17%. However, food security is still the biggest challenge for a large part of the world since the number of the people who lack sufficient nutrients from the food they consume still increases despite the efforts put to eradicate it (Braimah, 2013; Nhemachena, 2014).

2.6.2 Review of empirical methodologies

Women contribution on household food security has been addressed by a number of authors such as Hove and Gweme, 2017; Alade and Eniola 2012 and Gebre (2012) using various methodologies. In the study conducted by Hove and Gweme (2017) which was about women's food security and conservation agriculture in Zaka District Zimbabwe; the study was designed to evaluate the extent to which conservation agriculture contribute to food security in the semi-arid areas. Mixed method approach was used where data was collected through key informant interview, focus group discussion and observation. Despite the choice of mixed method approach which involves both the use of qualitative and quantitative approaches, the study lacked analytical approach since the researcher focused more on the qualitative approach which based on the assessment of attitude, behavior, opinions, insights and impressions. The mixed method approach used has limitations such that it is complex method which requires a complex research design, also resource and time consuming and is labour intensive. However, its usefulness is that it can be used to reduce gap in information when some data does not provide all the necessary information. The mixed method approach also provides complete and comprehensive understanding of the research problem since it combines both qualitative and quantitative research methods.

Alade and Eniola (2012) conducted a study on the contribution of gender on household food security. Multistage sampling techniques were used so as to select respondents. Data was collected from primary data sources using structured interviews. The data were analyzed using descriptive (frequencies, tables) and inferential statistics (Chi- Square) so as to determine the socio-economic characteristics of respondents and their contribution through physical, economic and sustainability of food access to the household as related to sex, family structure, education background, occupation, and household size. The

advantage of using Chi-square is such that it is an easier method to compute than other methods reviewed; it also can be used when data has been measured on a categorical scale, and makes no assumptions on the distribution of population. This method however is constrained because it requires for all participants measured being independent, data must be in frequency data also assumes random sampling of respondents (McHugh, 2013).

Gebre (2012), conducted a study focusing on examining the determinants of food insecurity among urban households in Addis Ababa in Ethiopia. The researcher specifically addressed the food insecurity gap and its severity among urban households and identification of the determinants of food insecurity among the urban households. The study used 2006/07 Young Lives household survey conducted by Young Lives of Ethiopia. Data was collected using purposive and simple random sampling techniques applied and analyzed by both descriptive statistics and econometrics analysis where the descriptive analysis used Foster, Greer and Thorbeck distributional measures of food insecurity while econometric analysis used binary logistic regression model. Therefore binary logistic regression models for analysis was the method for analyzing the role of women on household food security. Binary logistic regression has weaknesses since it requires much data for analysis so as to get meaningful results. However, its strength is that it is more flexible as compared to other methods prior mentioned.

2.7 Conceptual Framework

The conceptual framework is a structured outline presenting variables to be studied and hypothetical relationship between and among variables (Kothari, 2004). The conceptual framework (Fig.1) shows the relationship between women contribution through food production and off farm activities and how the two concepts contribute to household food

and nutrition security in the study area. It also shows how the roles of food production, food preservation, food preparation, food storage, and food processing assist the women to contribute on household food and nutrition security.

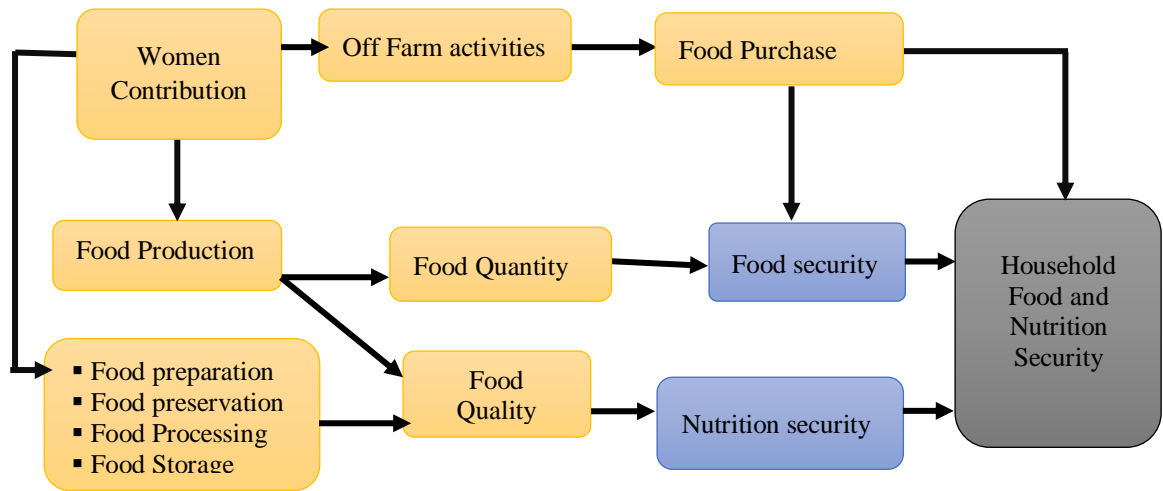


Figure 1: Conceptual framework

Source: Adopted from (FAO, 2007; FAO 2011).

CHAPTER THREE

3.0 METHODOLOGY

3.1 Study Area

The study was conducted in rural areas of Chamwino District which is one of the seven districts of Dodoma Region. Majority (80%) of the residents in Chamwino district are smallholder farmers engaged in crop farming and livestock keeping (Chamwino District Profile, 2015). The District has a total area of 8056 square kilometers, with the population of 368 886 people male being 177 312 and female are 191 574 (United Republic of Tanzania URT, 2012; Nyamwanji, 2016). The study area was chosen due to its nature of semi-arid which is prone to drought with lower rainfall. This hinders food and nutrition security by food production alone (Matunga, 2008). Also the life pattern of most people living in the selected area is that majority of male leave the villages in search of high and fast paying jobs in the urban centres, leaving larger part of food production and other household responsibilities to women at home; there is also a growing immigration in the study area which is expected to increase population that will put pressure on the available resources such as land for food production, and settlement.

3.2 Research Design

A cross section design was used for this study. This is because it allows data to be collected at a single point in time and can be used for a descriptive study as well as for determination of relationship between variables (Babbie, 1990; Bailey, 1998). The design also saves time and other resources for data collection (Casley and Kumar, 1988).

3.3 Target Population

Female members (of 18 years old and above) in Chamwino Districts were selected for the study. This is because the study focused on examining the contribution of women only to household food and nutrition security in the study area.

3.4 Sampling Design and Sample Size

The sample size consisted of 150 respondents who were randomly selected. The use of the sample size was determined based on the argument made by Matata et al. (2001), that a sample of 120 respondents and above is adequate for most socio-economic studies. Sample size was determined by the following formula developed by Cochran (1977).

$$n = Z^2 pq / e^2$$

Where: n is the minimum sample size.

Z= Standard normal deviation set at 1.96 as corresponding to 95 confidence level,

e = the desired level of precision or degree of accuracy set at 0.05

p = the estimated proportion of an attribute that is present in the population

(signifies the percentage of the targeted population estimated to have a particular characteristics set at 0.5 and

q= is the percentage of failure; 1 – p set at 0.5.

In this case, Z = 1.96, P = 0.5, q = 0.5 and e = 0.05

Therefore, Sample size;

$$n = Z^2 pq / e^2$$

$$n = 1.96^2 \times 0.5 * 0.5 / 0.05^2$$

≈ 385 respondents

However, the researcher used a sample size of 150 respondents due to financial limitations and inaccessibility of some villages. In consideration of the missing effect in the result, the researcher obtained supplement information through focused group discussion and interviewing the key informants.

3.5 Sampling Procedure

Multistage sampling technique was used in selecting the District, wards and villages. Where stratified random sampling was used to select 2 wards out of the 36 wards that make up Chamwino District. The selected wards were Buigiri and Mlowa Barabarani. Simple random sampling was used to select two villages, one village from each ward. These were Chinangali II and Mlowa Barabarani. From Chinangali II village 46 households, each with a woman or women of above 18 years of age were selected and 104 households, each with a woman or women of above 18 years of age were selected from Mlowa Barabarani village proportionately. These households were randomly selected from the prepared village register which was used as a sampling frame. Other respondents included the key informants who were the District Agricultural officer, District Nutritional Officer and Village Agricultural Extension Officers. However results and findings should be taken with cautious due to reduced sample size as a result of financial limitations and inaccessibility of some villages which might have caused bias.

Table 1: Population and sample

District	Wards	Village	Population	Respondent
Chamwino	Buigiri	Chinangali II	3 387	46
	Mlowa	Mlowa	20 337	104
	Barabarani	Barabarani		
	Total			150

3.6 Type of Data and Data collection Tools

3.6.1 Type of data collected

Primary and secondary data were used in the study. The primary data were obtained from respondents who were randomly selected as explained in section 3.5. The primary data was collected using semi-structured questionnaire in Appendix 1 through face to face interview. The researcher conducted face to face interview in order to have clear response from respondents. Secondary data was extracted from previous reports which include Journals, Articles and Research reports. Key informants such as the District Agricultural Officer, District Nutrition Officer and Village Agricultural Officers were interviewed using the key informant interview guide in Appendix 2.

3.6.2 Data collection tools

3.6.2.1 Semi-structured questionnaire

The designed questionnaire was simple and clear for anyone to fill it even without any much assistance from researcher as indicated in Appendix 1. It was meant to capture knowledge and experience from the respondent on food and nutrition security in their households. Therefore, apart from its effectiveness in covering large area of the population, questionnaires were used so that to give the respondent the room for them to provide honest responses. The socioeconomic characteristics variables include age, household income, education, marital status, household size and economic activity were also captured through the questionnaire. Moreover, other variables such as financial services, access to information and access to productive resource were besieged along with data on how food was prepared, preserved, processed and consumed by household members.

3.6.2.2 Key informant interview guide

An interview guide was used to collect data from identified key informants in the study area as shown in Appendix 2. The key informants were selected based on their accessibility, willingness to talk and knowledge on the issues spelt out on the subject matter of household food and nutrition security. The key informant was asked to provide data relating to women's awareness and understanding of the concepts of food and nutrition security and its practicability in the households. The nutrition experts were also interviewed to give information on the nutrition information such as the rates of malnutrition, stunting and wasting of children in the study area.

3.6.2.3 Focus group discussion guide

Focused group discussion (FGD) was conducted so as to get the general understanding of the women in the study area on household food and nutrition security. Nevertheless, FGD was conducted to compare women's awareness on household food security versus women's awareness on household nutrition security. A total of eight women respondents participated from Mlowa Barabarani village and a total of ten women respondents participated from Chinangali II village. Only those who were not part of face to face interview were selected for FGD along with other informants.

3.7 Data Analysis

Prior to analysis the data was first coded in Statistical Package for Social Sciences (SPSS) which is a user friendly software. The data was cleaned to deal with outliers, missing information and managed to separate based on specific objective. Both statistical and econometrics analysis were used to analyze data for meaningful interpretation. Linear regression and Food Consumption Scores and Nutrition quality analysis FCS-N were also employed for the analysis.

3.7.1 Assessment of women's awareness of household food and nutrition security

The specific objective one intended to assess women's awareness of household food and nutrition security in the study area. This was done so as to detect women's awareness and understanding of the concepts of food security and its four dimensions that are food availability, food accessibility, food utilization and food stability and nutrition security as an extension of food security in the study area. Descriptive statistics was employed to analyze women's awareness of household food and nutrition security. Descriptive statistics enables the researcher to present data in a meaningful way therefore simplifies the interpretation of data (Pizarro, 2015). Frequency and percentage were used to present the results.

3.7.2 Determination of the status of household food and nutrition security in the study area

The Food Consumption Score and Nutrition quality analysis (FCS-N) adopted from the World Food Program WFP (2015) was used to analyze the status of household food and nutrition security in the study area. Food Consumption Score was calculated using the frequency of consumption of different food groups consumed by individuals or households during seven days before the interview. The scores are expected to present the nutrients rich groups consumed by household members. FCS-N focuses on dietary diversity and food frequency (WFP, 2015). According to International Food Policy Research Institute (IFPRI, 2009), Food Consumption Scores are clearly superior to other measures of dietary diversity and nutritional security of households. In addition the main source of each food item consumed was also identified. The results were presented in average of the surveyed households in the study area.

Table 2: Measuring food consumption score and nutrition quality analysis**(FCS-N)**

Food Group	Frequency	Weight	FCS-N	FCS-N Components
Main Staples	Xx	2	Xx	Energy
Pulses	Xx	3	Xx	Protein
Vegetables	Xx	1	Xx	Vitamins
Fruits	Xx	1	Xx	Vitamins
Meat & Fish	Xx	4	Xx	Protein +Iron
Milk	Xx	4	Xx	Protein +Vitamin
Sugar	Xx	0.5	Xx	
Oil	Xx	0.5	Xx	
Condiments	Xx	0	Xx	
Food Consumption Score and Nutrition Quality Analysis (FCS-N)			Xxx	

Source: Food consumption score nutritional analysis guideline (WFP, 2015)

3.7.3 Determination of the factors influencing women's contribution on household food and nutrition security

Women's contribution through participation in food roles such as food preparation, food processing, food preservation and food storage was addressed. Descriptive statistics was used to present the results in tables and figures. Linear regression analysis was then used to analyse the factors influencing women's contribution to household food and nutrition security that was measured through the household food consumption scores obtained. Linear regression was used so as to check for the possible effect on the dependent variable that might be caused by the changing the independent variable (Reyna, 2007).

Mathematically the model was represented by

$$\gamma_i = \beta_0 + \beta_i X_i + \beta_i Z_i \varepsilon \quad \dots\dots\dots (1)$$

Where

γ_i = Household food and nutrition security

X_i = Socio-economic factors

Z_i = Non socio-economic factors

β = Coefficient

β_0 = Intercept

ε = Error term.

$i = 1, 2, 3 \dots\dots\dots$

The definition and measurement of variables were provided in Table 3;

Table 3: Variables and measurements

S/ N	Variable	Explanation of Variable Measurement	Unit	Expected Sign
	Household Food and Nutrition Security	Food Consumption Score and Nutrition Quality Analysis (FCS-N)	Number	
	Socio-economic factors			
1	Age	Age of the woman	Year	+/-
2	Education level	1 if woman had formal education, 0 Otherwise	Dummy	+/-
3	Marital status	1 if woman married, 0 Otherwise	Dummy	+/-
4	Household size	Number of members in the household	Number	+/-
5	Woman's income	Total woman's income per annum	Dummy	+/-
6	Economic activity	1 if farming, 0 otherwise	Dummy	+/-
	Non-Socio-Economic Factors			
7	Access to information	1 if woman access the information, 0 Otherwise	Dummy	+/-
8	Access to financial Service	1 if woman access financial services, 0 Otherwise	Dummy	+/-
9	Access to productive resource	1 if woman access land resource, 0 Otherwise)	Dummy	+/-

3.7.3.1 Test for underlying assumptions of the econometric model

- **Regression diagnostic tests**

This was primarily performed with the model to observe the exact level of significance of each estimated value, checking on how the data meet the assumption of OLS regression. When doing linear regression, all assumptions underlying linear regression should not be violated and the predictors are thought to be linear in parameter.

- **Multicollinearity**

Multicollinearity occurs when independent variables in a regression model are correlated. This correlation is a problem because it reduces precision of the estimated independent variables in a model. If the degree of correlation between variables is high enough, it can cause problems when you fit the model and interpret the results. Gujarati (2007) suggests that if there is multicollinearity among independent variables one independent variable may either be dropped or combine cross sectional and time series data, or additional of new independent variable or do nothing or transformation of variables. Variance Inflation Factor VIF was calculated for each of the independent variables in the model. Gujarati (2009) suggests that, the larger the value of variance inflation factor (VIF), the more troublesome or collinear will the independent variables be. From estimation results VIF for each variable was less than five (5). Therefore there was no serious multicollinearity. This is shown in Appendix 4. Therefore in this study do nothing was opted as a way of dealing with multicollinearity.

- **Heteroscedasticity**

Heteroscedasticity is defined as a situation in which the variance of the dependent variable varies across the data. It is common applied for cross-sectional data. This problem of Heteroscedasticity is normally found in regression analyses (Greene, 2009).

Heteroscedasticity test was performed to trace whether assumption of homoscedasticity has been violated. Before Heteroscedasticity test was conducted, null hypothesis (H0) and alternative hypothesis (H1) were developed, null hypothesis (H0) stated that there is constant variance (homoscedasticity) while alternative hypothesis (H1) stated that no constant variance (Heteroscedasticity). However, result of Chi-square had 6.49 with p-value (0.0109) less than 10% level of significance. This gives evidence of rejecting null hypothesis (H0). Therefore, Heteroscedasticity was not a serious problem as shown in Appendix 5.

- **Model specification test**

The model specification test was performed to check whether a model is correctly specified. Gujarati (2007) argued that model for data analysis should not have specification bias. *Hatsq* test was conducted to test the model. The null hypothesis stated that a model is well specified while alternative hypothesis stated that a model is not well specified. From the test, *hatsq* had 0.0886 with P – value (0.774) of *hatsq* is greater than 10%, hence we fail to reject the null hypothesis. Therefore, a model is well specified and not suffering from specification bias as indicated in Appendix 6.

- **Test for omitted relevant variable**

Test for omitted relevant variable was conducted to check whether there was any relevant variable to be addressed that was omitted. Before testing for missing relevant variable, null hypothesis was set which says no omitted relevant variable and alternative hypothesis says there is omitted relevant variable. However result of $F(3, 137) = 1.02$ with P value = 0.3879. Since P value (0.3879) is greater than 1% level of significance ($P < 1\%$) we fail to reject the null hypothesis. Therefore no relevant variable was omitted and no irrelevant variable was included in the model. This is shown in Appendix 7.

CHAPTER FOUR

4.0 RESULTS AND DISCUSSIONS

4.1 Demographic Characteristics

4.1.1 Age of respondents

The women in the study area are in the adult working age of 33-42. This is represented by 34% in Mlowa Barabarani village and 31% in Chinangali II village. At this age group women are said to be in a better position of engaging in both farm and off farm activities which gives them access to resources such as income (McCarthy and Sun, 2009). The income access enables the women in the study area to buy inputs and food items belonging to the food groups that cannot be produced locally. This is indicated in the Fig. 2 as follows.

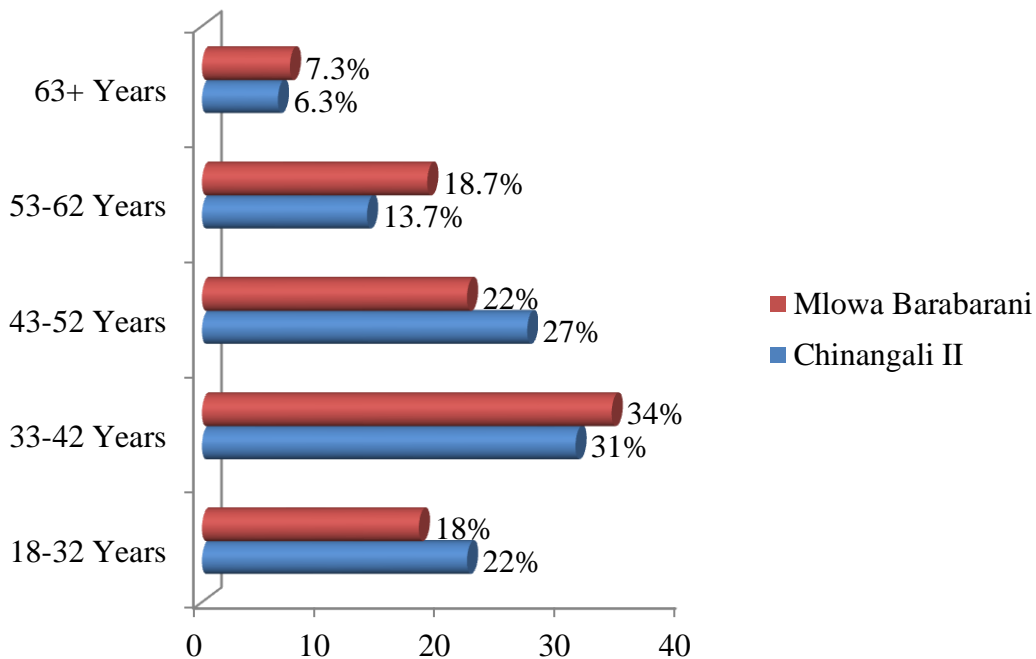


Figure 2: Distribution of respondents by age

4.1.2 Education level of respondents

Education is a process of transferring knowledge through systematic instructions or guidance. It may be specific knowledge acquired by an individual after studying particular subject matters or experiencing certain life lessons. Education is provided by either the instructors or certain life situations. Findings show that majority of the women in both villages Mlowa Barabarani and Chinangali II had attained a primary level of formal education by 53.8% and 47.8% respectively. This level of education is however not satisfactory in ensuring that households are food and nutrition secured. According to UN Report (2013), educated women are said to be the utmost sole determinant of food and nutrition security. This is because education enables women to have access to proper knowledge on household food and nutrition security, also gives them access to income which increases the expenditure on food. The levels of education attained are illustrated in the Table 4 as follows;

Table 4: Education level of respondents

Village Education level	Chinangali II		Mlowa Barabarani	
	Frequency	Percent	Frequency	Percent
No Formal education	10	21.7	20	19.2
Primary education	22	47.8	56	53.8
Secondary education	8	17.4	22	21.2
Higher Learning Education	6	13.0	6	5.8
Total	46	100.0	104	100.0

4.1.3 Marital status of respondents

Marital status is a person's state of being single, married, separated, divorced, or widowed. Fig. 3 shows that 57.8% of women from Mlowa Barabarani and 45.9% of women from Chinangali II village were married. Majority of women in the study area are involved in marital roles at a younger adolescent age. Marriage in adolescent age supports

higher rate of malnutrition, anemia to mothers, low birth weight, poor nutrition status and stunting to children. This is due to maternal-foetal competition for nutrients and energy between mother and child since adolescent mothers are still growing and developing themselves (Malhotra and Singh, 2011). Early marriage puts the women in a greater risk of nutrition insecurity. The higher marital status in the study area is driven by cultural beliefs, and the demand for men to have women working in the agricultural production and other food and reproduction roles within the household.

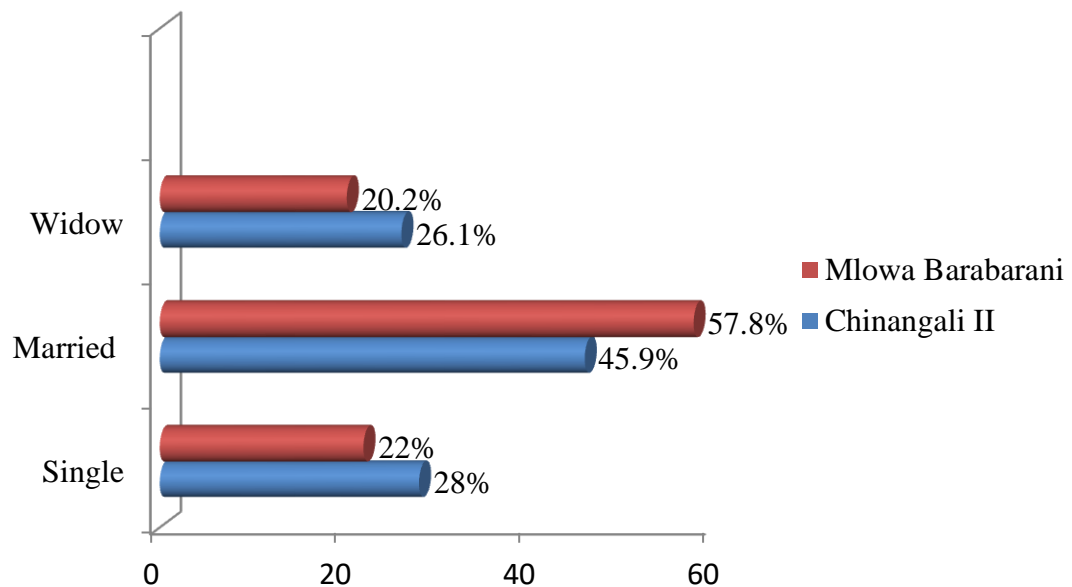


Figure 3: Marital status of respondents

4.1.4 Household size of respondents

The findings from Table 5 indicate that 47.8% of the women in Chinangali village and 35.6% of women in Mlowa Barabarani village were living in the households of 8-12 members.

Table 5: Household size of respondents

Village Household size	Chinangali II		Mlowa Barabarani	
	Frequency	Percent	Frequency	Percent
0-4 Household members	2	4.3	28	15.4
4-8 Household members	11	23.9	36	24.0
8-12 Household members	22	47.8	49	35.6
12-16 Household members	11	23.9	37	25.0
Total	46	100.0	104	100.0

4.2 Socio-economic Characteristics

4.2.1 Economic activity of respondents

An economic activity is any activity that is performed by person to generate income. It involves the production of goods and services with a view to make them available to consumers. Economic activity may either be self-employment through business vending and agripreneurship or profession employment (FAO, 2007). From the findings majority of the women from both villages Mlowa Barabarani and Chinangali II village depended on agricultural production as a major economic activity. This goes by a percentage of 36.7% and 40.7% respectively. According to FAO (2011), almost 50% of the women in developing countries are employed in agricultural production. They therefore make a significant contribution to the agriculture sector and to the household food and nutrition security. This is shown in Fig. 4;

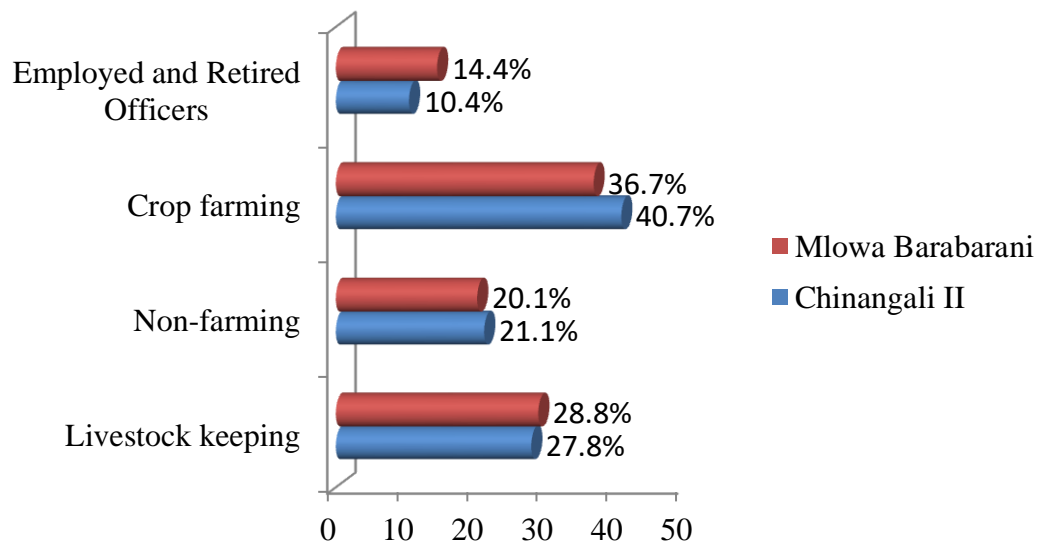


Figure 4: Economic activity performed by women

4.3 Women's Awareness of Household Food and Nutrition Security

4.3.1 Women's awareness of household food security

The findings shows that the women in the study area were aware of the concepts household food security, as shown in Table 6, the women's awareness of household food security in both villages Chinangali II and Mlowa Barabarani were 60.9% and 40.4% respectively. Their awareness or understanding is limited to only one dimension of food security which relies on food physical availability. The women in the study area are less aware of the other three dimensions of food security which are food accessibility, food utilization, and food stability.

Table 6: Women's awareness of household food security

Village Variable	Chinangali II		Mlowa Barabarani	
	Frequency	Percent	Frequency	Percent
Availability of food	28	60.9	42	40.4
Access of Food	11	23.9	28	26.9
Availability and Access of food	7	15.2	34	32.7
Total	46	100.0	104	100.0

4.3.2 Women's awareness of household nutrition security

The results shows that, the women in the study area were aware of household nutrition security as shown in Table 7 which presents the extent of women's awareness on the concept of household nutrition security. The finding reveals that majority of the women in both Mlowa Barabarani and Chinangali II village were aware (understood) of the concept of nutrition security as the ability to consume enough food produced. Findings from focused group discussion also align with this argument since it reported that majority of the women in the study area perceived household nutrition security as consumption of a simple diet that includes a single food item. The women further responded that, the food to be consumed does not have to include all the necessary food groups or consider the necessary nutritional requirements.

Lucy; one of the participants in the focus group discussion was quoted saying that *"nutritious diets are for the rich people who can afford all the food groups per meal"*. Her argument focused on the perception that household nutritional security is highly related to financial status. The argument reflects lack of awareness and proper understanding of the concept. The human body requires a balanced diet that must have all the food groups such as carbohydrate, protein, fats, vitamins and oils to support proper growth and development, particularly during infancy and childhood (World Health Organization

WHO, 2014). Hence, lack of balanced diet would results to ineffectiveness of people towards production activities, also increases the chances for vulnerability for diseases.

Table 7: Women’s awareness of household nutrition security

Village Variable	Chinangali II		Mlowa Barabarani	
	Frequency	Percent	Frequency	Percent
Meet Dietary Needs Through Purchasing and Production	14	30.4	29	27.9
Consumption of Enough Foods produced	23	50.0	52	50.0
Meeting Daily Dietary Consumption & Self-Sufficient	9	19.6	23	22.1
Total	46	100.0	104	100.0

4.3.3 Challenges to the awareness of household nutrition security

There has been a number of efforts applied to create awareness of nutrition security in the study area. Among the efforts are such as improving nutrition security for pregnant women and infants’ age between 0-1000 days under Save the Children International. Despite the effort, little emphasis has been put considering other adult members of the household irrespective of their gender and age. During Focused group discussion, the women in the study area mentioned the challenges that affects their practicability in achieving household nutrition security. These are such as;

- **Women’s perception** on the concept is negative due to traditional experience in childbirth and childbearing. Also due to culture and norms influenced by the mothers and mothers-in-law on how to feed and raise their children and themselves (the pregnant women).

Sophia from Save the Children Project confessed that some mothers in law are a hindrance to practising the knowledge of nutrition security. She narrated *that* “They have had more than five children and fed them with what they had. They did not consider the nutrient requirements and their children are grownups now

and are very energetic” Therefore, the women consider passing the experience to the current generation denying them the ability to learn and practice new ways of feeding infants and themselves.

- **Less consciousness of turning the resources owned for food consumption** as a way of improving diets. The women in the study area have resources or access to some of these resources such as cows, chicken and vegetables that are kept in small gardens around the household. However, the main aim of having the mentioned resources is for sale and not for household consumption. Hence, more education is needed to raise the women’s understanding of a balanced diet, also improve the women’s understanding of the importance of these household resources such as cows for meat and milk, chicken for eggs and meat.
- **Money hoarding** was identified as a challenge to the women’s awareness of household nutrition security. This is because some women might have the knowledge of what nutrition security is but does not give a priority to it due to the idea that they love to have money in their savings but not to be used for improving household nutrition security.
- **Male partners** were also identified to be a hindrance for the women’s awareness of household food and nutrition security in the study area. This is because even after conducting awareness seminars, women would hardly practice the knowledge because are denied the right to by the male partner in the idea of preventing food wastage. The male partners assume that by being able to consume different food items in a meal they are wasting the money that could be used to buy food for the next day or in times of shortage. Men as the key decision makers on what to eat in the household, also have a say on the household resources such as the livestock kept and the kinds of food items to be produced and purchased for

the household consumption. So, improving awareness of household nutrition security should focus not only on the women but also to the male partners in the study area for it have to tangible results.

4.4 The Status of Household Food and Nutrition Security

(FCS-N) was used to analyze the status of household food and nutrition security in the study area. Results in Table 8 revealed that on average, the Food Consumption Score was 16.1 meaning that majority of the households in the study area lie on the poor diet cluster. Due to the nature of the study area being semi-arid. The possibilities of achieving household food and nutrition security through agricultural production alone is limited. According to Musembi (2011) semi-arid areas still face higher rates of food insecurity due to less rainfall throughout the year. This leads to early cessation as a result total crop failure, poor post-harvest management technologies and low or no income gained from agricultural production. Nevertheless, findings in Fig. 6 show that the major food groups consumed in the study area were accessed through agricultural production. These were staple foods and pulses. This means that households in the study area depended on agricultural production to achieve food and nutrition security. Apart from engaging in agricultural production, Fig. 6 also showed that households in the study area purchased other food items that were not easily accessed through agricultural production. These are such as meat, fruits, vegetables and sugar. Findings further showed that the household members also received food gifts and food aids where they could neither produce nor purchase. This is well demonstrated in Fig. 5.

Table 8: Status of household food and nutrition security

Food Items	Food Group	Frequency	Weight	FCS-N	Classification by Cluster description	FCS-N Component
Maize, maize porridge, rice, sorghum, millet pasta, bread and other cereals.	Main Staples	10	2	20	Poor diet clusters	Energy
Beans, Peas, groundnuts and cashew nuts	Pulses	11	3	33	Borderline diet cluster	Protein
Vegetables, Leaves	Vegetables	2	1	2	Poor diet clusters	Vitamin A
Orange, mango, pineapple, avocado, pawpaw, cucumber, sweet banana, watermelon and Grapes.	Fruits	8	1	16	Poor diet clusters	Vitamin A
Beef, Goat, Poultry, Pork, eggs, and fish.	Meat & Fish	8	4	32	Borderline diet cluster	Protein + Iron
Milk, Yoghurt, and other dairy	Milk	6	4	24	Poor diet clusters	Vitamin A +Protein
Sugar and sugar products; honey.	Sugar	1	0.5	0.5	Poor diet clusters	
Oils, Fats, and Butter	Oil	2	0.5	1	Poor diet clusters	
Spices, tea, coffee, salt, fish powder, small amount of milk for tea.	Condiments	1	0	0	Poor diet clusters	
Overall FCS in average				128.5/8 = 16.1	Poor diet cluster	

FCS: 0-21= Poor diet cluster, 21.5-35= Borderline diet cluster and >35=acceptable diet cluster (WFP, 2015).

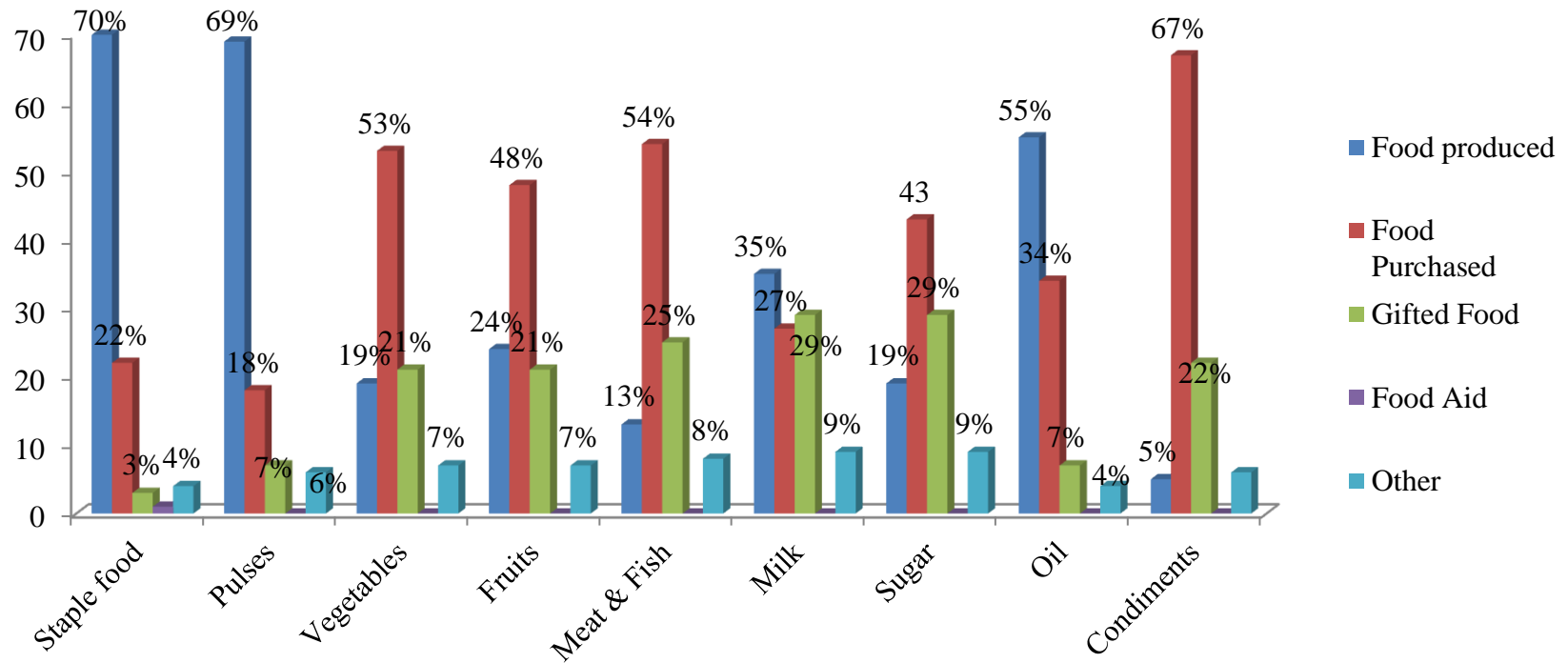


Figure 5: Main source of the food consumed

4.5 Factors Influencing Women's Contribution on Household Food and Nutrition Security

4.5.1 Women contribution on household food and nutrition security

Findings as indicated in Table 9 shows that in Mlowa Barabarani, 41.3% of the women respondents contributed to household food and nutrition security through engaging in both food production (farm activities) and small businesses (off-farm activities). While in Chinangali II 39.1% of the majority of women contributed to household food security through engaging in food production alone. According to Kalansooriya and Chandrakumara (2014), women play key roles in maintaining all four pillars of food security as well as nutrition security as food producers, and agricultural entrepreneurs by dedicating their time, income, and decision making so as to maintain household food and nutrition security.

Table 9: Women contribution on household food and nutrition security

Village	Chinangali II		Mlowa Barabarani	
Variable	Frequency	Percent	Frequency	Percent
Through food crop Production	18	39.1	34	32.7
Through engagement in small Business	11	23.9	27	26.0
Through food crop production and small Business	17	37.0	43	41.3
Total	46	100.0	104	100.0

4.5.1.1 Proxy for women's contribution on household food and nutrition security

- **Women's contribution through food preparation and food handling**

Hygiene is an important aspect of human health. Hand washing before food preparation is among the food hygiene's that is to be considered so as to promote good health. Women play central role to achieve household hygiene and health. This is because they are responsible for all kind of food preparation and handling in the household (Adebowale and Kassim, 2017).

Findings in Table 10 indicate that 43.5% of the respondents in Chinangali II village and 35.6% of the respondents in Mlowa Barabarani village regularly washed their hands before and during food preparation, whereas 10.9% of the respondents in Chinangali II village and 18.2% of the respondents in Mlowa Barabarani do not wash their hands at all before and during food preparation. Not washing hands at all or rarely washing hands before food preparation exposes the household members in the study area to foodborne diseases which have a negative impact health and wellbeing of the people; this is particularly for raw eaten foods such as fruits and vegetables that take short time of preparation. (Adebowale and Kassim, 2017). However women in the study mentioned that water scarcity is one among the factors that contribute to occasional hand washing and no hand washing at all. This is due to the fact that the study area lies on the semi-arid with few water sources and lower rainfall during the year (Allaban *et al.*, 2015).

Table 10: Women's frequency in hand wash before food preparation and food handling

Village Variable	Chinangali II		Mlowa Barabarani	
	Frequency	Percent	Frequency	Percent
Regularly wash hand	20	43.5	37	35.6
Not wash hand	5	10.9	19	18.3
Rarely wash hand	21	45.7	48	46.2
Total	46	100.0	104	100.0

- **Women's attendance to food preparation seminar or trainings**

Training and seminars are important aspects of knowledge transfer. Women's attainment of proper knowledge of food preparation helps to prevent food nutrients loss that usually occurs through evaporation. Evaporations occurs during food boiling especially for vegetables that

are rich in Vitamin C which is soluble to water and heat (Spritzler, 2016). Food frying also contribute to nutrient loss especially for food items such as fish. Vegetables also lose nutrients due heavy washing, and traditional drying. Findings in Table 11 shows that in both villages' women's attendance to food preparation seminar or trainings still lags behind as majority do not attend. This goes by 84.8% in Chinangali II village and 83.7% in Mlowa Barabarani village. Since food preparation seminars and trainings are directly linked to household food and nutrition security. It is vital to conduct them in the study area so as to improve the status of household food and nutrition security in the study area.

Table 11: Food preparation seminar or training program attended

Village	Chinangali II		Mlowa Barabarani	
Variable	Frequency	Percent	Frequency	Percent
YES (have attended)	7	15.2	17	16.3
NO (have not attended).	39	84.8	87	83.7
Total	46	100.0	104	100.0

- **Women contribution through food storage facilities**

Food storage facilities enable women to store surplus food so as to ensure food availability beyond harvest period (FAO, 1996). Fig. 6 shows the percentage of the women's choice of food crop storage facilities. Findings shows for all food groups, women in the study area use traditional food storage facilities. This is demonstrated by 38% of leguminous foods, 56% of cereal crops, 24% of vegetables, and 2 percent of root crops. Women's choice of traditional food storage is still predominant in the study area. Despite its negative effects such as fungi and less longevity, traditional food storage is cheaper compared to other food storage facilities.

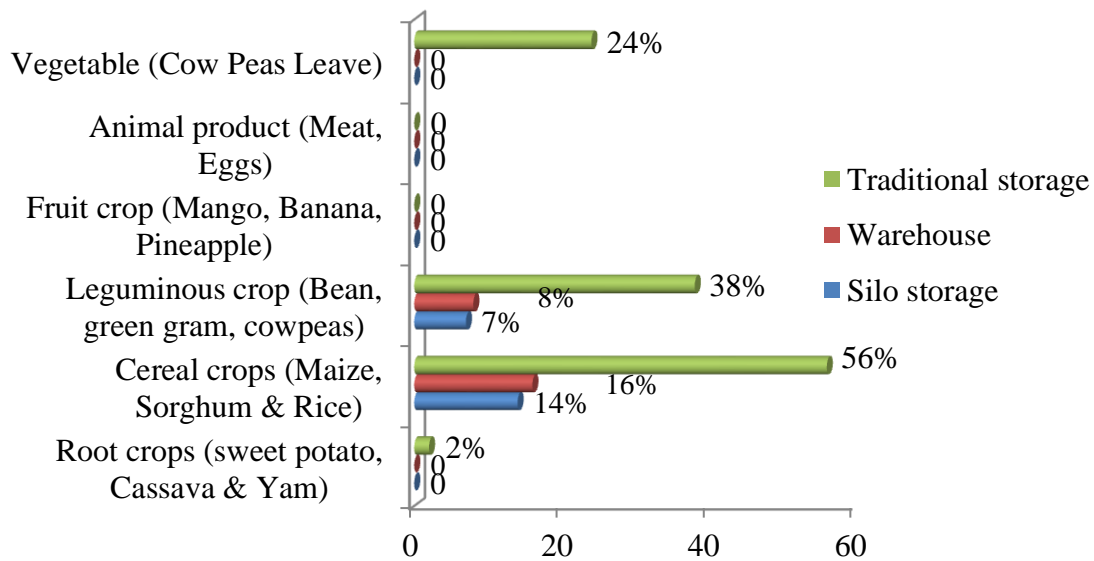


Figure 6: Existing food storage facilities

- **Existing preservation technology for food crops**

Food preservation is associated with reducing food spoilage therefore increase food shelf life. This ensure food availability even after harvest season. Findings in fig. 7 reveals that, 92% of the women in the study area use sun heat (drying) to preserve almost all the food items except animal products where 17% is preserved by fire (smoking). Despite its affordability drying method for food items such as vegetables, meat and fruits causes' loss of nutrients such as protein, vitamin c, thiamin and lipids which are important for the body's physiology (Amit et al., 2017).

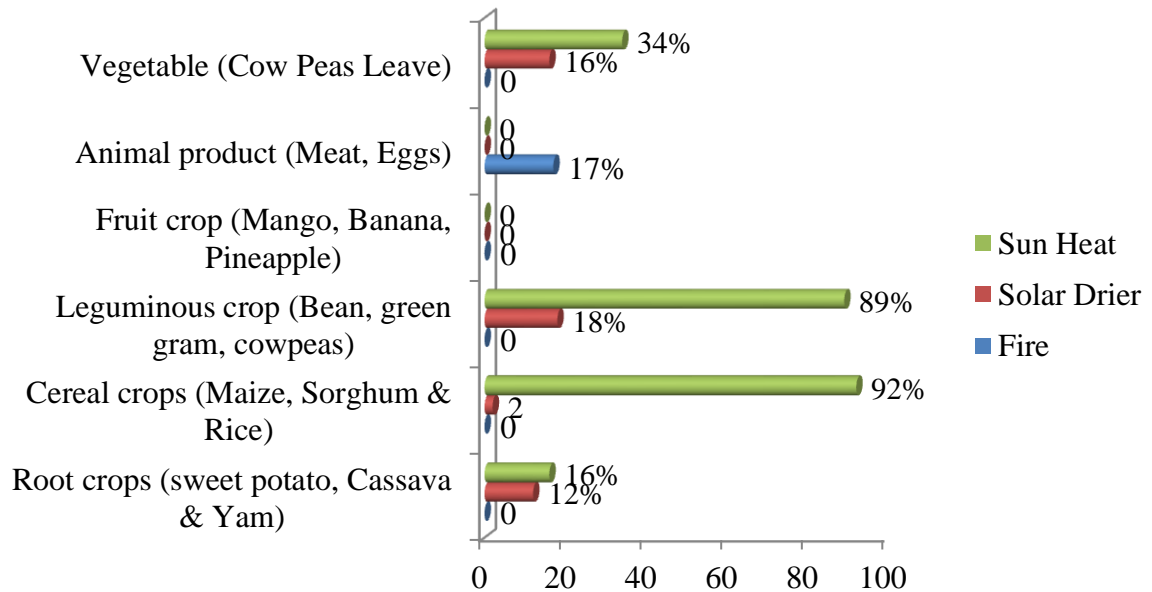


Figure 7: Existing food preservation facilities

- **Existing food processing technologies**

Over the years, the shift from traditional food processing to modern food processing is predominant. Food processing such as milling, cooling, heating and smoking, causes changes to the food components which some results to detrimental effects on food quality and nutritional deprivation (Augustin *et al.*, 2016). However food processing technology helps to increase food shelf life and reduce food waste (Augustin *et al.*, 2016). Fig. 8 shows that power driven machine was mostly used for processing food crop such as cereal 87% leguminous crops 21% and root crops 12% respectively. While vegetables and animal products such as meat and eggs were processed at 9% and 8% respectively.

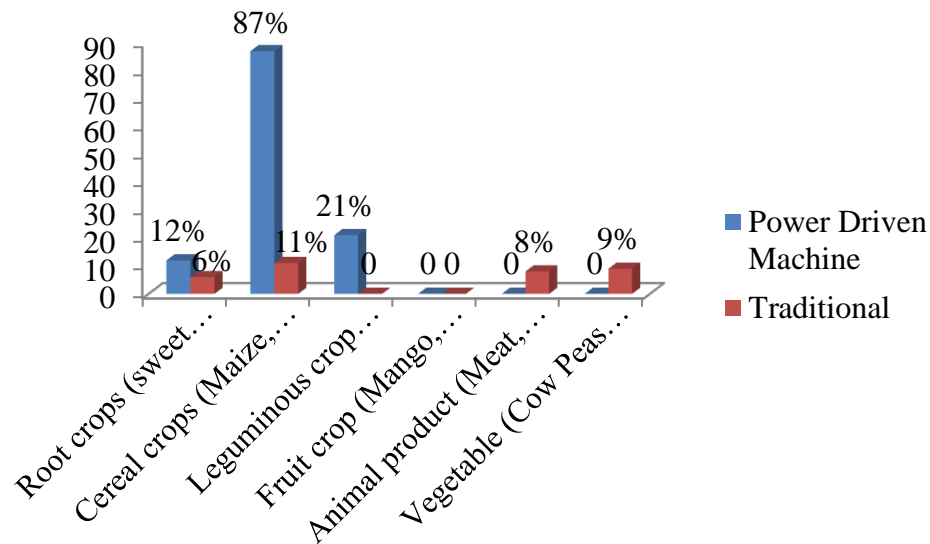


Figure 8: Existing food processing technologies

Thereafter the factors that influence women contribution to household food and nutrition security were analyzed with a focus on understanding their effect. The regression model in Table 12 has goodness of fit, since F test (9, 140) = 15.75 with P – value (0.0000) less than 1% level of significance. This signifies that independent variables together have relationship with dependent variable. However, R squared was 0.4629 equivalent to 46.29%. Also implies that the independent variables jointly explained the variation in dependent variable by 46.29%. Five out of nine variables included in the model are statistically significant at various specified levels of significance.

4.5.2 Factors affecting women contribution on household food and nutrition security

Table 12 therefore shows that women's contribution on household food and nutrition security was significantly affected by age, income, education level, household size, and economic activity. Results in Table 12 shows that age p value was statistically significant at 10%

(0.0600<0.1) level of significance. This indicates that the age of a woman has a significant relationship with household food and nutrition security such that as the age of a woman respondent increased, the contribution to household food and nutritional security declined by 13.20%. From this results we can conclude that women's ability to effectively produce and achieve household food and nutrition security decline with age. This calls for a focus to be on the women in the young and middle age as far as engagement to income generating activities and food production activities are concerned.

Results in Table 12 further reveal that 1 percentage increase of the woman's income lead to a significant increase of household food and nutrition security by 21.9%. This means that woman's income regardless of considering the source positively affect household food and nutrition security in the study area. According to Kalansooriya and Chandrakumara (2014) women's income highly contribute to household's ability to access food, therefore, achieve food and nutrition security. Income also significantly contribute to women's ability to access modern food processing and food storage facilities especially in rural areas (Ombakah, 2014).

From results in Table 12 the women's education level attained was statistically significant at 1% with a P-value 0.0120. This shows that the educated women were in a better position of becoming food and nutrition secured by 11.16% than non-educated women. Relating to utility theory, women with formal education are in a good position to make right preferences and choices of what to consume in the household so as to achieve food and nutrition security. Education is therefore considered as a foundation for balanced diet consumption in many communities. This is because it contributes to the nutrition quality consideration of the diets

prepared in the households (Kalansooriya and Chandrakumara, 2014; Hove and Gweme, 2017).

Findings also showed that women who directly engaged in agriculture as a basic economic activity had significantly increased the household food security by 11.47% than women who do not engage in farming as a basic economic activity. This is because agriculture acts as a source of food also as a source of money obtained from resale of the produced food. This can be used to purchase food items that are not locally produced. According to National Bureau of Statistics (2017) Tanzania has more than 76% of rural population who are engaged in agriculture and depend on it for survival 54% being women a 46% being men (Mmasa, 2013). This shows that in the study area, women's participation in agriculture is a major contribution towards achieving household food security as well as nutrition security. Achievement of household food and nutrition is also made possible through interaction of both farm and off farm activities (Rupasingha, 2006). Therefore, based on the results it can be said that women's participation in agriculture in Chamwino District has contributed further to household food security than household nutrition security.

Household size was statistically significant at P-value 0.0720 which is statistically significant at 10% level of significance. From the findings it is shown that as size of household gets larger, the possibility of the household to become food secured also increases. This is because household size is related to manpower for engaging in agricultural production and other food roles. The argument is also supported by Mukungu (2016) and Nyamwanji (2016) who argued that as the household size gets larger, the household member's possibilities to become food secured also increases because the household members act as a source of labour

for agricultural production. However, if the agricultural and income resources are constrained, household food and nutrition security can hardly be achieved when the household size is larger. Therefore, the argument for either keeping a small household size or a large household size, mostly depend of the available income and food resources as they both have an implication on household food and nutrition security.

Table 12: Regression analysis results

Factors influencing Women's contribution on HFNS	Coefficient	Robust Std. Err	T	P-value
Age (Measured in year)	-0.1320	0.0697	-1.89	0.0600
AccessIN (1 if access information, 0 Otherwise)	0.0177	0.0456	0.39	0.6990
Income (Measured in TZS)	0.2191	0.0379	5.78	0.0000
Education (1 if has formal education, 0 Otherwise)	0.1116	0.0440	2.54	0.0120
Maritalsts (1 if she is married, 0 otherwise)	-0.0536	0.0433	-1.24	0.2180
Hhsize (Measured in number)	0.0792	0.0437	1.81	0.0720
Access FS (1 if access financial services, 0 Otherwise)	-0.0118	0.0490	-0.24	0.8090
Access PR (1 if access land resource, 0 Otherwise)	0.0333	0.0441	0.76	0.4510
Economic Activity (1 if farming, 0 Otherwise)	0.1147	0.0486	2.36	0.0200
Constant	0.9829	0.6246	1.57	0.1180

4.6 Summary of the Study Findings

This part attempts to provide answers for research questions which guided the study. The research questions were from specific objectives, where each specific objective had one research question. The following were responses for each question:

Research Question 1: Are women in the study area aware about the concept and meaning of household food and nutrition security? What are the challenges facing women towards achieving household food and nutrition security?

- i. The response from the findings showed that Yes, the women in the study area were aware of household food and nutrition security. However, their extent of awareness of food security was limited to one dimension of food security being food availability and their extent of awareness on nutrition security was based on food quantity rather than food quality.
- ii. The women also faced a number of setbacks in their attempt to achieve household food and nutrition security in the study area. These setbacks were identified during the focused group discussion conducted. During the focused group discussion, the women mentioned that cultural practices passed down by the parents' in-laws during maternity and child bearing has limited the application of modern food and nutrition security techniques. Performance of food roles such as food processing, food preservation and storage have continued to be locally performed leading to continuing nutrient loss. Also poor water infrastructures in the study area is a limitation considering the nature of the study area being semi-arid. Absence of enough wells has limited consumption of green fresh vegetables since they demand to be watered. Low income also is a hindrance since women are unable to access food that are not locally produced through purchase. Marriage was also mentioned since women do not have the ability to equally engage in decision making especially on what to produce for food also on what to consume for daily meals. Majority of the women in the study area were also involved in marriage responsibilities at a younger age. These

challenges have greatly suppressed women's contribution to household food and nutrition security in the study area.

Research Question 2: What is the status of household food and nutrition security in the study area?

- Findings reported that the status of majority of the households in the study area consumed poor diets which symbolizes nutrition insecurity. The results for the food consumption score revealed that main food items consumed in the study area were sorghum millet, maize, pulses, meat and fish. This suggests that the status of nutrition security in the study area is poorer as compared to the status of food security.

Research Question 3: What are the factors that influence women's contribution on household food and nutrition security in the study area? Findings revealed that age, Income, education, economic activity, and household size directly influenced the contribution of women to household food and nutrition security in the study area.

CHAPTER FIVE

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

The aim of this study was to assess the contribution of women to household food and nutrition security in Chamwino District. The study focused on assessing women's awareness of household food and nutrition security, determining the status of household food and nutrition security and determining the factors influencing women's contribution to household food and nutrition security in the study area. Conclusions are made on the basis of each specific objective.

The study findings on the women's awareness of household food and nutrition security confirmed that majority of the women in the study area were less aware of the concept of household food and nutrition security. Their awareness of household food security was limited to only one dimension of food security being food availability. The women also understood household nutrition security as the consumption of food not regarding the nutrient adequacy of the food item consumed. Results on the status of household food and nutrition security revealed that majority of households in Chamwino District consumed poor diets which symbolizes nutrition insecurity. The food consumption score results indicate that, main food items consumed by the household members in the study area were maize, millet, beans and nuts. This does not meet all the necessary requirements for a balanced diet. Results on the factors which influence the women contribution on household food and nutrition security concluded that age, education level attained, income, household size and economic activity

performed affects the women's contribution to household food and nutrition security in the study area.

5.2 Policy Recommendations

Based on findings, it is therefore recommended that:

- i. The Government, NGO's and other related public and private bodies should establish programmes and projects to empower and educate women on the concepts of food security and nutrition security.
- ii. The Government should focus on improving food supply chains in the study area through construction of reliable market centres so as to ensure adequate supply of food items that are not produced locally.
- iii. Nutrition Officers in the District should educate women and other members of the household on the importance of the food resources kept within the household so that they can be used to improve the status of household food and nutrition security in the study area.
- iv. The Government, NGO's and other related public and private bodies should establish projects that will empower women in the study area to improve their production ability such as emphasize the use and supply of improved inputs and engagement in small businesses.

- v. The Government, NGO's and other related public and private bodies should give further trainings to the women on modern techniques of food preservation such as fortification so as to prevent nutrient loss.
- vi. Nutrition officers should train women in the study area on proper ways of food preparation so as to reduce food nutrients loss.
- vii. The Government, NGO's and other related public and private bodies should educate the rural communities on the importance of family planning.
- viii. Irrigation farming from dug wells should be introduced in the study area.
- ix. The Government, NGO's and other related public and private bodies should also train the men on the concept of household food and nutrition security so as to become supportive and enable their wives to use the skills and knowledge that they acquire from trainings and seminars.

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APPENDICES

Appendix 1: Household survey questionnaire

Dear respondent,

My name is JANETH NELSON NGILANGWA a Master student at Sokoine University of Agriculture located in Morogoro, Tanzania. I am here to undertake a research on the contribution of women on household food and nutrition security in Chamwino District, Tanzania. I kindly request you to answer the following questions carefully. All information is safe and secured with the researcher and will be used for educational purpose of fulfilling a requirement for a Master degree in Agricultural and Applied Economics at Sokoine University, Morogoro.

The general aim of the study: To determine the contribution of women on household food and nutrition security in Chamwino District.

Region [.....]

District [.....]

Ward [.....]

Village [.....]

Name of numerator

Name of interviewee.....

Date of interview.....

Contacts of the respondent/interviewee:

A. Household Characteristics

A1. Household size [.....]

A2. Give details of the household members (including household head) living in the compound also who are dependent within the household

Name (1 st name)	Gender 1=Male 2= Female	Age	Relationship to household head	Highest education level attained	Primary activity
1.	[____]	[____]	[____]	[____]	[____]
2.	[____]	[____]	[____]	[____]	[____]
3.	[____]	[____]	[____]	[____]	[____]
4.	[____]	[____]	[____]	[____]	[____]
5.	[____]	[____]	[____]	[____]	[____]
6.	[____]	[____]	[____]	[____]	[____]
7.	[____]	[____]	[____]	[____]	[____]
8.	[____]	[____]	[____]	[____]	[____]

Relationship to

HHH

Education level

Primary activity

1= Household

head

2= Wife

3= Son

4= Daughter

5= Daughter -in-

1= No formal education

2= Pre-school age

3= Primary education

4= Ordinary level of secondary
education

5= Advanced level of secondary

1= None

2=Farmer

3= Civil servant

4=Employee in private
business

5=Engaged in own business

law	education	
6=Son -in- law	6=College education	6= Labourer on farm
7=Grand children	8=Higher education	7=Labourer off farm
8 = Nephew		8=Student
9= Farm employee		9=Others (specify).....
10= Grant Parent		
11= Sister		
12=Brother		
13= Cousin		

A3. What is the name of the household head?.....

A4. Annual Average Income of the Household Head [.....]

B: Women awareness on food and nutrition security

B1. What is food security?

B2. What is nutrition security?

B3. How can you tell if your household is food secured?

B4.How can you tell your household is nutrition secured?

B5.Who mainly decide what is eaten in the household and why?

B6. Who usually prepare food in the household?

B7. What is his/her understanding of nutrition security?

B8. How often does he/she prepare food?

- a) Frequently
- b) Never
- c) Rare

B9. How do you participate in achieving household food and nutrition security in the household?

If no, why?

B10. How does he/she prepare food?

- a) Good
- b) Neutral
- c) Poor

B11. How often do you wash your hands before food preparation?

- a) Repeatedly
- b) Not at all
- c) Occasionally

B12. Have you ever attended any food preparation seminar or training program?

- a) Yes
- b) No

B13. Kindly fill out the table following items (on how you participate on food storage)

S/N		Silo	warehouse	Tradition
	Root crops (sweet potato, Cassava & Yam)			
	Cereal crops (Maize, Sorghum & Rice)			
	Leguminous crop (Bean, green gram, cowpeas)			
	Fruit crop (Mango, Banana, Pineapple)			
	Animal product (Meat, Eggs)			

B14. Kindly fill out the table following items (on how you participate on food preservation)

S/N		Chemical	Refrigerat	Solar	Sun Heat
	Root crops (sweet potato, Cassava & Yam)				
	Cereal crops (Maize, Sorghum & Rice)				
	Leguminous crop (Bean, green gram, cowpeas)				
	Fruit crop (Mango, Banana, Pineapple)				
	Animal product (Meat, Eggs)				

B15. Kindly fill out the table following items (on how you participate on Food Processing)

		Solar Drier	Electric	Traditional
	Root crops (sweet potato, Cassava & Yam)			
	Cereal crops (Maize, Sorghum & Rice)			
	Leguminous crop (Bean, green gram, cowpeas)			
	Fruit crop (Mango, Banana, Pineapple)			
	Animal product (Meat, Eggs)			

C. Determining the current level of household food and nutrition security in the study area

Please describe the foods (meals) that you consumed for the past seven days, during the day and night whether at home or outside home.

Qn NO	Food Item (Examples)	Food Group	Name of the food	Number of days eaten in the last 7 days From 0-7days 0=Not consumed 1= One day 2=Two days 3= Three days 4=Four days 5=Five days 6= Six days 7= Seven days	Main food Source for the last seven days 1. Own Production 2. Purchased 3. Gift 4. Food aid 5. Other
C1	Maize, maize porridge, rice, sorghum, millet, bread and other cereals.	Main Staples			
C2	Beans, Peas, groundnuts and cashew nuts	Pulses			
C3	Vegetables, Leaves	Vegetables			
C4	Orange, mango, pineapple, avocado, pawpaw, cucumber, sweet banana, watermelon and Grapes.	Fruits			
C5	Beef, Goat, Poultry, Pork, eggs, and fish.	Meat and Fish			
C6	Milk, Yoghurt, and other dairy	Milk			
C7	Sugar and sugar products; honey.	Sugar			
C8	Oils, Fats, and Butter	Oil			
C9	Spices, tea, coffee, salt, fish powder, small amount of milk for tea.	Condiments			

D: Determination of the factors that influence women's contribution on household food and nutrition security

D1. What do you do for a living? (Probe for business, farming, and employment)

.....

D2. Do you engage in off-farm activities? Yes/No.....

D3. If yes which off farm activities do you engage in? Name them.....

D4. What motivated you to engage in off-farm activities?

D5. How much money (in TZS) do you earn from off-farm activities?

[.....]

D6. How much money (in TZS) do you earn from farm activities?

[.....]

D7. How frequently do you purchase root crop for household consumption per month?

[.....]

D8. How frequently do you purchase cereal crop for household consumption per month?

[.....]

D9. How frequently do you purchase leguminous crop for household consumption per month?

[.....]

D10. How frequently do you purchase fruit for household consumption per month?

[.....]

D11. How frequently do you purchase oil crop for household consumption per month?

[.....]

D12. Kindly estimate your average monthly expenditure on the following items for your household.

Nature of expenditure	Total expenditure (TZS) per month
1. Food
2. Education
3. Charcoal
4. Kerosene
5. Electricity
6. Medical
7. Firewood
8. Clothing
9. Telephone
10. Gas
11. Social obligations
12. Savings
13. Other expenditures
Total expenditure per month	<div style="border: 1px solid black; height: 20px; width: 100%;"></div>

D13. Do you have access to land use or land ownership?

D14. If yes, what do you do with the land?

D15. How involved are you in making sure that there is adequate food in the household at all the times?

D16. Do you think your area could be self-reliant in provision of adequate food to its people?

D17. What hinders you from achieving food and nutrition security in the household?

E. Challenges associated with women towards household food and nutrition security

	Perceived challenges by women on food and nutrition security	Please Rate scale by ticking (√) where appropriate				
		Strongly disagree	Disagree	Undecided	Agree	Strongly agree
E1	Education level of women					
E2	Awareness of women on nutritious foods					
E3	Inaccessibility of nutritious foods					
E4	Women lack knowledge on food preparation					
E5	Women lacks knowledge on food preservation					
E6	Women lacks knowledge on food processing					
E7	Women lacks knowledge on food storage					
E8	Knowledge on food groups and their nutrients content and importance					
E9	Availability of information on food and nutrition security					
E10	Training program on nutritious foods					
E11	Size of households headed by women					
E12	Size of dependents on the women					

E13	Annual earnings/ income by women					
E14	Women suppressed by traditional and culture					
E15	Housing asset availability to women					
E16	Women health status					
E17	Quality of nutritious food consumed per day					
E18	Quantity of nutritious foods consumed per day					
E19	Level of food production, produced by women					

E20. Name the challenges you face in accessing nutritious food that are not mentioned in the table above.

F: Recommendations for Improving Food Security

1. What are your recommendations for improving household food and nutrition security in this area?

Appendix 2: Interview Guide for Key Informant

My name is Janeth Nelson Ngilangwa a student from Sokoine University of agriculture pursuing MSc Agricultural and Applies Economics. I am collecting data examining The Contribution of Women on Household Food and Nutrition Security in Chamwino District. My study intends to assess women's awareness of household food and nutrition security, determine the status of household food and nutrition security but also assessing the factors that influences the contribution of women on household food and nutrition security in Chamwino District.

The purpose of key informant interviews is to collect information from a wide range of people including community leaders, professionals, or residents—who have firsthand information about the community in question.

Questions for Key Informant

- a) What is the name of your organization?
- b) What is your position in your organization?.....

Questions

1. What is food security?
2. What is nutrition security?
3. Are women in this area aware of food security?
4. Are women in this area aware of nutrition security?
5. To what extent are they aware of nutrition security?
6. What is the interpretation of nutrition security in this area?
7. How is nutrition security considered in the production process?
8. What hinders women's awareness on food security in this study region?
9. What initiatives have been taken to improve nutrition security in this area?
How effective have they been to improve nutrition security in this area?
10. Are there special trainings provided to women in this area on nutrition security?
.....
11. How are these training conducted?
Have the trainings been effective?
12. What are the challenges associated with the provision of these trainings?
13. Are there trainings on food preservation, storage, preparation?
.....

14. What is the outcome of these training on nutrition security in the study area?

.....

15. How are women involved in the roles mentioned above?.....

16. What is the status of nutrition security in this area?

17. How can you compare it to the previous years?.....

18. What is the status of food security in this area?.....

19. How can you compare it to the previous year?.....

20. How can you compare the status of food security to that of nutrition security in this area?.....

21. What would you recommend to improve the status of nutrition security in this area?

.....

22. To what extent are women involved in off- farm activities in this area?

.....

23. What are these off farm activities they perform?

.....

24. To what extent do these off farm activities contribute to household food security?

.....

25. To what extend do these off farm activities contribute to household nutrition security?

.....

26. Do women have a say on the income they receive from on-farm activities?

.....

27. Do women have a say on what they receive from off-farm activities?

.....

Appendix 3: Focused group discussion

Jina langu naitwa Janeth Nelson Ngilangwa, Ni mwanafunzi wa Chuo cha Kilimo Sokoine. Ninasoma shahada ya uzamili ya Uchumi Kilimo Elekezi. Ninafanya utafiti juu Ya Mchango Wa Mwanamke Katika Usalama Lishe Katika Kaya Katika Wilaya Hii Ya Chamwino. Utafiti huu utasaidia kujua hali ya usalama lishe katika wilaya kwa kipindi hiki na kuleta maboresho ya usalama lishe itakapowezekana. Pia itanisaidia kumaliza masomo yangu.

Maswali Ya Majadiliano Ya Kikundi Lengo.

1. Usalama wa chakula ni nini?
2. Usalama lishe ni nini?
3. Je umepata elimu yoyote juu ya usalama wa chakula?
4. Je umepata elimu yoyote juu ya usalama lishe?
5. Je elimu hii imekusaidia kwa kiasi gani?
6. Je Elimu hii haijakusaidia kwa sababu gani?.....
7. Je unazingatia usalama lishe/ lishe bora katika shughuli zako za uzalishaji kabla na baada ya kuzalisha mazao?.....
8. Nini kinasababisha usizingatie usalama lishe wakati wa uzalishaji?.....
9. Je unazingatia usalama lishe wakati wa kuandaa chakula kwa ajili ya kuliwa na familia?.....
10. Je unazingatia usalama lishe wakati wa kuhifadhi chakula?.....
11. Je unazingatia usalama lishe wakati wa kutunza chakula?.....
12. Nini kimefanyika ili kuhakikisha kuna usalama lishe katika eneo hili?
13. Je ni nini kinazuia usalama lishe katika eneo hili?.....
14. Unadhani nini kifanyike ili kuboresha na kukuza usalama lishe katika eneo hili?
.....

Appendix 4: Test for multicollinearity

Variable	VIF	1/VIF
lnAge	1.18	0.850107
lnIncome	1.15	0.868725
Educ	1.12	0.890137
lnHhsize	1.10	0.908552
AccessIN	1.09	0.916372
AccessFS	1.08	0.922066
Maritalsts	1.07	0.930754
AccessPR	1.04	0.957979
Mean VIF	1.1	

Appendix 5: Heteroscedasticity tests

Breusch-Pagan / Cook-Weisberg test for Heteroscedasticity	
Ho: Constant variance	
Variables: fitted values of lnDFNS	
Chi-square (1)	= 6.49
Prob > chi2	= 0.0109

Appendix 6: Model specification test

InReturn	Coefficient	Std. Err.	z	P>z	[95% Conf. Interval]
_hat	1.6553	2.2819	0.73	0.469	-2.8543 6.1648
_hatsq	-0.0886	0.3084	-0.29	0.774	-0.6980 0.5208
_cons	-1.2068	4.2119	-0.29	0.775	-9.5305 7.1170

Appendix 7: Test for omitted relevant variable

Ramsey	RESET test using powers of the fitted Values of lnDFNS
	Ho: model has no omitted variables
	F (3, 137) = 1.02
	Prob > F = 0.3879