

**AN ASSESSMENT OF FOOD SECURITY STATUS AND FACTORS INFLUENCING
THE CHOICE OF FOOD INSECURITY COPING MECHANISMS IN RWANDA: THE
CASE OF GISAGARA DISTRICT**

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**A thesis submitted in partial fulfillment of the requirements for the award of a Master of
Science degree in Agricultural and Applied Economics of the University of Nairobi.**

July, 2014

DECLARATION

This thesis is my original work and has not been presented for the award of a degree in any other academic institution.

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DEDICATION

I dedicate this thesis to my wonderful family.

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ABSTRACT

Despite the remarkable progress in term of economic growth and poverty reduction made in Rwanda since the tragedy of the 1994 genocide, more than 80 percent of its rural population is still relying on subsistence agriculture practiced on small land, and this makes it difficult for them to overcome the problem of food insecurity. The purpose of this study was to analyze food security status and to determine households' food insecurity coping mechanisms as well as the factors influencing the choice of food insecurity coping mechanisms. A sample of 234 households was selected based on systematic sampling procedure in 13 sectors of Gisagara District, the study area. The first objective was addressed by using Food Consumption Score. The results from this proxy show that 12.5 percent of households in the study area had low food consumption score (food insecure) while 33.4 percent have borderline food consumption score (moderately food insecure) and 51 percent of households were found to have acceptable food consumption score (food secure). In terms of food insecurity coping mechanisms adopted by households, the results show that casual labour based coping mechanism, assets based coping mechanism, borrowing based coping mechanism, assistance based coping mechanism and adjustment in food consumption based coping mechanism were the main coping mechanisms adopted by households. To determine the factors influencing the choice of those coping mechanisms, Multinomial Logit Regression Model (MNL) was used. Results from the estimation of the MNL model revealed that among eight variables included in the model, six were found to be significant, that is age, household size, land size, livestock ownership, cooperative membership and total annual income. The findings of this study show that vulnerability to food insecurity can be reduced by decreasing exposure to risks and shocks or by increasing the ability to cope with different shocks. Policy interventions need to complement the positive effects of the

households' food insecurity coping mechanisms and mitigate their deficiencies. Based on the key findings of this study, key recommendations to enhance food security were suggested, namely promoting income-generating activities, enhancing the cooperatives' efficiency, creating employment opportunities and promoting the development of the livestock sector.

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ABBREVIATIONS AND ACRONYMS

AIN:	American Institute of Nutrition
CFSVA:	Comprehensive Food Security and Vulnerability Analysis
DFID:	Department for International Development
EDPRS:	Economic Development and Poverty Reduction Strategy
FAO:	Food and Agriculture Organization
FCS:	Food Consumption Score
HFS:	Household Food Security
HFI:	Household Food Insecurity
IFPRI:	International Food Policy Research Institute
IFRC:	International Federation of Red Cross
MNL:	Multinomial Logit
MINAGRI:	Ministry of Agriculture and Animal Resources (Rwanda)
NISR:	National Institute of Statistics of Rwanda
REMA:	Rwanda Environment Management Authority
SPSS:	Statistical program for Social Sciences
VIF:	Variance Inflation Factor
WB:	World Bank
WFP:	World Food Program

CHAPTER ONE

INTRODUCTION

1.1 Background information

Food security is a broad concept that requires more than food production and food accessibility. In reality, it revolves around 4 pillars, namely food availability, food accessibility, nutritional factors and stability of food supply (Gross *et al.*, 1999). The implication is that achieving food security requires access to sufficient food supply through the market or through other sources and that the use of those food supplies is appropriate to meet the specific dietary needs of households or individuals in the households. Consequently, food insecurity represents the inability to fulfill such conditions.

Food insecurity is defined as limited access to sufficient food or inability to acquire sufficient foods in socially acceptable ways for all household members due to economic constraints (Cook, 2002), and is often associated with poor health status (Adams, 2003). Food security is thus achieved when all people, at all times, have physical and economic access to sufficient, safe, and nutritious food to meet their dietary needs and food preferences for an active and healthy life (FAO, 2003).

Worldwide, more than 1.2 billion people live in extreme poverty and over 850 million people are chronically hungry, despite the existence of sufficient food at the global level (FAO, 2008). The United Nations Millennium Summit [2000] set out Millennium Development Goals (MDGs) and adopted as one of its goal the need to reduce by half the number of people living in extreme poverty and hunger by the year 2015. However, the FAO's State of Food Insecurity in the World

(2010) has already indicated that the prospects of achieving that goal are bleak. The number of undernourished people remains unacceptably high, and is higher than the level that existed when the hunger reduction target was agreed at the World Food Summit in 1996 (FAO, 2010).

In sub-Saharan Africa, the proportion of undernourished people remains at highest level, being 30 percent in 2010, but varies widely at the country level (FAO, 2010). However, a large number of African nations have been actively engaged in initiatives to reduce food insecurity. And around half of the sub-Saharan African countries have so far implemented several food security program, designed to improve the availability and access to food by the population in need (IFRC, 2007).

In order to tackle the problem of poverty and hunger in Rwanda, the Government of Rwanda has adopted an Economic Development and Poverty Reduction Strategy (EDPRs) that sets out the country's objectives, priorities and major policies for the period 2008-2012. The EDPRs provides a medium term framework in order to achieve the long term objectives embodied in the "Rwanda Vision 2020", which is aimed at transforming Rwanda into a middle-income country by 2020.

Among the strategies set out in the EDPRs in order to reduce poverty and hunger, a key one aims at promoting the agricultural land intensification through the production of high value crops, modern livestock management and through the promotion of commodity chains and agribusiness. Furthermore, one cow per poor household program has been launched as a part of effort to achieve MDGs, and this program aims at enabling every poor household to own and manage an improved dairy cow which would help the households to improve their nutrition

through milk and meat consumption and to improve soil fertility using the cow manure which will enhance their crop production.

Despite the impressive progress made by Rwanda since 1994 genocide in terms of economic growth and poverty reduction, certain developments targets still remain challenging in the country. Food and nutrition security of the population remains a key building block in not only consolidating the gains already made after the Genocide of 1994, but also in further accelerating the rate of growth towards the realization of the Millennium Development Goals and Vision 2020 (NISR, 2009). The smallholder farm families remain the most vulnerable to food and nutrition insecurity.

Typically, smallholder households in rural areas in Rwanda rely upon the receipts from agricultural production to live and to purchase household necessities. As they are net consumers of agricultural products, they are even more sensitive to price shocks and variation. Hence smallholder agricultural households must carefully balance productive and reproductive decisions to maintain a minimum level of consumption throughout the course of the year.

1.2 Statement of problem

In Rwanda, the agricultural sector employs nearly 80% of the working population and is characterized by low productivity and low economic returns. Almost 80 percent of the households in Rwanda practice a traditional subsistence agriculture which is mainly carried out on narrow plots of land that are exhausted by a continuous utilization. Rwanda's rate of population growth is among the world's highest (above 2.8 percent annually) and the average rural population density of 574 inhabitants per square kilometer of arable land is the highest in

Africa (NISR, 2009). As a consequence, farm sizes are very small, averaging 0.83 hectares per household, and will get smaller with increasing population (NISR, 2008). Therefore, an increasing number of households are vulnerable to food insecurity, and 28 percent of the rural population in Rwanda was said to be food insecure in 2009, with 24 percent being highly vulnerable and 26 percent being moderately vulnerable (NISR, 2009).

According to Rwanda Environment Management Authority (REMA), cyclical droughts and erratic rainfall are the main causes of food insecurity in Rwanda as they affect levels of food production and cause rising prices of staple foods, thus worsening the already poor situation of rural households (REMA, 2010). Socio-economic factors, especially the distribution of land and other resources, are said to be the main factors influencing food insecurity in Rwanda in general (WFP, 2010).

However, much of the research done so far on the status of food security in Rwanda has emphasized on severity and causes of food insecurity. Such studies have not focused on understanding how households in rural areas cope with food insecurity, and this is a knowledge gap that this study attempted to fill by assessing the mechanisms used by rural household to cope with food insecurity and the factors influencing the choice of such mechanisms. The knowledge generated from this study is expected to contribute to the development of appropriate interventions for improving food security and nutrition in Gisagara District in particular and Rwanda in General.

1.3 Objectives of the study

1.3.1 Overall objective

The overall objective of this study was to assess the food security status and the factors influencing the choice of food insecurity coping mechanisms in Rwanda through the case study of Gisagara District.

1.3.2 Specific Objectives

1. To determine the households food security status;
2. To determine the coping mechanisms used by households to cope with food insecurity;
3. To identify and characterize the factors influencing the choice of food insecurity coping mechanisms.

1.3.3 Research questions

- What is the food security status of rural households in Gisagara District?
- What are the coping mechanisms adopted by food insecure households in Gisagara District?

1.3.4 Hypothesis to be tested

That each of the following socio-economic factors either singly or jointly with others has or have no significant influence on adoption of food insecurity coping mechanisms in Gisagara District: age, gender, education, cooperative membership, land size, total annual income, household size and livestock ownership

1.4 Justification of the study

Development practitioners are increasingly emphasizing the importance of understanding livelihood systems, complexity of rural livelihoods and how rural households cope with different shocks, for effective policy formulation (Deb, *et al.*, 2002). Thus an understanding of the situation of food security at household level and how people cope with food insecurity by adopting different mechanisms is very important. Such understanding allows policy makers to better plan and takes actions that address the specific problems, as well as development potentials of the different population segments.

Livelihoods-based analyses can lead to more appropriate and differentiated policies and actions. Therefore, carrying out an empirical research as was done in this study has both basic (academic) and applied (practical) purposes. Since literature concerning food insecurity coping mechanisms is scarce in the study area, the findings of the study were expected to contribute toward bridging the existing literature gap on the understanding of food security and coping mechanisms used by food insecure households. This study was also expected to contribute and equip different organizations and policy makers with pertinent information on livelihood strategies adopted by households to cope with food insecurity, which they can use to design appropriate policies to improve food security in the study area in particular and in Rwanda in general.

1.5 Organization of the study

This study is presented in five chapters. Chapter one presents the introduction and includes the background information, problem statement, research questions, objectives and justification. Chapter two presents a review of literature that includes the theoretical and empirical studies on

the food security and coping mechanism adopted by food insecure households. Chapter three describes the methodology used in this study. Study findings are presented and discussed in chapter four and chapter five presents the conclusions and recommendations.

CHAPTER TWO

LITERATURE REVIEW

2.1 Concept of food security

The 1996 World Food Summit agreed to the definition of food security as “access by all people at all times to enough and nutritionally adequate and safe food for an active and healthy life”. According to the Food and Agriculture Organization (FAO, 1996) and the World Bank (1986), extensive research has been undertaken focusing on household food security, food insecurity and hunger, especially by some experts working in the American Institute of Nutrition (AIN). Subsequently, the FAO, AIN and World Bank have come up with various modifications of the definition of food security and it is now generally agreed that household food security is attained when household members are able to acquire and ensure adequate, safe and nutritious food to meet their nutritional, social and psychological requirements (FAO, 1996). This study adopted this definition in its assessment of food security status in Rwanda.

Based on the World Bank (1986), the definition of food security focuses on three distinct but interrelated elements, all of which are essential to achieving food security:

- Food availability: having sufficient quantities of food from household production, other domestic output, commercial imports or food assistance,
- Food access: having adequate resources to obtain appropriate foods for a nutritious diet, which depends on available income, distribution of income in the household and food prices;

- Food utilization: this dimension of food utilization underlines the importance of such processes as marketing, storage, processing, cooking practices, feeding practices and levels of nutrition to the attainment of food security.

The World Bank (1986) also classified food insecurity in two categories, namely chronic and transitory. Chronic food insecurity is a continuously inadequate diet caused by the inability to acquire food, and it affects households that persistently lack the ability either to buy enough food or to produce their own. On the other hand, transitory food insecurity is a temporary decline in a household's access to enough food. It results from instability in food prices, food production or household incomes. Transitory is often used to imply mild or moderate, with the corollary assumption that chronic equates acute food insecurity (Devereux, 2006). The worst form of transitory food insecurity is famine (Devereux, 2006).

Food security is a concept that can generally be addressed at global, regional, national, sub-national, community, household and individual levels (Smith, 2004). The development of the concept of food security was initially done with a relatively clear focus on national and international food supply. In the 1970s, food security was mostly concerned with national and global food supply, but in the 1980s the focus shifted to questions of access to food at household and individual levels (Maxwell *et al.*, 1992; Wiebe and Maxwell, 1998).

Household food security accounts for the consumption levels of all members of a household. Farm household production and food security analysis at the household level requires an understanding of the household's ability to either produce enough food or generate enough income to purchase food. Policies and measures which have been implemented by most countries

to ensure food security include encouraging increased agricultural production to maintain food self-sufficiency (Rohrbach *et al.*, 1989).

On coping mechanisms, Maxwell *et al.*, (1992) postulated that most households access food by consuming what they produce or by purchasing food in the growing season from income earned from their harvest time sales or from off farm work. Therefore, farmers are expected to generate income from the sale of their produce which can be used to purchase food besides consuming what they produce from any farming activity. The income generated can also be used to serve as capital for the production of other commodities, such as livestock, thus allowing for the diversification of farm enterprises and increased food base.

2.2 Measurement and indicators of food security

Available literature shows that full range of food insecurity and hunger cannot be captured by any single indicator. Instead, a household's level of food insecurity or hunger must be determined by obtaining information on a variety of specific conditions, experiences and behaviors that serve as indicators of the varying degrees of severity of the condition. Household surveys are usually used to get this information. Research over the past two decades has identified a particular set of information on conditions, experience and behavioral pattern that consistently characterize the phenomenon of food insecurity and hunger in households (Maxwell, 1996).

Two objective methods of food security measurement have been widely used in most food security studies. One is to estimate gross household production and purchases over time and the growth or depletion of food stocks held over that period of time and presume that the food that

has come into the household possession and disappeared has been consumed. The other is to undertake a twenty-four hour recall of food consumption for individual members of the household or the household as whole and analyze each type of food mentioned for caloric content. However, neither method provides a full assessment of the food security because they fail to take into account the vulnerability and sustainability elements of food security. Therefore, neither method has been accepted as a “gold standard” for an analysis of household food security (Maxwell, 1996).

Maxwell (1996) goes on to argue that there has been a paradigm shift in food security measurement from one based on objective indicators to one based on subjective perception. One such subjective approach has been to analyze the use of and reliance upon strategies developed by households and to solicit for sequential response for dealing with insufficiency of food at household level as direct indicators.

According to Frankenberger (1992), household food security indicators are divided into three categories, namely process, access and outcome indicators. He further explains each indicator as follows:

- a) Process indicators reflect food supply/availability that includes inputs and measures of agricultural resources, institutional development and market infrastructures and exposure to regional conflict and its consequences.
- b) Access indicators are various means or strategies used by households to meet their household food security needs.
- c) Outcome indicators can be grouped into direct and indirect indicators. Direct indicators of food consumption include those indicators which are closest to actual food

consumption rather than marketing channel information or medical status. Indirect indicators are related to nutritional status assessment and generally used when direct indicators are either unavailable or too costly (in terms of money and time) to collect.

However, Frankenberger (1992) ultimately classifies these indicators into two main categories, namely process and outcome indicators. The former provides an estimate of food supply and food access situation and the latter serves as proxies for food consumption.

After making distinction between “process indicators” and “outcome indicators”, Frankenberger (1992) classifies process indicators into indicators that reflect food supply, such as meteorological data, information on natural resources, agricultural production data, food balance sheet, *et cetera*, and those that reflect food access. On the other hand, outcome indicators are classified into direct indicators, which are closest to actual food consumption, rather than indirect indicators focusing on storage estimates, subsistence potential ratio and nutritional status assessment.

The level of food insecurity can be measured by employing various methods that depend on the availability of resources, type of research and its purpose. Regarding measurements of food insecurity, Debebe (1995) noted that despite the shortcomings in the measurements, qualitative and quantitative approaches or a combination of both have been used to identify and develop food security indicators.

Hoddinott (1999) outlines four ways of measuring food security outcomes, namely individual intake, household caloric acquisition, dietary diversity and indices of household coping

strategies. Each method of measuring food security outcomes entails different methods of collecting and analyzing the data; as highlighted hereafter:

Individual intake: This is a measure of the amount of calories or nutrients consumed by an individual in a given time period, usually 24 hours. There are two methods of generating data with this method. The first is observational method. For this method, an enumerator resides in the household throughout the entire day, measuring amount of food served to each person. The enumerator also notes the type and quantity of food consumed outside the household. The second method is a recall of the previous 24 hours of food consumption for each household member. When implemented correctly, this “recall” method covers the type of food consumed, the amount consumed, food eaten as snack and meals outside the household. The “recall” method requires interviewing carefully every household member about food type, ingredients and quantities for every meal and snack consumed, and this is obviously an extremely difficult task.

Measurements of intake using the observational method needs to be made repeatedly, ideally for seven nonconsecutive days in order to account for within person and within household day-to-day variations in nutrient intake (for example, those resulting from religious prohibitions on the consumption of certain foods on certain days of the week or seasonal changes in diet). It requires highly skilled enumerators who can observe and measure quantities repeatedly and quickly and in a fashion that does not cause households to alter typical levels of food consumption and distribution within the households.

Household caloric acquisition: Here the person responsible for preparing meals is asked how much food was prepared for consumption over a period of time. The most knowledgeable person in the household is asked a set of questions regarding food prepared for meals over specific

period of time, usually 7 or 14 days. It requires listing out food types on questionnaire and distinguishing unambiguously between the amounts of food purchased, the amount prepared for consumption and the amount of food served. This measure produces a crude estimate of the number of calories available for consumption in the household. Because the questions are retrospective rather than prospective, the possibility that individuals will change their behavior as a consequence of being observed is lessened. The level of skill required by enumerators is less than that needed to obtain information on individual intakes.

Indices of household coping strategy: This is an index based on how households adapt to the presence or threat of food shortages. The person within the household who has primary responsibility of preparing and serving meal is asked a series of questions regarding how households are responding to food shortages. Among several ways of summarizing the result, counting the number of different coping strategies used by the household is one. The higher the sum, the more food insecure the household. Calculating the weighted sum of these different coping strategies, where the weights reflect the frequency of use by the household, is another method. Merits of this measure are that it is easy to implement and it captures the notion of adequacy and vulnerability. As it is a subjective measure, comparison across households or localities is problematic.

Dietary diversity: One or more persons within the household are asked about different items they have consumed in a specified period. Where it is suspected that there may be differences in food consumption among household members, these questions can be asked of different household members. Calculating a simple sum of the number of different foods eaten by that person over the specified period of time or calculating a weighted sum where the weights reflect

the frequency of consumption is used. The disadvantage of this measure is that it does not record quantities.

Hoddinott and Yohannes (2002) have indicated four reasons which make Dietary Diversity an attractive indicator of household food security. First, a more varied diet is a valid food security outcome in its own right. Second, a more varied diet is associated with improved child anthropometric status, birthweight, *et cetera*. Third, questions on dietary diversity can be asked, thus making it possible to examine food security at household level. Fourth, obtaining data on dietary diversity is relatively straightforward.

Dietary Diversity has been proven to be positively associated with child nutritional status and growth in a variety of studies in developing countries (Ferguson *et al.*, 1993; Onyango *et al.*, 1998; Tarini *et al.*, 1999; Arimond and Ruel, 2002). For example, Ruel (2002) analysed data from the Ethiopia 2000 Demographic and Health Survey (DHS) and found a positive and statistically significant correlation between food-group diversity measures and children's height-for-age Z-scores.

Other studies in Mali and Kenya have found a strong positive correlation between dietary diversity and children's nutrition. In urban areas of Mali, Hatloy *et al.*, (1998) found that lower food variety or dietary diversity scores were associated with twice the risk of being stunted or underweight. In Kenya, Onyango *et al.*, (1998) measured dietary diversity by the number of individual types of food consumed in 24 hours and found that it was significantly and positively associated with children nutrition status like height-for-age Z-scores, weight-for-age Z- scores and weight-for height Z- scores.

2.3 Household coping mechanisms

According to Young (2001), households actively try to protect their livelihoods, adopting several actions and mechanisms when faced with shocks and stresses that affect their livelihood or livelihood outcomes. These behavioral responses are termed “coping mechanism” and encompass a wide range of economic, social, political and behavioural responses to declining food security or perceived threats to food security (Young *et al.*, 2001).

Ellis (2000) defines coping mechanisms as the methods used by households to survive when confronted with unanticipated livelihood failure. The mechanisms pursued by households differ in several aspects, that is, within the household and between households (Maxwell *et al.*, 2003). Due to varying degrees of wealth among households, different coping mechanisms are adopted by households at different poverty levels. However, some coping mechanisms are common to all households but the extent to which such strategies enable a household to remain afloat depends on the assets at their disposal (Devereux, 2001). Above all, the general tendency is that the lower the household asset status, the more likely the household would engage in erosive responses, such as selling off some productive assets, for example farm implements (Hoddinott, 2004).

Webb and von Braun (1994) argue that coping mechanisms adopted by households form a continuum of strategies from “risk minimization” to “risk absorption” and finally to “risk taking”. Risk minimization involves asset accumulation, saving and income diversification. Risk absorption follows on from risk minimization and involves drawing on savings and existing food reserves, and often restriction of consumption of food and non-food items. The final stage (last phase) is risk taking which involves households taking desperate measures, such as breaking up

the family through migration, consumption of survival or famine foods and sale of private possessions.

Many of the household responses, especially during the last phase, clearly have irreversible impacts on household well-being, and conditions get worse unless external assistance arrives. Due to the irreversible nature of the risk-taking strategies and their adverse impact on post-crisis recovery, households would be reluctant to sell assets, especially agricultural assets in an agrarian community, and would only do so as a measure of last resort (Webb and von Braun 1994). This study examined the situation in Gisagara District of Rwanda.

To adapt to food shortages requires a change in people's behavior (Maxwell, *et al.*, 2003). The different strategies that can be used by households to deal with food insecurity include changing the type of food in the diet, reducing food portions, spending a day without a meal or sending soliciting for the members of the family to eat in their neighbor's households. It has to be noted, however, that when households reduce the number of meals as food insecurity coping mechanism, they become more vulnerable, eat less-nutritious food, cut back on health and education expenses, and sell their assets.

The relationship between household diet diversity score and coping mechanisms is that a household which has low diet diversity always uses more coping mechanisms in order to deal with lack of food access and food shortages. Coping mechanisms are an indication of the vulnerability of a family, because households that are poor and likely to be destitute use more coping mechanisms, clearly indicating their vulnerability to hunger (Maxwell and Caldwell, 2008). This study evaluated if this situation was valid in case of Gisagara District in Rwanda.

CHAPTER THREE

METHODOLOGY

3.1 Conceptual Framework

Livelihoods underpin food security because they are the means by which people access to resources and assets in their environment in order to meet household needs. An analysis of the livelihoods of households begins with examining the five livelihood assets – physical, financial, natural, social and human capital – followed by the range of livelihood strategies into which people translate them (DFID, 1999). Food security is one outcome of a successful livelihood strategy.

The sustainable livelihoods framework presented below (Figure 3.1) focuses on the strengths and assets that people own to ensure their food security and livelihoods. These are represented by five key categories of capital (physical, financial, natural, social and human capital) that households can draw from to achieve positive livelihood outcomes, such as reduced vulnerability, increased income, well being and improved food security.

The larger political, economic, geographic, social and cultural context and its associated institutions determine the local environment and the type of access that households will have to resources (DFID, 1999). It conditions the external vulnerability context in which households operate, and the shocks, trends and seasonality to which they are exposed. It also conditions the resources and coping mechanisms that the households make use of.

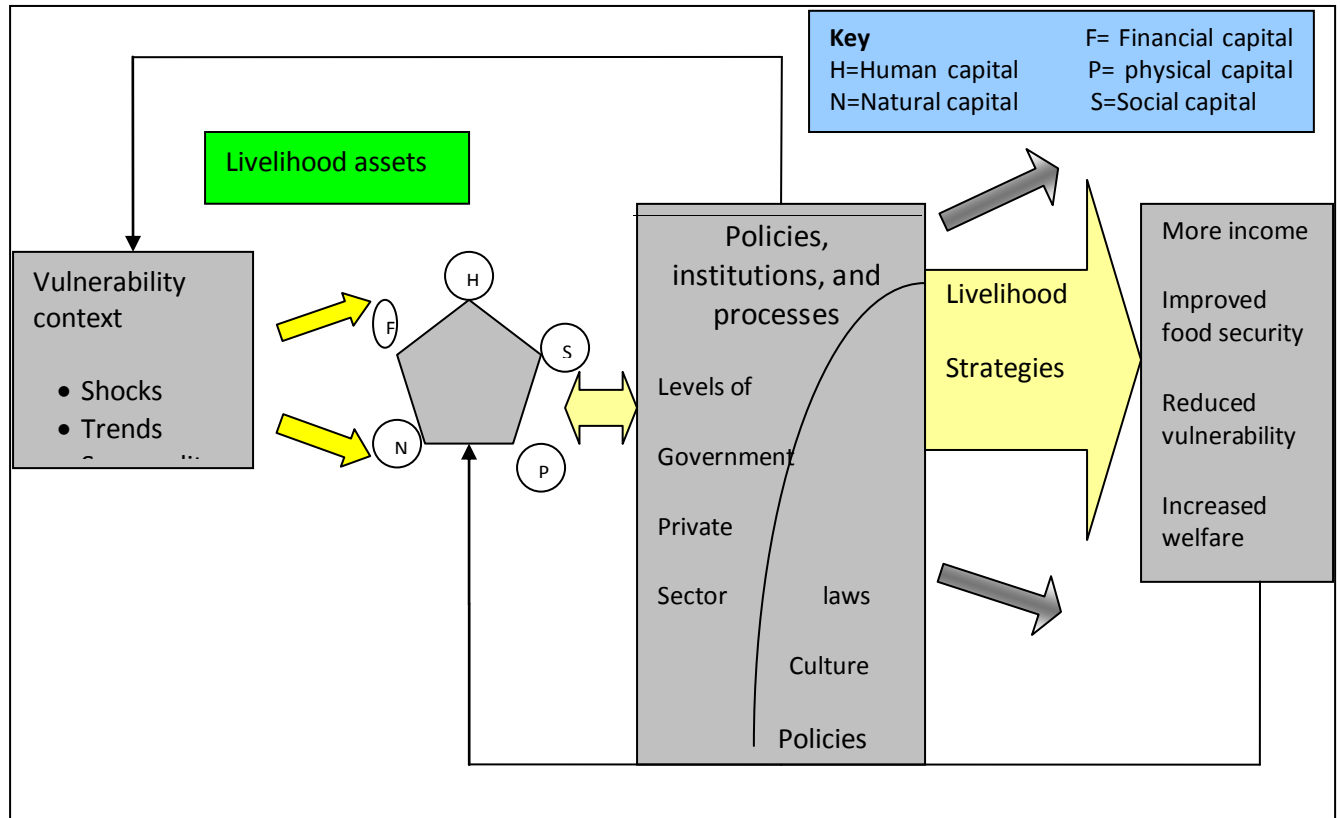


Figure 3.1: Sustainable livelihoods framework

Source: Adapted from DFID, 1999.

Understanding the nature of shocks and coping mechanisms used by households is an important aspect of sustainable livelihood and food security. The sustainability of household livelihood depends on the ability to cope with and recover from the stresses and shocks (Scoones 1998).

As shown in figure 3.1, the study assumed that institutional, socio-economic and environmental factors together influence the adoption of mechanisms to cope with food insecurity. A household with several assets can more effectively maintain its consumption level, reduce vulnerability, improve food security and increase their welfare by disposing of some of its assets (physical, financial, natural, social and human capital). Its ability to do so increases according to the proportion of assets held.

3.2. Study area

The study was conducted in Gisagara District, one of the 8 Districts making up Southern Province of Rwanda (see Figure 3.2: Map of Gisagara District). This District is classified as a rural District by the Rwanda National Institute of Statistics (NISR) based on population density and indicators of remoteness (such as distance from major country road and major hospital). It is situated in the south-western part of the Province. To the southeast, Gisagara District is bordered by Akanyaru River which occupies much of its borders with the Republic of Burundi. Huye, Nyanza and Nyaruguru Districts also share borders with Gisagara. Gisagara District is composed of 13 administrative sectors which are simply called “sectors” and 54 administrative cells, simply called “cells”.

Gisagara is one of Rwanda’s smallest District. It has a surface area of 678 square kilometers (km^2) and a population of 276,161 inhabitants. It is one of the District with the highest population densities in Rwanda (more than 320 inhabitants per km^2). Some of its sectors have a population density of up to 550 inhabitants per square kilometer, reflecting the problem of land scarcity.

The agroclimatic setup of the District is also representative of Rwanda. Gisagara has an altitude ranging between 1600 and 1800 meters with two wet seasons and two dry seasons. The short wet season is in October and November. The main rainy season lasts from mid-March to the end of May. However, it should be noted that the succession of seasons becomes irregular from year to year and causes dryness. Gisagara’s average temperature is 20°C . The area is partly hilly. The hilly slopes ranging between 50 to 80 percent are frequent in this region, with some farms going

even beyond 90 percent of slope. This setup explains the rapid soil degradation process which Gisagara District continuously suffers from.

The four main crops grown in this District are rice, maize, cassava, and coffee. Though the majority of community does farming at a subsistence level, the District has some well organized commercial farmers, such as rice and coffee growers. Coffee and (to some extent) rice are the only cash crops grown in the District. Agricultural processing (coffee washing stations and rice processing factory) is the only major industry found in the District, but small-scale coltan and cassiterite mining activities are also found in the area. The tertiary sector mainly comprises retail commerce, transport services, construction, and artisanship.

The habitat of the Gisagara District is predominantly dispersed settlements. *Umuganda* (or conglomeration) settlements as well as rural towns are common in some sectors. The District possesses a dense road network, even though the majority is rough roads. The District is bordered by the Kigali-Bujumbura highway, which is the only tarmac road, found in the area. Access to infrastructure, such as electricity, is limited to areas near roads, especially highway and major rough roads. Only three out of the 13 sectors in Gisagara have access to electricity.

Gisagara District was selected as a case study for this research because it is one of the poorest districts in Rwanda and faces high levels of food insecurity (NISR 2009). It can thus provide an excellent basis from which to learn about and evaluate factors influencing food insecurity and coping mechanisms.

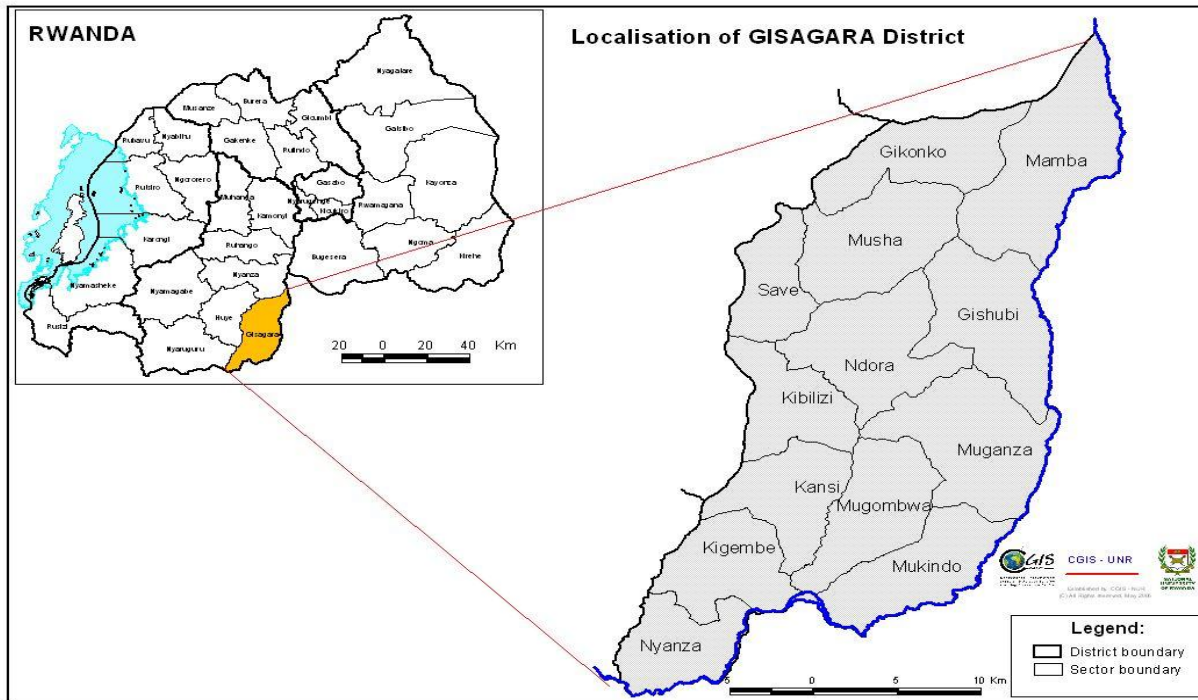


Figure 3.2: Map of Gisagara District

Source: GIS-NUR

3.3 Data sources and sampling method

The data was collected from households in Gisagara District, which had been selected using a systematic sampling method. A sample of 234 households was selected, that is 18 households per sector over 13 administrative sectors that compose Gisagara District, namely Nyanza, Kigembe, Kansi, Kibirizi, Muganza, Mugombwa, Mukindo, Musha, Gishubi, Mamba, Gikonko, Ndora, and Save. A sampling frame (list of households) was obtained for each sector and respondents were selected from each sector randomly using systematic sampling method for which the starting point was chosen at random that is the first i^{th} household was selected randomly in each sector. Thereafter, the subsequent households were selected at regular intervals which were obtained by dividing the total population of each sector by 18.

3.4 Data collection

Both primary and secondary data were collected in this study. Primary data were collected through a survey, using a semi-structured questionnaire which was administered at the household level. The questionnaire gathered information on household characteristics, such as demographic information (name, sex, age, education, *et cetera*), socio economic characteristics and other pertinent information. The household heads were the main respondents, but the person who is responsible for preparing meals for the household was also equally important in providing information on the available food for consumption by the household over the 7 days' recall period.

3.5 Empirical model

3.5.1 Food Security measurement

3.5.1.1 Food consumption score

As it is difficult to capture food security in terms of food availability, food access and food utilization in one measure due to the complexity and multidimensionality of these indicators, the proxy indicator Food Consumption Score (FCS) has been used. It measures the level of food security by taking into account dietary diversity, food consumption frequency and relative nutritional importance of different food groups. When analysing the validity of the FCS, Wiesmann, *et al.*, (2009) found that it is a useful measure because dietary diversity and food frequency are highly correlated with calorie consumption per capita. The FCS as a proxy to measure food security has been developed by the World Food Program (WFP, 2007). To apply the FCS, the households are grouped according to their overall consumption score, on the basis

of three classes as follows: (i) poor food consumption, (ii) borderline food consumption, and (iii) adequate food consumption. Thresholds for separating these three groups are generated by using a weighted food consumption score. Each food group is given a weight based on its nutrient content and then multiplied by the number of days a household consumed one or more items from that group within a seven-day period. Table 3.1 below provides a breakdown for each food group and the associated weight as well as the justification of such weight.

Table 3.1: Food Items, Food Groups and weights for calculation of the FCS and Justifications

Food Items	Food Group	Weight	Justification
Cereals: Corn, Wheat, Sorghum, Rice, Bread Roots and Tubers: Manioc, Sweet Potatoes, Banana	Staples	2	Energy dense, protein content lower and poorer quality than legumes, micronutrients (bound by phytates)
Peanuts, Beans	Pulses	3	Energy dense, high amounts of protein but of lower quality than meats, micronutrients (inhibited by phytates), low fat
Vegetables (including green, leafy vegetables, shoots)	Vegetables	1	Low energy, low protein, no fat, micronutrients
Fruits	Fruits	1	Low energy, low protein, no fat, micronutrients
Animal Proteins: Fish, Meat, Eggs	Meat & Fish	4	Highest quality protein, easily absorbable micronutrients (no phytates), energy dense, fat. Even when consumed in small quantities, improvements to the quality of diet are large
Milk / milk products	Milk	4	Highest quality protein, micronutrients, vitamin A, and energy. However milk could be consumed only in very small amounts and should then be treated as condiment, and therefore reclassification in such cases is needed
Sugar	Sugar	0.5	Empty calories. Usually consumed in small quantities
Oils and Fats	Oil	0.5	Energy dense but usually no other micronutrients. Usually consumed in small quantities

Source: World Food Program (2007).

The highest weight is attached to foods with relatively high energy, good quality protein, and a wide range of micronutrients that can be easily absorbed (WFP, 2007). If a certain food item is eaten on three of the last seven days, it should be given a frequency score of three, even if it has been eaten more than once a day. The food items are then assembled into the appropriate food group, for which the maximum number of consumption days is seven. Thus, if one food item is eaten on four of the last seven days and another food item within the same food group is eaten every day, the food groups have been given a frequency score of seven. On the basis of the FCS, the cut-off points are used to categorize households as follows:

- a) Households with poor food consumption have a food score of ≤ 21
- b) Households with borderline food consumption have a food score of 21.5 – 35
- c) Households with adequate food consumption have a food score of ≥ 35.5

To determine the households' food security status in this study, the consumption of 21 food items which are common in Rwanda was assessed: the food items were Maize, Rice, Other Cereals, Cassava, Sweet Potato, Other Roots/ Tubers, Bread, Cooking Banana, Beans and Peas, Other vegetables, Cassava leaves, Groundnuts, Sunflowers, Fresh Fruits, Fish, Meat, Poultry, Eggs, Oil, Sugar, Milk.

To facilitate the analysis, the food items were grouped into main staples, such as: Pulses, Vegetables, Fruits, Meats and Fish, Milk, Sugar and Oil. The Food Consumption Scores (FCS) were computed by grouping together food items in order to reflect the diversity and frequency (number of days per week) of the food items being consumed by a household. For each food group, the frequency represents the number of days an item from the food group was consumed, with a range from 0 (never) to 7 (every day). A weight was assigned to each food group (according to the WFP standards), representing the nutritional importance of the food group.

In line with the explanations given above, the most basic estimation equation for the Food Consumption Score used for this study is:

$$FCS = \alpha_{\text{cereals\&tubers}} \beta_{\text{cereals\&tubers}} + \alpha_{\text{pulses}} \beta_{\text{pulses}} + \alpha_{\text{vegetables}} \beta_{\text{vegetables}} + \alpha_{\text{fruits}} \beta_{\text{fruits}} + \alpha_{\text{meats}} \beta_{\text{meats}} + \alpha_{\text{dairy-products}} \beta_{\text{dairy-products}} + \alpha_{\text{sugar}} \beta_{\text{sugar}} + \alpha_{\text{oil}} \beta_{\text{oil}}$$

Where,

α_i = weight of food group

β_i = number of days per week

3.5.2 Coping mechanisms and factors influencing their adoption.

3.5.2.1 Coping mechanisms

The coping mechanisms adopted by households were identified using the responses given by households to 20 questions developed by Mardiharini (2000), which questions were adapted to food behavior, experiences and conditions that are known to characterize households in Rwanda that have difficulties to meet their food needs.

3.5.2.2 Factors influencing the choice of food insecurity coping mechanism

The research question in this case was to investigate what determines the choice of a particular coping mechanism of a household in Gisagara District. To answer this question, it was hypothesized that the choices of the coping mechanism depend on household socio-economic characteristics. The fact that household members may choose different coping mechanisms, and whether in the end all these types of mechanisms can be used by a household simultaneously or not, determines the econometric specification of the problem.

3.5.2.2.1 Multinomial logistic regression

The multinomial logit (MNL) model was used to analyze the factors influencing the choice of coping mechanism by food insecure households in Gisagara District. The advantages of the MNL are that it permits the analysis of decisions across more than two categories, allowing for the determination of choice probabilities for different categories unlike the binary probit or logit models (Madalla 1983; Wooldridge 2002).

The MNL model is expressed as follows:

$$P(y = j/x) = \exp(x\beta_j) / \left[1 + \sum_{j=1}^J \exp(x\beta_j) \right], j = 1, \dots, J \dots\dots\dots (1)$$

Where y denote a random variable taking on the values $\{1, 2, \dots, J\}$ for a positive integer J , and let x denote a set of conditioning variables. In this case, y denotes coping options or categories, and x contains different household characteristics. The question is how, ceteris paribus, changes in the elements of x affect the response probabilities $P(y = j/x), j = 1, 2, \dots, J$. Since the probabilities must sum up to unity, $P(y = j/x)$ is determined once we know the probabilities for $j = 2, \dots, J$.

Hence, for the parameter estimates of the MNL model in equation (1) to be unbiased and consistent, it requires the assumption of independence of irrelevant alternatives (IIA) to hold. More specifically, the IIA assumption requires that the probability of using a certain coping mechanism by a given household must be independent of the probability of choosing another coping mechanism (that is, P_j/P_k is independent of the remaining probabilities). The premise of

the IIA assumption is the independent and homoscedastic disturbance terms of the basic model in equation (1).

The parameter estimates of the MNL model only provide the direction of the effect of the independent variables on the dependent (response) variable; the estimates represent neither the actual magnitude of change nor the probabilities. Differentiating equation (1) with respect to the explanatory variables provides marginal effects of the explanatory variables, which are given as:

$$\frac{\partial p_j}{\partial x_k} = P_j (\beta_{jk} - \sum_{j=1}^{J-1} P_j \beta_{jk}) \dots\dots\dots (2)$$

The marginal effects, or marginal probabilities, are functions of the probability itself. They measure the expected change in probability of a particular choice being made with respect to a unit change in an independent variable (Green 2000).

It is important to mention that prior to the estimation of the multinomial logistic regression model; the explanatory variables were examined for the existence of multicollinearity. In this study, Variance Inflation Factor (VIF) was used to measure the degree of linear relationships among the continuous explanatory variables.

Following Gujarati, VIF was calculated with the following formula:

$$VIF (X_j) = \left(\frac{1}{1 - R_j^2} \right)$$

Where:

X_j = the j^{th} quantitative explanatory variable regressed on the other quantitative explanatory variables.

R_j^2 = the coefficient of determination of the regression equation representing the proportion of variance in the j^{th} independent variable that is associated with the other independent variables in the model.

As a rule of thumb, if the VIF of a variable exceeds 10 that variable is said to be highly collinear and it can be concluded that multicollinearity is a problem (Gujarati, 2004).

There might be also an interaction among discrete variables, which could lead to the problem of multicollinearity. To detect this problem, contingency coefficients were computed for each pair of discrete variables.

The contingency coefficients are computed as follows:

$$C = \sqrt{\frac{\chi^2}{n + \chi^2}}$$

Where, C = coefficient of contingency, χ^2 = a Chi-square random variable and n = total sample size. The value of contingency coefficients ranges between 0 and 1. If the value of contingency coefficient is less than 0.5, it suggests that there is no serious problem of high degrees of association between the discrete variables.

3.5.2.2.2 Dependent variable

The multinomial logit model was used in order to assess the factors influencing the choice of food insecurity coping mechanisms by households. In developing the empirical model using multinomial logit estimation, the dependent variable is the coping mechanism.

3.5.2.2.3 Independent variables

The set of exogenous variables that were chosen as probable factors influencing the choice of coping mechanisms by rural households in Gisagara District are presented in the Table 3.2 below.

Table 3.2: Independent variables in the MNL model

Description	Value	Expected Sign	Explanation for the sign
Age of head of household	Number of years	(+ve)	Rural households mostly base their livelihoods on agriculture. The older the household head, the more experience he has in farming and weather forecasting. Moreover, older persons are greater risk averters, and mostly they intensify and diversify their production activities. As a result, the chance for such household to be food insecure is less and it has more choices of coping mechanisms to be adopted, based on his experience.
Gender of head of household	0=Female, 1=male	(+ve)	Most of rural households in Gisagara base their livelihoods on agriculture and still using archaic methods to cultivate, and in that sense the labor force plays a key role in that area. Male-headed households are in a better position to pull labor force than the female headed ones. Thus, sex of the household head is an important determinant of food insecurity coping mechanism to be adopted.
Household size	Number of people living in the house	(-ve)	A household with larger number of members are likely to be food insecure because of high dependency burden, with a potential exhaustion of coping mechanisms in relation to the coverage of household food consumption.
Educational level of head of household	Schooling years	(+ve)	Education equips individuals with the necessary knowledge of how to have a better life. Hence, a household with educated head is likely to be food secure because education offers more ability to cope with food insecurity.
Farm land size of a household	Size of land owned (in	(+ve)	Household who have large land sizes have a better option to diversify production and

	hectare)		to increase its production. Such a household will be in a better position in term of food security and thus will have more options of food insecurity coping mechanism to be adopted.
Cooperative Membership	0= No, 1= Yes	(+ve)	Co-operatives worldwide are committed to the concept of mutual self-help. This makes them natural tools for social and economic development, and provides significant additional benefit to communities, and social systems co-operatives allow these people to cope with food insecurity and maintain their rural lifestyles.
Total livestock owned	Number	(+ve)	Livestock are a source of income for farming households. Households who have better possession of livestock are likely to be food secure in the sense that livestock can be used as coping mechanisms to alleviate household food insecurity.
Total annual income	Rwandan Francs	(+ve)	A household that manage to secure larger income from any source have better chance to secure access to food it needs and has more choices of food insecurity coping mechanism to be adopted.

CHAPTER FOUR

RESULTS AND DISCUSSION

This chapter presents a discussion of the results. The first section summarizes the results by using descriptive statistics such as means, percentage and frequencies to describe the socioeconomic and demographic characteristics of the sample households. The second section focuses on the measuring of food security using Food Consumption Score proxy in order to determine the food security status in Gisagara District. The households are then classified into three major food security categories, namely households with poor food consumption, borderline food consumption and adequate food consumption. The last part in this chapter presents the results from econometric analysis that identifies the factors influencing the choice of food insecurity coping mechanisms.

4.1. Socio economic and demographic profiles of respondents

The demographic and socio economic characteristics of the sampled households in the study area (Gisagara District) are presented in the tables in figures given below.

4.1.1 Household size

The results presented in the figure 4.3 below show that the average household size in Gisagara District is 4 persons and the median is 5.

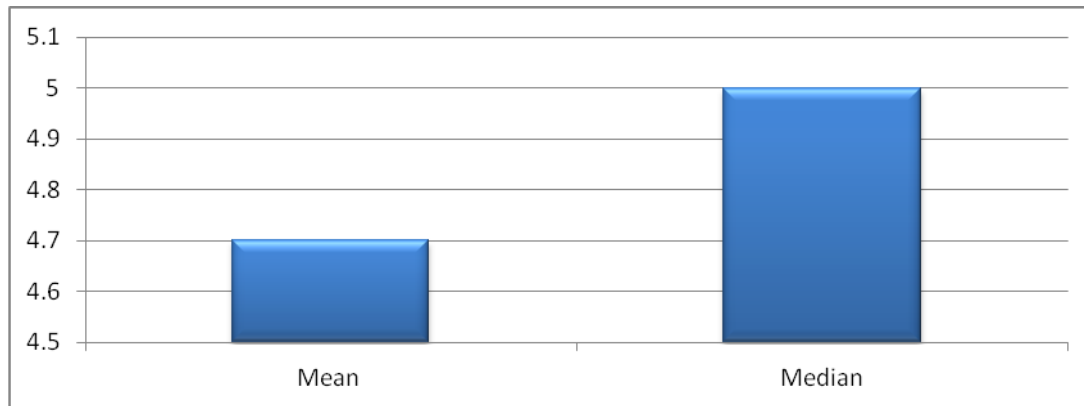


Figure 4.3: Household size

Source: Author's survey, 2012

Household size is measured by the number of family members in the household. According to Brown (2004), increasing family size tends to exert more pressure on food consumption. In the case of Gisagara District, land holdings are very small. Households without other income generation activities depend only on less productive agricultural land for living. Therefore, increasing household size results in increased demand for food. However, this demand cannot be matched with the existing food supply from own production and this end up with the household becoming food insecure.

4.1.2 Age of household heads

The results on average age of household heads in Gisagara District are presented in Tables 4.4 below.

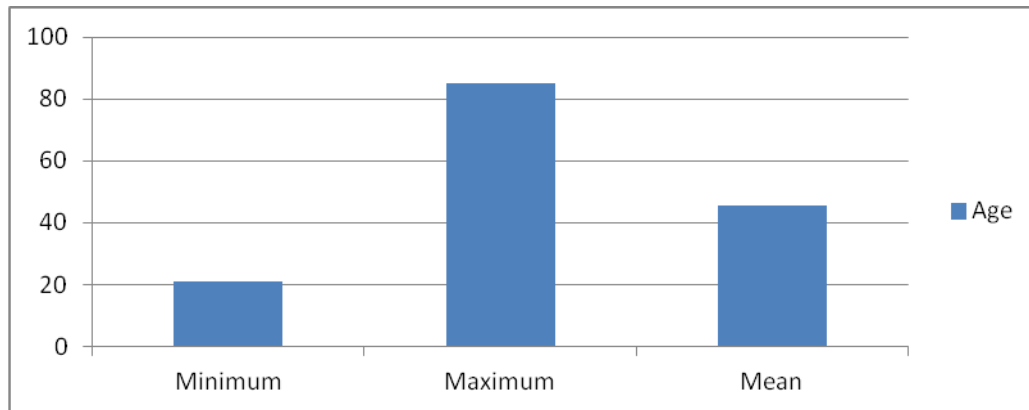


Figure 4.4: Age of household heads

Source: Author's survey, 2012

The results show that the average age of household heads among the sample size was found to be 45 years. The minimum was 21 years and the maximum was 85 years.

Hofferth (2003) argues that the higher the age of the household head, the more stable the economy of the farm household and the more food secure the household, because older people have relatively richer experiences of the social and physical environments as well as greater experience of farming activities. Moreover, older household heads are expected to have better access to land than younger heads, because younger men either have to wait for a land distribution through inheritance, or have to share land with their relatives. Due to land scarcity in Gisagara District, young people often do not have a land to inherit from their parents, and for lack of productive resources, they rely on low wage from casual labor in agricultural or non agricultural related and hence becoming vulnerable to food insecurity.

4.1.3 Gender of household heads

The results presented in the Table 4.3 below show that 32.1 percent in the sample of 234 households interviewed are female-headed households while 159 households (69 percent) are male-headed households.

Table 4.3: Gender of household heads

Gender	Frequency	Percent
Female	75	32.1
Male	159	67.9
Total	234	100.0

Source: Author's survey, 2012

In Gisagara District, women generally face many gender-specific constraints as agricultural labourers and depending on cultural norms, some farming activities rely on access to male labour without which women farmers face delays and tend to cultivate smaller plots and achieve lower yields, thus exposing them to food insecurity.

4.1.3 Education level of household heads

In term of education, the results presented in the Table 4.4 below show that the majority of household heads in Gisagara District had attended school. The highest level of education attained by any of the household heads is secondary education. None of the household heads had attended a tertiary education. Among the sample of 234 households, 59.4 percent had attended primary school, and only 10.7 percent had attained secondary school. The results show that 29.9 percent had not attended any formal schools and were assumed illiterate.

Table 4.4: Education of household heads

Level	Frequency	Percent
Illiteracy	70	29.9
Primary school	139	59.4
Secondary school	25	10.7
Total	234	100.0

Source: Author's survey, 2012

Despite the low level of education of household heads in Gisagara District, those who managed to acquire a certain level of education are often better off in terms of getting more involved in income generating activities, thus helping them to sustain their livelihood and improve food security.

4.1.4 Land ownership

The Figure 4.5 presents the results on land ownership for the sample households in Gisagara District.

Table 4.5: Land ownership

Land size	Frequency	Percent
More than 0.5 hectare	90	38.5
Between 0.1 and 0.5 hectare	73	31.2
Less than 0.1 Hectare	38	16.2
Landless	33	14.1
Total	234	100.0

Source: Author's survey, 2012

Farm size was taken as the total farm land area owned by the household, measured in hectares.

The Table 4.5 below shows that among the sample of 234 households in Gisagara District, 38.5

percent own more than 0.5 hectares, 31.2 percent own between 0.1 and 0.5 hectare and 16.2 percent own less than 0.1 hectare. The results show that 14.1 percent were landless.

According to FAO (2009), the size of the land in agriculture influences household food security in that the larger the farmlands the higher the production. These statistics on households land ownership show an obvious problem of land scarcity in Gisagara District. The majority of households had small plots equivalent to 0.5 hectares or less. The fact that agriculture is the main source of income for households in Gisagara District, those without access to land or with small plots without any other income generating activity are vulnerable to food insecurity.

4.1.5. Livestock ownership

The Figure 4.5 below presents the results on livestock ownership in Gisagara District.

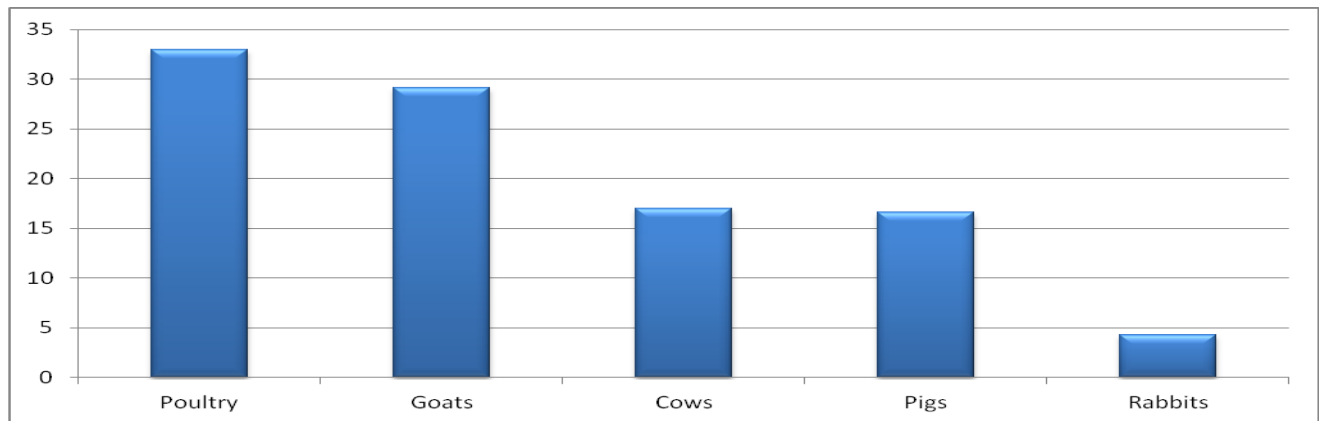


Figure 4.5: Livestock ownership

Source: author's survey, 2012

The results from this study reveal that 67 percent of households owned at least one farm animal. Results presented in the Figure 4.5 show that the most commonly owned livestock are poultry, goats, pigs and cows. Chicken are owned by 33 percent and goats by 29.1 percent of the

households while the households that own rabbits, cows and pigs are 17 percent, 16.6 percent and 4.3 percent respectively.

This high number of chicken is attributed to their easiness of up-keep, while goats are small ruminants that can easily survive from limited feeding.

The households keep livestock mainly for meat, milk, skins and manure. Livestock for them is regarded as a form of investment. Livestock are used as a ready source of cash and can be sold if the household is in dire need of cash, especially in times of poor harvest. It can thus be inferred that livestock ownership in Gisagara District increases household income and thus improves household food security.

4.2.6. Main activities and source of income in Gisagara District

Table 4.6 presents the results on main activities and source of income in Gisagara District. The results shows that among the 234 households, 47.86 percent got their income from agriculture (crop production) and 20.51 percent from agro-pastoralism (agriculture and livestock), 12.82 percent from casual agriculture related wage labour, 6.41 percent from their own business, 5.55 percent from casual non agriculture related wage labour and 4.70 percent got their income from their regular employment in different sectors. The results also show that 2.13 percent rely on remittances.

Table 4.6: Main activities and source of income

Activities	Frequency	Percent
Agriculture (crop production)	112	47.86
Agriculture and livestock	48	20.51
Casual labour (agricultural related)	30	12.82
Running own business	15	6.41
Casual labour (non agricultural related)	13	5.55
Regular employment	11	4.70
Remittances	5	2.13
Total	234	100

Source: Author's survey, 2012

Table 4.6 shows that agriculture and agro- pastoral sector were relatively dominant as a source of livelihoods. It is important to note that no single activity can ensure adequate levels of income for households; hence most them combine different activities in order to get income and ensure improvement in their food consumption and other needs.

Household income generation depended to a large extent on household portfolio of assets, including physical and financial assets, human and social capital, as well as on the quantity of labour with which the household is endowed.

For the households that rely on crop production and selling, the smaller the plot of land cultivated the higher the likelihood of not getting enough income to sustain their livelihood. Hence, many households with small land parcels indeed also provide part-time casual labour in agricultural or non agricultural related activities in order to support their low production and cope with food insecurity.

The larger the land parcels that a household cultivated, the more likely it is to have high income from crop production. The households engaged in a larger number of livelihood activities are also likely to get higher incomes. Similarly, having a household that owns livestock is more likely to generate high income and thus better access to food.

4.2.7. Safety Net Programs

Safety net programs have been used by governments and non-government organizations in response to food insecurity for most vulnerable households in Gisagara District. In order to identify the most vulnerable households, the Government of Rwanda (GoR) uses the method called *UBUDEHE* (a traditional Kinyarwanda word that defines the collective action employed towards solving social problems). *Ubudehe* classifies the Rwandan population into six categories according to their economic status, whereby people range from the first category which comprises of the poorest people to the sixth category that includes the richest.

The Figure 4.6 presents the results of safety net programs from the sample households in Gisagara District.

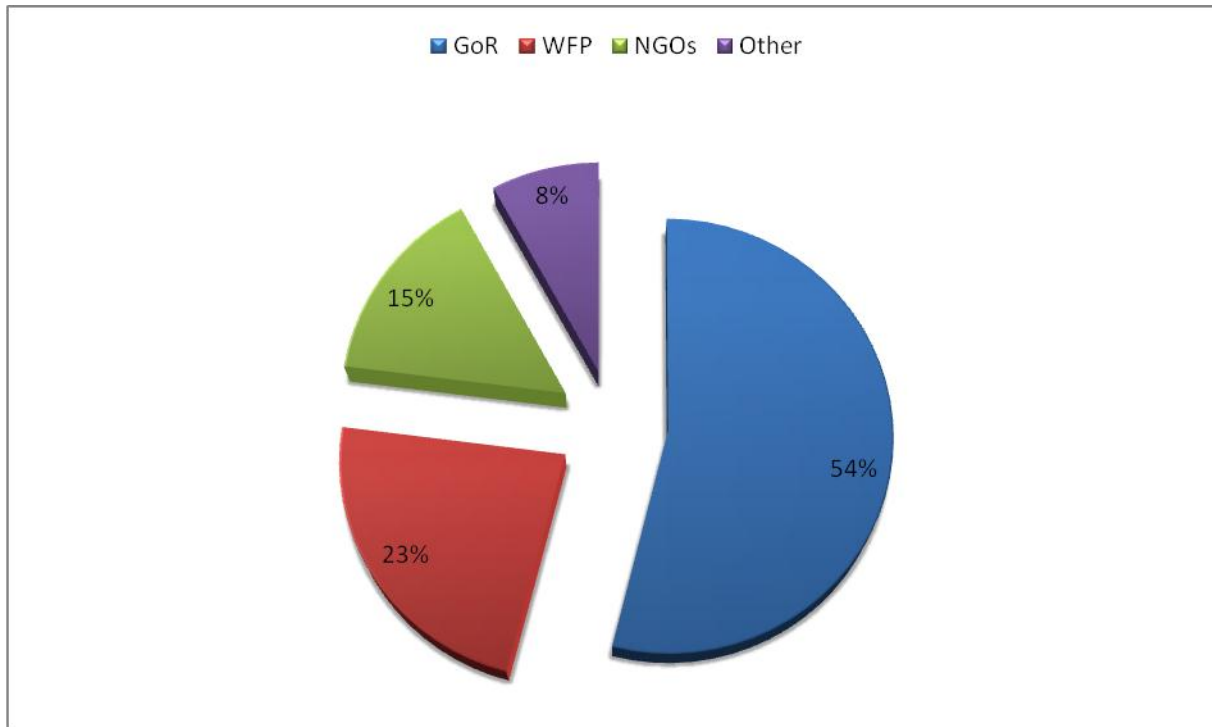


Figure 4.6: Safety Net Programs for sample Gisagara District Households

Source: Author's survey, 2012

The results presented in the Figure 4.6 show that 10 percent of food or non food assistance received by most vulnerable households comes mostly from the Government and is often supported by some international and local organizations. The Government provides 54 percent of assistance to most vulnerable households, followed by WFP with 23 percent of food assistance given and NGOs with 11 percent, but there is 8 percent from other sources, such as churches.

4.3 Food security status in Gisagara District

4.3.1 Household Food Consumption Score (FCS)

Data on the food consumption of the 234 households was collected in Gisagara District, capturing the variety and frequency of different foods consumed over a 7-day recall period. The approach in the calculation of the FCS is discussed in subsection 3.5.1.1 of the Chapter 3.

The Table 4.7 below presents the results of households classified according to food consumption groups from a sample of 234 households interviewed in Gisagara District, based on FCS computation.

Table 4.7: Food consumption groups by items

Food Consumption Groups	Pop. (%)	Food Groups (Weekly Consumption)								Food Consumption Score
		Tubers & Cereals	Pulses	Vegs	Fruits	Anim. Prot.	Oil	Sugar	Milk	
Poor Food Consumption	12.5	5.1	2.2	2.1	0.5	0.1	0.3	0.2	0	19.9
Borderline Food Consumption	33.4	6.2	4.1	4.5	1.2	0.7	4.1	1.7	0.5	34.8
Acceptable Food Consumption	54.1	7	5.1	4.4	3.4	2.9	7	4.7	3.1	61.5
Total	100									

Source: Author's survey, 2012 (See Section 3.5.1.1 on categorization)

Using the Food Consumption Score cut-off, the results show that the households with poor food consumption in Gisagara District are 12.5 percent, while 33.4 percent have borderline consumption and the households with acceptable food consumption are 54.1 percent. According to the FCS, households with poor consumption are regarded as food insecure, while the households with borderline consumption are categorized as moderate food insecure and the households with acceptable food consumption are categorized as food secure.

The study found that the diet of the households with poor food consumption was exclusively based on staples food, and such households consumed, on average, cereals and tubers (5 days) and some combination of pulses and vegetables consumed two days in a week. The consumption of meats, fish, milk, oil, sugar and fruits was almost close to zero. This result indicates that the quality of the diet of the households in this category is very poor, by lacking in both protein and micronutrients.

It was also found that, among households with borderline consumption, tubers and cereals were consumed over 6 days per week, but there is a significant improvement in terms of pulses, oil and vegetables consumption (4 days per week) compared to the households with poor consumption. However, consumption of meat, fish, milk and fruits still remains infrequent being about one day on average per week. This result indicates that the households with borderline consumption score still lack food that is rich in protein and micronutrients. However, for the households with acceptable consumption score, the results show that all food groups were consumed in significant amounts over the seven days in a week, during which the consumption of animal proteins and milk attained an average of three days a week.

4.3.2 Food Sources

The households were asked to provide information about sources of food, for each of the food items consumed. Results show that the food items were obtained from different sources; especially from households own crop production, purchases and domestic livestock. The Figure 4.7 below compares food sources by food consumption groups.

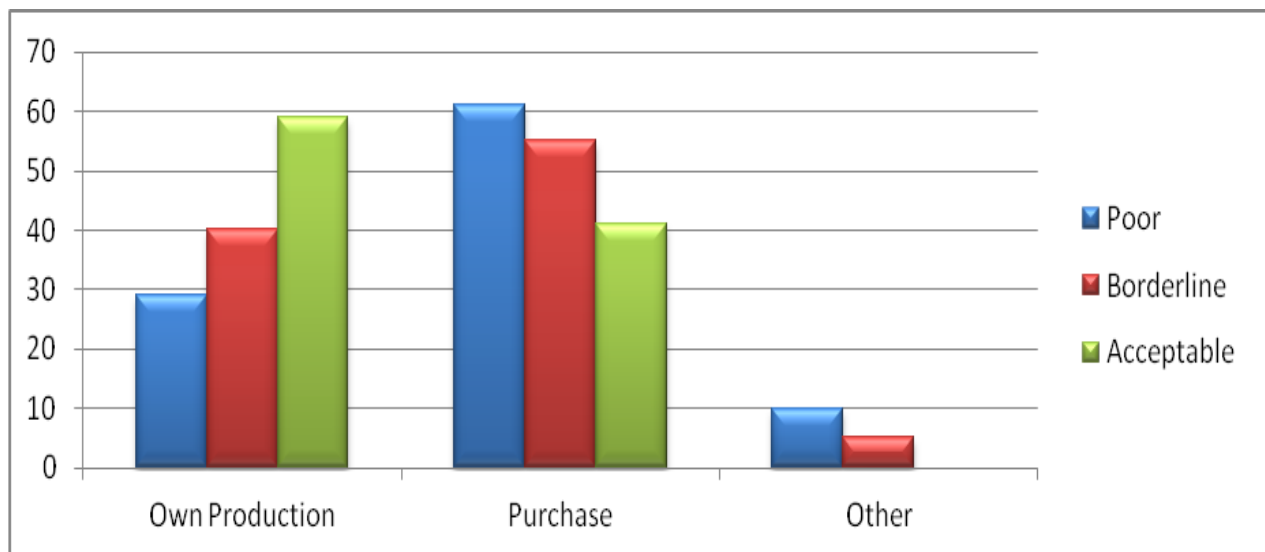


Figure 4.7: Food sources based on food consumption categories

Source: Author's survey, 2012

Results show that own production is the main source of foods at 59 percent (especially staple foods) for food secure, while 41 percent of food consumed by this category is purchased. This is because food secure households consume food from their own production and purchase only items that they do not produce such oil, sugar and salt. The share of purchases for households with poor consumption (food insecure) and borderline consumption (moderate food insecure) was

61 percent and 55 percent respectively, with the share of other sources (food aids, gifts...) for these households reaching 10 percent and 5 percent respectively.

The situation of high food dependence on purchases and/or other sources is explained by the fact that Gisagara District is a place where access to adequate productive land is a problem for many farm households. In order to buy food, they rely on low wage from agriculture labor and remittances to some extent.

4.4 Food Insecurity Coping Mechanisms

This section addresses the second and the third objectives on determining the mechanisms used by households to cope with food insecurity in Gisagara District and the factors influencing the choice of food insecurity coping mechanisms.

Among the sample of the 234 households interviewed, 121 households reported to have encountered a problem of food access caused by different shocks, namely land not enough for food production, drought, flood, erosion and pest damage to crops before harvest. Therefore, the households adopted one or more mechanisms to cope with the shocks mentioned above.

According to (Mardiharini, 2000), households with excessive risk exposure and without access to relevant food insecurity coping mechanisms are the most vulnerable to food insecurity.

4.4.1 Description of food insecurity coping mechanisms.

Coping mechanisms were categorised into five main groups, based on the answers given by the sample households in Gisagara District are presented in the table 4.8.

Table 4.8: Food insecurity coping mechanisms

Coping mechanisms adopted	Frequency	Percent
Casual labour based coping mechanisms	35	42
Assets based coping mechanisms	26	25
Borrowing based coping mechanisms	21	17
Assistance based coping mechanisms	13	11
Food adjustment-based coping mechanism	16	5
Total	121	100

Source: Author's survey, 2012

As illustrated in Table 4.8, casual labour-based coping mechanisms in agricultural or non agricultural sectors were adopted by 42 percent to cope with food insecurity. Assets-based coping mechanism was adopted by 25 percent. This coping mechanism consists of selling or renting such assets as agricultural land, livestock, stored crops and other valuable assets in order to cope with food insecurity. Borrowing-based coping mechanism was adopted by 17 percent and consists of borrowing money or food in order to cope with food insecurity. Assistance-based coping mechanisms was adopted by 11 percent to cope with food insecurity and it consists of receiving food aid in kind or in cash by vulnerable households from friends/relatives, Governments and Non Government Organisations while adjustment in food consumption as a coping mechanism was adopted by 5 percent and it consists of such food consumption adjustments as limiting portion sizes at meal times, reducing adult consumption to benefit children, relying on cheaper foods and skipping or reducing the quantity of meals.

4.4.2 Econometrics Model

What determines the choice of particular coping mechanisms by a household in Gisagara District? To answer this question, socio-demographic characteristics of households were analyzed. The fact that household members may choose different coping mechanisms for food insecurity, and whether these types of mechanisms can be used by a household simultaneously or not, influenced the specification of the econometric problem.

4.4.2.1 Detecting multicollinearity and degree of association

A Multinomial Logit Model was selected to analyze the factors influencing food insecurity coping mechanisms, as discussed in section 3.5.2 of the Chapter 3. However, before fitting the model, it was important to check whether there was any serious problem of multicollinearity among the continuous variables and also by examining the degree of association among discrete independent variables, following Gujarati (2004).

Following Gujarati (2004), the value of Variance Inflation Factor (VIF) greater than or equal to 10 is an indicator for the existence of a serious problem of multicollinearity as discussed in session 3.5.2.1 of the chapter 3. The Table 4.9 presents the value of VIF for each of the continuous variables.

Table 4.9: Variance Inflation Factor

Variable	VIF	1/VIF
Total Annual Income	2.85	0.350954
Age	1.94	0.516059
Household size	1.81	0.551077
Membership of cooperative	1.49	0.671914
Livestock ownership	1.45	0.690092
Mean VIF	1.9	

Source: Authors' calculations

Results from the Table 4.9 show that the VIF of all the continuous variables are smaller than 10. Thus, all the hypothesized 6 continuous explanatory variables were included in the model. The degree of association among discrete variables was estimated through the value of contingency coefficients as discussed in session 3.5.2.1 of the chapter 3. The results of the estimates of the contingency coefficients among cooperative membership, education and gender are presented in Table 4.11.

Table 4.10: Contingency coefficient for discrete variables

	Cooperative membership	Education	Gender
Cooperative membership	1		
Education	0.074	1	
Gender	0.014	0.185	1

Source: Authors' calculations

The results presented in the Table 4.10 show that the contingency coefficients for cooperative membership, education and gender of household heads are lower than 0.2. Since these figures are less than 0.5, they suggest that no serious association exists between the variables. Therefore, all the three discrete variables were included in the model.

4.4.2.2 Multinomial Logit model results

The estimation of the multinomial logit model was undertaken by normalizing one category called state or the base category. In this analysis, the most adopted coping mechanism (casual labour-based coping mechanism) is the reference base.

The Table 4.11 presents the estimated multinomial logistic coefficients obtained by maximum likelihood which provides the direction of the effect of the independent variables on the dependent variables. Even though the multiple coefficient of correlation (R-squared) is 0.32 and may appear low, the F value is highly significant ($p < 0.01$). This confirms that the independent variables explain acceptable levels of the observed variations in the food insecurity coping mechanisms.

Table 4.11: Maximum likelihood estimates of factors influencing food insecurity coping mechanisms

Number of obs = 234
 LR chi2(44) = 127.85
 Prob > chi2 = 0.0000
 Log likelihood = -83.61
 R-squared = 0.324
 F(8, 234) = 67***

Source: Authors' calculations

Explanatory variables	Assets-based coping mechanism	Borrowing-based coping mechanism	Assistance-based coping mechanism	Food adjustment-based coping mechanism
AGE	.0176 (0.049)*	.059 (0.136)	-.071 (0.117)	-.030 (0.022)**
GENDER	1.452 (0.098)*	-2.544 (.014)**	-.466 (0.589)	-.660 (0.590)
EDUC	-1.273 (0.099)	-1.669 (0.018)	-1.033 (0.168)	-1.201 (0.199)
HHSIZE	-.250 (0.462)	.231 (0.513)	.012 (0.075)*	.056 (0.120)
LANDSIZE	.316 (0.002)***	.617 (0.083)	-.296 (0.602)	-1.214 (0.303)
LIVESTOCK	3.401 (0.000)***	1.193 (0.167)	.311 (0.759)	.048 (0.970)
MCOOPER	2.320 (0.040)**	.118 (0.001)***	2.377 (0.024)**	2.652 (0.070)*
TOTINCOM	2.41e-06 (0.064)*	-3.98e-07 (0.909)	-4.59e-06 (0.060)*	2.74e-06 (0.050)*

Notes: p-values are in parentheses: * p < 0.10, ** p < 0.05, *** p < 0.01

The estimated multinomial logistic coefficients obtained by maximum likelihood estimation do not generate a direct economic interpretation, and the sign of an estimated coefficient only provides the direction of the effect of the explanatory variable (Greene, 2003). To address this limitation, marginal effects were calculated. Marginal effects give the change in the predicted probability associated with change in the explanatory variables (Green, 2003).

The Table 4.12 presents the marginal effects from the MNL, which measures the expected change in probability of a particular choice being made with respect to a unit change in an independent variable.

Table 4.2: Marginal effects of factors influencing food insecurity coping mechanisms

Explanatory Variables	Assets based-coping mechanism	Borrowing based-coping mechanism	Assistance based-coping mechanism	Food adjustment-based coping mechanism	Casual labour-based coping mechanism
AGE	.012 (0.045)**	-.001 (0.234)	.009 (0.123)	-.0001 (0.342)	-.0184 (0.019)*
GENDER	.034 (0.245)	-.069 (0.554)	-.050 (0.832)	-.004 (0.992)	.008 (0.345)
EDUC	-.024 (0.287)	-.028 (0.991)	-.115 (0.550)	-.007 (0.089)	.174 (0.997)
HHSIZE	-.004 (0.287)	-.003 (0.005)	.048 (0.113)	.100 (0.066)**	.055 (0.016)**
LANDSIZE	.266 (0.004)***	.012 (0.577)	-.035 (0.114)	-.008 (0.234)	-.037 (0.029)**
LIVESTOCK	.324 (0.000)***	.020 (0.167)	.016 (1.000)	-.0009 (0.342)	-.149 (0.114)
COOPERM	.059 (0.876)	.109 (0.002)***	.382 (0.987)	.026 (0.514)	-.0009 (0.983)
TOTINCOM	-6.84e-07 (0.786)	-1.83e-08 (0.452)	-5.64e-07 (0.087)*	-2.40e-08 (0.054)*	-4.54e-08 (0.285)

Source: Authors' calculations

Notes: p-values are in parentheses: * p < 0.10, ** p < 0.05, *** p < 0.01

Based on the Table 4.13 results, the following observations were made:

Age: This variable was found to be significant and influence positively and negatively the choice of assets-based coping mechanism and labour-based coping mechanism at 10 percent and 5 percent respectively. The results show that the likelihood of a household head to choose assets-based coping mechanism increases by 1.21 percent with increasing of age. On the other hand, the results show that the likelihood of a household head to choose casual-labour based coping mechanism decreases by 1.84 percent with increasing of age. The possible explanation is based on experience in farming of household head and land inheritance culture in Gisagara District. The older the household head, the more it is likely to have some assets, especially land and livestock, and thus rely more on assets-based coping mechanisms unlike household with younger head. Because of land scarcity, younger farmer households often have small plots that are unable to produce enough food for consumption and hence rely more on casual labour in order to cope with food insecurity.

Gender: Contrary to what was expected in the hypotheses of this variable, being male or female does not influence the adoption of any coping mechanisms. This implies that there is no significant difference in coping mechanisms adopted by male-headed and female-headed households.

Education of Household Head (EDUC): The variable education was not found to be significant, implying that there is no significant difference in terms of coping mechanisms adopted by households based on their education level.

Household size (HHSIZE): This variable was found to be significant and positively influences households to choose casual labour-based coping mechanisms at 5 percent level of significance. One extra person in the household increases the likelihood to adopt casual labour by 5.53 percent. This result suggests that the larger the household, the more the food demand and the more the households participate in casual labour in order to feed the household members. Furthermore, as expected, household size was also found to be significant at 10 percent in influencing households to adopt “adjustments in food consumption” as a coping mechanism. To feed larger households requires more resources (income) which are lacking for many rural households in Gisagara District. Hence, the larger the household, the more the odds to choose adjustment-based coping mechanism and this increases at 9.98 percent with an addition of one extra person in the household.

Land size (LANDSIZE): This variable was found to be significant at 1 percent and influences positively the household to choose assets-based coping mechanism. The results show that a unit increase of farm size increases the likelihood of choosing assets based-coping mechanism by 26.6 percent. This may be explained by the fact that land in Gisagara District is an important asset indicator of wealth. Hence, to cope with food insecurity, a household with access to land tends to lease a part of it in order to get cash

and buy food. Furthermore, this variable was also found to be significant at 5 percent and to negatively influence the choice of casual labour-based coping mechanisms. The results show that a unit decrease of farm size increases the likelihood of choosing casual labour-based coping mechanism by 3.7 percent. This implies that households with small land have difficulties to produce food that can feed the whole household and hence tend to rely on casual labour-based coping mechanisms.

Cooperative membership (COOPERM): As expected, being a member of a cooperative has a significant and positive influence at 5 percent on household to opt for borrowing-based coping mechanism by 10 percent. The reason is that being a member of a cooperative allows households to build the concept of mutual self-help in everyday life. Once confronted with food insecurity, lending and borrowing food or money to buy food becomes easier among household members of the same cooperative.

Livestock ownership (LIVESTOCK): As expected, this variable positively influences the households to opt for asset-based coping mechanism at 1 percent level of significance. An increase of the number of livestock by 1 livestock unit increases the probability of a household to sell livestock as food insecurity coping mechanism by 32 percent.

Total Annual Income (TOTINCOM): This variable was found to be significant and negatively influences the households to opt for both food adjustment-based and assistance-based coping mechanisms at 10 percent. This shows that households which manage to

earn high income from any sources are less likely to depend on food aid or any assistance. They are also less likely to reduce a meal or skip it as coping mechanisms in the adjustments of food consumption in food insecure area

CHAPTER FIVE

SUMMARY, CONCLUSION AND POLICY IMPLICATIONS

5.1 Summary and Conclusion

Food insecurity is the most crucial and persistent problem facing rural households in Rwanda. Even though the country has considerably reduced the problem of poverty in general, many of its rural households are still unable to feed themselves throughout the year. Food availability in the country is largely determined by domestic staple food production through subsistence agriculture (FAO, 2010).

The purpose of this study was to provide an assessment of the food security status and factors influencing the choice of food insecurity coping mechanisms in Gisagara District of Rwanda. The following objectives were addressed: (i) the assessment of food security status in Gisagara District, (ii) the identification of food insecurity coping mechanisms adopted by households in Gisagara District, and (iii) the assessment of the factors influencing the choice of those coping mechanisms.

A survey of a sample covering 234 households from 13 sectors that compose Gisagara District chosen through a systematic sampling procedure was conducted. The data collected were analysed using Stata 10 and Statistical program for Social Sciences (SPSS). Descriptive statistics were generated to describe the social-economic and demographic characteristics of the households and also address the second objective on coping mechanisms adopted by households in Gisagara District.

The first objective was addressed using a commonly known measure of food security status known as a Food Consumption Score. The results based on this measure revealed that 12.5 percent of the households in the study area had a poor food consumption score (food insecure), while 33.4 percent fall in a borderline food consumption score (moderate food insecure) and 51 percent of the households have an acceptable food consumption score (food secure).

The households that experienced food insecurity problem, which in some cases is repeated over years, had to adopt some mechanisms to cope with food insecurity. The third objective of the study aimed to find out and characterize the factors that influence the choice of food insecurity coping mechanisms in Gisagara District. Thus, to respond to this objective, a Multinomial Logit Model was used and the results revealed that out of the eight variables included in the model, two were found to be insignificant and six were found to be significant at different levels, which are 1, 5 and 10 percent levels. The choice of casual labour-based coping mechanisms was found to be positively influenced by household size and negatively influenced by land size and age. The choice of assets-based coping mechanisms was found to be positively influenced by age, livestock and land size while the choice of borrowing-based coping mechanisms was found to be positively influenced by cooperative membership. The choice of food adjustment-based coping mechanisms was found to be positively influenced by household size and negatively influenced by total annual income. Finally, the choice of the assistance-based coping mechanisms was found to be negatively influenced by total annual income.

5.2. Policy implications and Recommendations

The agricultural sector of Gisagara District is characterised by land scarcity and the increasing fragmentation of the already small parcels of land cultivated by households. Subsistence crop farming is not enough to feed the entire household sufficiently throughout the year. Therefore, policies should promote initiatives that invest more in rural off-farm activities to generate employment to enable households increase their income and thus be able to improve their food security.

The results of this study revealed that the households that own livestock are more likely to have a high food consumption score (food secure) due to its important role in terms of income generation and provision of food. Thus, efforts should be made to improve the production and productivity of livestock in Gisagara District. The results of the study also show that farm cooperatives play a vital role in improving food and nutrition security for their members in rural areas in the sense that they generate employment and serve as a food insecurity coping mechanism option for the member households through the concept of mutual self-help (social capital). Hence policies should encourage and support the establishment of cooperatives in rural area.

As part of short-term solutions, it is important that actions are taken to alleviate the chronic food insecurity among the most vulnerable households which are unable to cope with food insecurity by expanding food safety net programs so as to enable them to have access to adequate food.

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APPENDIX: QUESTIONNAIRE

SECTION 1: GENERAL INFORMATION

1.1. Survey number _____

1.2. District _____ Sector _____
Cell _____

1.3. Date of interview _____

1.4. Name of enumerator _____

1.5. Name of respondent _____

SECTION 2: HOUSEHOLD CHARACTERISTICS

No	Name of household members	Sex	Age	Marital status	Relationship to hh head	Educatio n	Main occupatio n	Health status
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								

2.1. Codes for sex: 1= male 0= female,

2.2. Codes for marital status: 1= Married, 2=Divorced 3= Widow 4= Widower 5= Single,

2.3. Codes for relationship to household head: 1 = HH Head, 2=wife, 3 = Son, 4 = Daughter,
5= Grand Father, 6=Grandmother, 7= Brother, 8 = Sister 9=other (specify)_____

2.4. Codes for main occupation: 0= no occupation, 1= peasant farmer, 2= daily laborer,

3=Schooling, 4= trader, 5= handicrafts, 6= Civil servant, 7=other (specify) _____

2.5. Codes for health status: 1=Ok 0= Sick

2.6. Codes for education: 1= Illiteracy, 2=Primary, 3=Secondary, 4= University, 5= other (specify) _____

SECTION 2: ACCESS TO LAND

2.1. Do you own land? 1= Yes 0= No

2.2. If yes what is the size of your land approximately:

2.2.1. Less than 0. 1 hectare_____ between 0.1 - 0.5 hectare_____ More than 0.5 hectare_____

2.3. Other (specify)_____

2.4. Did you use chemical fertilizer during this cropping period? 1=Yes, 0=No

2.5. Did you use natural (from animal/plant, *et cetera*) fertilizer during cropping period? 1=Yes, 0=No

2.6. Did use Irrigation during this cropping period? 1=Yes, 0=No

SECTION 3: LIVESTOCK OWNERSHIP

3.1 Do you own domestic animals? *1= Yes, 0=No.*

3.2 If yes, give details

Types	No owned in the last 12 months	Use	Reason for sale
Cattle			
Chickens			
Cow			
Donkeys			
Mule			
Ox			
Others (Specify) _____			

3.3. Use of livestock: *1=Meat, 2=Manure, 3= milk, 6= animal traction*

3.4. Reason for sale: *1= to purchase agricultural inputs, 2= to pay taxes and other debts, 3= to purchase food, 4= Social obligation, 5= others (specify) _____*

3.5. Did you own more animal in the past? *1= yes, 0=no*

3.6. If yes to question number 3.5, what are the reasons for livestock decline?

1= Draught 2= Disease 3= livestock sale 4= other (specify) _____

SECTION 4: MEMBERSHIP TO COOPERATIVES

4.1. Do you or member of your family member of any formal cooperatives? *1= Yes; 0=No*

4.2. If yes, would you mention the name of the cooperatives? _____

4.3. What benefits did you gain by being membership of such cooperatives? *1= Income increased, 2= labour Shared, 3= credit used, 4= others specify _____*

4.4 If no, what is the probable reason: *1= No information 2= No interest 3= No cooperatives in 4= other (specify) _____*

SECTION 5: HOUSEHOLD INCOME AND EXPENDITURE

5.1. Household Income: What are your priorities sources of income and what is the income estimate from these sources for the last 12 months

Income source	Do you get income from this source? <i>1=Yes, 0= No</i>	How regularly do you get income from this source (see codes)	What is the estimated amount that you have got from this source in the last 12 months?
Sale of crops			
Sale of livestock			
Fishing			
Sale of other products, eg: firewood, trees...			
Regular employment (specify)_____			
Casual employment (Agricultural related)			
Casual employment (non agricultural related) (specify)_____			
Transport services			
Running own business			
Remittances			
Other, specify_____			

Regularly of income source, 1= do not get, 2 occasionally, 3= regularly, 4= All the time

5.2. Do you have savings? 1=yes, 0=No

5.3. If yes, how much did you save in the last 12 months? _____

5.4. Access to credit

Source of borrowed money	Have you ever borrowed? 1=yes, 0=no	Amount borrowed in the last 12 months
Relative		
Friend		
Informal savings and credit group		
Money lender		
Government		
NGO/Church		

Credit from bank		
Credit from micro-finance institution		

5.5. Household expenditure: On average how much did you spend on the following items/ services in the last 12 months.

Item	Amount in Rwf
Food	
Transport	
Medical experience	
Clothing	
Rent	
Energy (Fuel for cooking/ lighting)	
Water bills	
School fees	
Village /gvt contribution	
Social contribution	
Beer/other refreshment	
House building and repair	
Expenditure on agricultural inputs	
Other (specify) _____	

SECTION 6: MIGRATION STRATEGY

6.1 Have any members of this household left the area for over a month in the past years. 1= Yes; 0=No

6.2 If yes, give details:

Name of Immigrant	Destination	Time intervals	Motivation

6.3 If only one or several household member has left the area in the past five years, could you describe the household situation (food/labour/cash) in years that s/he(or you) left the area? *1= Increased income, 2=Better employment, 3= improved food access, 4= food shortage 5= Low income, 6=no employment, 8= other* _____

6.4. Has the importance of migration and remittances from migrant for the household?

1= Increased, 2= Decreased 3= stayed the same over time

8.5. In general do you believe that migration is better alternative to escape from food shortage?

1=Yes, 0=No

8.6. If yes, justify your reason _____

SECTION 7: EXTERNAL ASSISTANCE / PROGRAM PARTICIPATION

7.1. Food Assistance

Types of Food Assistance	Did you receive this type of Fodd Assistance? 1=yes, 0=Non	Who provides the food assistance? (Uses Codes)
Food for school children (eaten at school or take-home)		
Food for pregnant and breastfeeding women and small children		
Food for work		
Food for training		
Free food distributions		
Other food assistance programs, (specify) _____		

Codes for assistance provider/source: 1 = Government, 2 = UN agency, 3 = NGO, 4 = Church/Mosque, 5 = Community, 6= Relative(s)/Friend(s), 7=Other (Specify) _____

7.2. Non Food Assistance

7.3. Did your household or one (or more) of its members benefit from any non-food assistance in the last 12 months?

Types of Non Food Assistance	What type of Food assistance was provided? <i>1=Yes, 0=No</i>	Who provides the food assistance? (Use the codes)
Money allowances/loans (including micro-credit)		
For education (such as school materials)		
For medical services		
Income generating activities		
Construction/building materials		
Water and/or sanitation		
Agricultural assistance (tools, seeds, fertilizer, <i>et cetera</i>)		
Veterinary services		
Other, specify _____		

Codes for assistance provider/source: 1 = Government, 2 = UN agency, 3 = NGO, 4 = Church/Mosque, 5 = Community, 6= Relative(s)/Friend(s), 7=Other (Specify) _____

SECTION 8: FOOD SOURCES AND CONSUMPTION

8.1. Yesterday, how many times did the adults in this household eat? _____

8.2. Yesterday, how many times did the children (<14 years old) in this household eat? _____

8.3. Could you please tell me how many days in the past one week your household has eaten the following foods and what the source was?

For Food Recall in last 7 days (check box if consumed)							Food Item	Number of days eaten in last 7 days	2. Food Source (Use codes)
1	2	3	4	5	6	7			
							Maize (such as Ugali, posho)	<input type="checkbox"/>	<input type="checkbox"/>
							Rice	<input type="checkbox"/>	<input type="checkbox"/>
							Other cereals (Sorghum ...)	<input type="checkbox"/>	<input type="checkbox"/>
							Cassava	<input type="checkbox"/>	<input type="checkbox"/>
							Sweet Potato	<input type="checkbox"/>	<input type="checkbox"/>
							Other Roots and tubers (potatoes...)	<input type="checkbox"/>	<input type="checkbox"/>
							Mandazi / Chapatti / Bread	<input type="checkbox"/>	<input type="checkbox"/>
							Banana a cuire	<input type="checkbox"/>	<input type="checkbox"/>
							Beans and Peas	<input type="checkbox"/>	<input type="checkbox"/>
							Other vegetables	<input type="checkbox"/>	<input type="checkbox"/>
							Cassava Leaves	<input type="checkbox"/>	<input type="checkbox"/>
							Ground nuts	<input type="checkbox"/>	<input type="checkbox"/>
							Sunflowers	<input type="checkbox"/>	<input type="checkbox"/>
							Fresh fruits	<input type="checkbox"/>	<input type="checkbox"/>
							Fish	<input type="checkbox"/>	<input type="checkbox"/>
							Meat (domestic or wild)	<input type="checkbox"/>	<input type="checkbox"/>
							Poultry (chicken, ducks, guinea fowl)	<input type="checkbox"/>	<input type="checkbox"/>
							Eggs	<input type="checkbox"/>	<input type="checkbox"/>
							Oil, fat, butter, ghee	<input type="checkbox"/>	<input type="checkbox"/>
							Sugar	<input type="checkbox"/>	<input type="checkbox"/>
							Milk	<input type="checkbox"/>	<input type="checkbox"/>
							Condiments (spices, fish powder, or other items used to give flavour to the food)	<input type="checkbox"/>	<input type="checkbox"/>

Food source codes: 1 = Own production (crops, animals), 5 = purchases, 2 = hunting, fishing, gathering, 3 = exchange labour/items for food, 4 = borrowed, 5 = exchange labour/items for food, 6 = gift (food) from family/relatives, 7 = food aid/subsidized food (NGOs, govt)

SECTION 9: COPING MECHANISMS

9.1. Did the household experience food shortages (in the last 12 months)? *1=Yes, 0=No*

9.2. If yes what was the reason for food shortages? _____

1= land not enough food production, 2=The yield was poor due to poor weather, soil fertility, rodents other (specify) _____, 3=Poor seeds used in planting, 4= sold most of the produce, 5=did not plant enough, 6=Other (specify) _____

9.2 In the past 30 days, if there have been times when you don't have enough food or money to buy food, how often has your household had to:

Coping option	Everyday	3-6 times/ week	Less than1 Week	Never	N/A
1. Rely on less preferred and less expensive foods					
2. Borrow food, or rely on help from friends or 3. Relatives					
4. Purchase food on credit					
5. Gather wild food					
6. Consume seed stock held for next season					
7. Send household members to live elsewhere					
8. Limit portion sizes at mealtimes					
9. Restrict consumption of adults so children can 10. Eat					
11. Reduce the number of meals eaten in a day					
12. Skip entire days without eating					
13. Sell jewellery or household items to purchase 14. Food					
15. Sell farm implements to purchase food					
16. Sell livestock to purchase food					
17. Consume stored crops or sell them to buy food					
18. Feed working members of HH at the expense of non-working members					
19. Rely on casual labour to buy food					
20. Other (specify)					