

**UNDERSTANDING THE FACTORS AFFECTING FOOD ACCESSIBILITY OF CASSAVA SMALL-SCALE FARMERS.
A CASE STUDY OF NYAMIYAGA SECTOR, KAMONYI DISTRICT, RWANDA**



A research project submitted to Van Hall Larenstein University of Applied Sciences in partial fulfilment of the requirements for the degree of Master in Management of Development, specialisation Food and Nutrition Security

By

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DEDICATION

First to my Father God,

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Table of Contents

ACKNOWLEDGEMENT	i
DEDICATION.....	ii
List of tables.....	v
List of figures.....	v
ACRONYMS	vi
ABSTRACT	vii
CHAPTER 1. INTRODUCTION.....	1
1.1. Background.....	1
1.2. Problem statement.....	2
1.3. Justification of the study.....	2
1.4. Research objective.....	2
1.5. Research main question.....	3
1.6. Research Sub questions	3
CHAPTER 2. LITERATURE REVIEW	4
2.1. Definition of key concepts	4
2.2. Dimensions of Food accessibility.....	5
2.2.1. Economic access	5
2.2.2. Social access	6
2.2.3. Physical access.....	6
2.3. Sustainable Livelihood Framework (SLF)	7
CHAPTER 3. RESEARCH METHODOLOGY	10
3.1. Study area	10
3.2. Research strategy	11
3.3. Research design.....	11
3.4. Research methods	11
3.5. Data collection.....	11
3.5.1. Data source.....	11
3.6. Sampling.....	13
3.7. Data Analysis	14
3.8. Ethical consideration	15
3.9. Limitation	15
CHAPTER 4. RESEARCH FINDINGS	16

4.1. Identification of respondents	16
4.2. Cassava production in Nyamiyaga sector	17
4.3. Income-generating activities of cassava small-scale farmers	21
4.4. Household income management	21
4.4. Food consumption score and food sources for cassava small-scale farmers	24
4.5. Physical market access.....	25
CHAPTER 5. DISCUSSION ON FINDINGS	27
Self-reflection as a researcher	30
CHAPTER 6. CONCLUSION AND RECOMMENDATION	32
6.1. CONCLUSION	32
6.2. RECOMMENDATIONS	33
BIBLIOGRAPY.....	34
ANNEXE	38
Annexe1. Semi-structured interview guide	38
Annexe 2. Focus Group discussion guide	41
Annexe 3. Key informant interview guide	42
Annexe 4. Cassava production	43
Annexe 6. Type of crops produced by respondents.....	46

List of tables

Table 1. Data collection methods and tools used.....	14
Table 2. Land size of cassava small-scale farmers.....	18
Table 3. Income generating activities of cassava small-scale farmers.....	21
Table 4. Household size	22
Table 5. Food sources of cassava small-scale farmers	24

List of figures

Figure 1. Operationalisation of Food accessibility	7
Figure 2. Sustainable livelihood Framework.....	8
Figure 3. Maps of Rwanda and Kamonyi district	10
Figure 4. Education level of respondents	16
Figure 5. Research assistant with respondent.....	16
Figure 6. Layout of farmsteads in Nyamiyaga sector	19
Figure 7. Men focus group discussion	20
Figure 8. Women focus group discussion.....	20
Figure 9. Household income management	23
Figure 10. Household top needs	23
Figure 11. Food consumption score of cassava small-scale farmers	24
Figure 12. Time spent to reach the market	25
Figure 13. Different food available at the market	26

ACRONYMS

CBSD: Cassava Brown Streak Disease

CIP: Crop Intensification Program

FAO: Food and Agriculture Organisation

FCS: Food Consumption Score

FFS: Farmer Field School

FGD: Focus Group Discussion

GDP: Gross Domestic Product

IFAD: International Fund for Agricultural Development

KI: Key Informant

MINAGRI: Ministry of Agriculture

NISR: National Institute of Statistics of Rwanda

RAB: Rwanda Agriculture Board

SLF: Sustainable Livelihood Framework

UN: United Nations

UNDP: United Nations Development Programme

VSLA: Village Saving and Loan Associations

WFP: World Food Programme

ABSTRACT

Kamonyi is one of the leading cassava producing districts in the southern province of Rwanda and cassava is the main source of food and income for farmers. Since 2014, the Cassava Brown Streak Disease outbreak reduced the cassava production and caused a considerable loss to farmers but the government provided cassava disease-resistant variety to cassava farmers to overcome that loss. This support greatly helped cassava farmers in Kamonyi district and the production increased from 19250 tonnes in 2015 to 41000 tonnes in 2018. Despite the increase of cassava production, food insecurity still increased in the district from 11% in 2015 to 23.5% in 2018. The objective of this research was to understand the factors affecting the food accessibility of cassava small-scale farmers in Nyamiyaga sector, Kamonyi district. Primary data were collected by using household interviews, focus group discussions and key informant interviews. These methods were applied on 25 households (11 males and 14 females), 3 Key informants and 2 focus group discussions (1 for males and another 1 for females) composed of seven members each. The results showed that cassava small-scale farmers mainly rely on income from cassava production. Some farmers now can diversify their income through livestock production and other non-farming activities. These sources of income are not enough to cover all household needs. The results also indicated that in many households, income management is done by both male and female and purchasing food is their priority need. It was found that purchase is the main food source for small-scale farmers in the study area which helps to supplement their diets, as they cannot mainly depend on their own production due to a shortage of land that limits crop diversification. This food source is limited by insufficient income stated early and this affect food accessibility of small-scale farmers.

Other factors affecting food accessibility are lack of a physical market and poor roads in the study area leading to the increase of the transport costs, which reduce the food accessibility of cassava small-scale farmers. Limited storage processing facilities push cassava small-scale farmers to sell their production at a low price during harvesting time to avoid aflatoxin contamination thus decrease their income and lead to food shortage in coming days.

This research recommends capacity building on small businesses and handcrafts that can help cassava small-scale farmers to diversify their sources of income, promotion of vegetable gardens for food diversification and organisation of small local markets in each cell and renewing available roads in the study area to facilitate market access for farmers.

Keywords: cassava crop, small-scale farmers, food accessibility.

CHAPTER 1. INTRODUCTION

1.1. Background

Rwanda is a small country situated in central east Africa and it is one of the countries with highest population densities worldwide with about 400 inhabitants per square kilometer (Randell & McCloskey, 2014). The country is mainly dependent on agriculture, which contributes more than 30% of the national gross domestic product (GDP). This sector provides for more than 80% of the labour force, 70% of export revenue, and contributes 90 percent of the country's food (MINAGRI, 2010). Over 80% of Rwandans residing in rural areas, depend on the agriculture sector by using small land of less than 1 hectare by family (Ntegereze, 2015). Agriculture production is mostly for subsistence and only one-third of the total harvest is transported to the market. Even though agriculture contributes the most to the country's food needs, a large segment of the population still struggles with food insecurity, malnourishment and poverty (Randell & McCloskey, 2014). According to WFP (2018), food insecurity at the national level is estimated at 18.7% with moderate food insecurity of 17% and severe food insecurity of 1.7%

To address the food security issue, in 2007, the Ministry of Agriculture and Animal Resources launched an ongoing program named Crop Intensification Program (CIP) to raise agricultural productivity from subsistence agriculture to market-oriented agriculture (MINAGRI, 2011). The CIP mainly focuses on four elements such as the supply of high-quality inputs (seeds and fertilizers), land use consolidation, provision of extension services and post-harvest technologies. CIP aims to double the production of eight priority crops (Irish potato, banana, maize, rice, cassava, soya beans, beans and wheat), raise the incomes of small-scale farmers and thus ensure food security (Ndushabandi, et al., 2018).

Cassava is an important crop for about 500-800 million people, and belongs to the top four produced crops in developing countries. It ranks second to maize for the production of starch worldwide (Nduwumuremyi, et al., 2016). Cassava is originated in south Mexico and was spread around the world over time. The crop is now mostly produced in Africa and plays a key role in food security. Cassava roots are rich in starch and comprise important minerals such as calcium, phosphorus, and vitamin C. Cassava is used for human consumption, livestock feed and industrial raw materials and is considered as a cash crop in many countries (Kolawole, et al., 2010). According to Otekunrin & Sawicka (2019), world cassava production was 291 million tonnes with 177million tonnes from Africa in 2017. The main cassava production countries are Nigeria, Congo DR, Thailand and Indonesia respectively.

Cassava (***Manihot esculenta cranz***) was first introduced in Rwanda by colonial Belgians in 1930 and it is grown in different areas of the country due to its resistance to drought and poor quality soil and it can be planted in 3 agricultural seasons (A, B, and C) (MINAGRI, 2011). In Rwanda, cassava is a major food crop and occupies third place after banana and sweet potato. It is mainly produced in the eastern and southern provinces of Rwanda and covers 21.5% of the area under farming. Cassava is the main source of food and income for many rural households and it can be sold as fresh roots, dry chips, flour, flour products and leaves (Munganyinka, et al., 2018).

Kamonyi, the study area, is also highly dependent on cassava crop as a source of food and income to farmers. Nevertheless, Kamonyi district is one of the districts with a high decline in food security. Food insecurity increased from 11 % (with 10% moderate food insecure and 1% severe food insecure) in 2015 (WFP, 2016) to 23.5% (with 20.6 % moderate food insecurity and 2.9 severely food insecurity) in 2018 (WFP, 2018). Nutrition status of Kamonyi district 2015 revealed that anaemia is estimated at 39% and stunting at 37%, wasting at 1% and underweight at 7% among children under-five and anaemia among women of reproductive age is at 12% (NISR, et al., 2016). The survey done in 2018, showed that stunting

among children under-five decreased to 32.1% and wasting and underweight increased to 4.8% and 17% respectively.

According to NISR (2018), different crops are produced in Kamonyi district to help inhabitants improve their food security. Seasonal Agriculture Survey 2018 showed that crops produced in agricultural season 2018 A are maize, rice, banana, beans, cassava, peas, sweet potatoes, groundnuts, irish potatoes, yams & taro, soya beans, vegetables and fruits.

This research was carried out to identify the factors affecting food accessibility of cassava small-scale farmers in Nyamiyaga sector, Kamonyi district.

1.2. Problem statement

Kamonyi is one of the leading cassava-producing districts in the southern province and cassava is the main source of food and income to farmers in the district. Since 2014, the outbreak of Cassava Brown Streak Disease known locally as Kabore adversely affected cassava productivity causing a big loss of yield to farmers and thereby increased food insecurity. To address the issue of Cassava Brown Streak Disease, through the FAO projects, Rwanda Agriculture Board (RAB) imported 14, 887 millions cuttings of cassava disease-resistant variety called NASE 14 and planted on 723 hectares. These cuttings have produced over 38.5 million new disease-free cuttings. These new disease-free cuttings were distributed to farmers of major cassava producers' districts including Kamonyi (FAO, 2019). The new NASE 14 restored the production of farmers. The cassava productivity has increased from 19250 tonnes in 2015 to 41000 tonnes in 2018 as shown in annexe 4. Despite the RAB effort of helping farmers to increase cassava productivity, gain more income and improve food security through the introduction of NASE 14, food insecurity in Kamonyi district is still increased. Data suggest that food availability is not an issue but rather food accessibility.

Kamonyi district, as a commissioner of this research, would like to gain a deeper understanding on factors affecting cassava small-scale farmers' food accessibility leading to food insecurity in the district.

The problem owner is Kamonyi district, which is one of the districts of the southern province, Rwanda. The district has a mission of ensuring the socio-economic development through proper implementation of national policies, strengthening the capacity of local authorities, mobilising the necessary financial means to carry out its mission, coordinating all the activities of administrative bodies of local authorities, ensuring the well-being socio-economic of population, assessing and overseeing all development working actors in the district, and ensuring that all their actions are consistent with national development policy (Kamonyi, 2013).

1.3. Justification of the study

There is a knowledge gap regarding the main factors causing food insecurity in Kamonyi district. This research seeks to identify the factors affecting food accessibility of cassava small-scale farmers in Kamonyi district. Information from the research will be very important to the Kamonyi district, Rwanda Agriculture Board and other organisations keen to develop needed interventions to enhance food security in Kamonyi district. Moreover, this information will be useful as a secondary source for other students and researchers for further research.

1.4. Research objective

This research aims to understand the factors affecting food accessibility of cassava small-scale farmers in Nyamiyaga sector, Kamonyi district to recommend to Kamonyi on needed improved interventions to help cassava small-scale farmers enhance their food security.

1.5. Research main question

What are the factors affecting the food accessibility of cassava small-scale farmers in Kamonyi district?

1.6. Research Sub questions

1. How does household income affect food accessibility of cassava small-scale farmers in Kamonyi district?
2. What is the impact of income management on food accessibility of cassava small-scale farmers in Kamonyi district?
3. How do food sources affect food accessibility of cassava small-scale farmers in Kamonyi district?
4. How does physical market access influence food accessibility of small-scale farmers in Kamonyi district?

Key concepts

Cassava crop, small-scale farmers, food accessibility.

CHAPTER 2. LITERATURE REVIEW

This chapter reviews the concept of food security and its dimensions but as the research focused on food accessibility, details on this dimension and its determinants such as economic, social and physical access are provided. From the operationalisation, the food accessibility concept is narrowed down to its dimensions and indicators that helped to identify where improved intervention is required to increase food accessibility and therefore food security of cassava small-scale farmers in Kamonyi district. The chapter also describes the Sustainable Livelihood Framework that was used to analyse livelihood assets of cassava small-scale farmers.

2.1. Definition of key concepts

Food security

“Food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life” (FAO, 1996). Leroy, et al., (2015) refer food security not only to physical and financial access but also it includes social access to sufficient quality food to meet nutritional requirements and culturally acceptable and preferred foods.

Food security is composed of four dimensions:

Food availability refers to the physical availability of food storage in adequate quantities through domestic production, imports and drawn-down of stocks (Swaminathan & Bhavani, 2013). According to FAO (2011), Food availability refers to enough quality food obtained from own production, food support and imports.

Food accessibility refers to the capacity of the household to obtain food sustainably through a combination of their household harvest and store, buying, exchange, gifts, borrowing, or food assistance (WFP, 2009). According to Schönfeldt (2003), food accessibility is determined by three major dimensions such as economic, social and physical access.

Food utilisation refers to the amount of required nutritional value including proteins, vitamins, and calories and micronutrients from the food consumed and how the body uses it (Ingram, 2011). Food utilisation for a household refers to suitable safe and healthy foods that meet its dietary needs. It includes the selection of quality food, hygiene practices for food preparation alongside with drinking safe quality water and sanitation and health care (Dutta & Saikia, 2018).

Food stability is assured when food is available and accessible with adequate utilisation and there is no fear of food insecurity at all times (Leroy, et al., 2015).

Food insecurity exists when there is no sufficient safe and nutritious diets or when people have limited capacity to obtain adequate food. It is caused by different factors like lack of adequate agriculture practices, low farming productivity, poor infrastructure, high transport cost, climate change, inappropriate marketing strategies, political conflicts and the main factor is poverty as said by Dave, et al., (2010). Food insecurity exists when the food source is greatly reduced and there is no possibility to increase it through new strategies, when there is increased malnutrition, when food sources are unsustainable and when people using coping strategies that risk their lives to sustain their livelihood (Attah, 2012).

Small-scale farmers

There are several definitions of small-scale farmers. Shaner, et al., (2018) state that they are farmers who are not capable of getting sufficient inputs that allow them to effectively use available technology, and some of them might have access to land. Another definition refers to farmers who use a small portion of land for food crops farming and sometimes cultivate cash crops (Nyambo, et al., 2019). In Rwanda, Small-scale farmers are defined as farmers that use small plots of land of less than 0.5 hectares for farming (MINAGRI, 2013).

2.2. Dimensions of Food accessibility

Having an abundance of food does not guarantee access to it, as food accessibility depends on the level of individual or household income (Premanandh, 2011). According to Ahmed, et al., (2017), the key factors causing food insecurity, are not only insufficient food available but also the inability of a household to access it. This research, therefore, emphasised on food accessibility rather than the other three dimensions of food security because if it is adequately addressed it can influence other dimensions such as food utilisation and food stability and ultimately result in improving food security in the community. As stated early by Schönfeldt (2003), food accessibility is determined by three major dimensions: economic, social and physical access.

2.2.1. Economic access

Economic access refers to the capacity of households to get a sufficient quantity of food to meet their requirements regularly (Dutta & Saikia, 2018). According to FAO, IFAD and WFP (2013), economic access is determined by household income and food prices. Food accessibility is influenced by income sources available to buy foods. A study done in Nigeria as an African country with a high population showed that a significant number of households are food insecure especially rural farming households. This is because the agriculture sector not performed well which led to supply shortage, income reduction of rural farming households, and thus affects their food accessibility. Non-farm jobs are the main coping strategies employed to diversify their income to improve food accessibility and reduce food insecurity (IROHIBE & AGWU, 2014).

Food price is determined to a large extent by food supply and food demand and this affects food accessibility. Limited infrastructure and storage facilities force farmers to sell their produce after harvesting at a low price. In many Sub-Sahara African countries, a decrease in production considerably increase food price and thus decline food access (Chijioke, et al., 2011). In food importing and low-income countries, consumers use a high percentage of their income for purchasing food, so an increase in food prices affects the consumers' ability to meet their food needs. When food price increased, consumers shift from more expensive and high nutritious foods to cheaper and poor nutritious food, which increase the risk of micronutrient deficiencies and other forms of malnutrition that affect people's health. (FAO, IFAD and WFP, 2013).

Women empowerment has been seen as a mechanism to increase food and nutrition security because empowered women are involved in crop farming and household dietary diversity. The research done in Bangladesh indicated that different associations in which women involved and had control over resources are certainly related to improved food security. It emphasized that decreasing intra-household gender inequality contributes certainly to household wellbeing (Sraboni, et al., 2014). The study done in Ethiopia also confirmed the role of women in maintaining food security. Besides their reproductive tasks, women are involved in productive work like small livestock production and petty trading of livestock, livestock products and have shops of food and non-food items, which help them to diversify their source of income.

The study also indicated that women spent almost their income on buying household food while a high percentage of men's income is spent on their personal needs (Gurmu, 2018).

Income is a key element for maintaining household food security and the study done in Indonesia showed that when women have control over income, it improves the dietary intake and nutrition status for households (Bashir & Schilizzi, 2013). The gender of the head of the family has an impact on food security and poverty within a family. Food insecurity is mainly found in female-headed families than male-headed families due to on average, men earn more income than women, mainly because women worked in the informal business and they are involved in other domestic tasks that burden their available free time which reduce their opportunities for income-generating activities (Kantor & Wood, 2012).

2.2.2. Social access

It refers to different kinds of food that are culturally suitable (Schonfeldt, 2003). Social ways through which a household can get food access include purchase, barter, food aids, borrowings, a gift from families and neighbours or a combination of them.

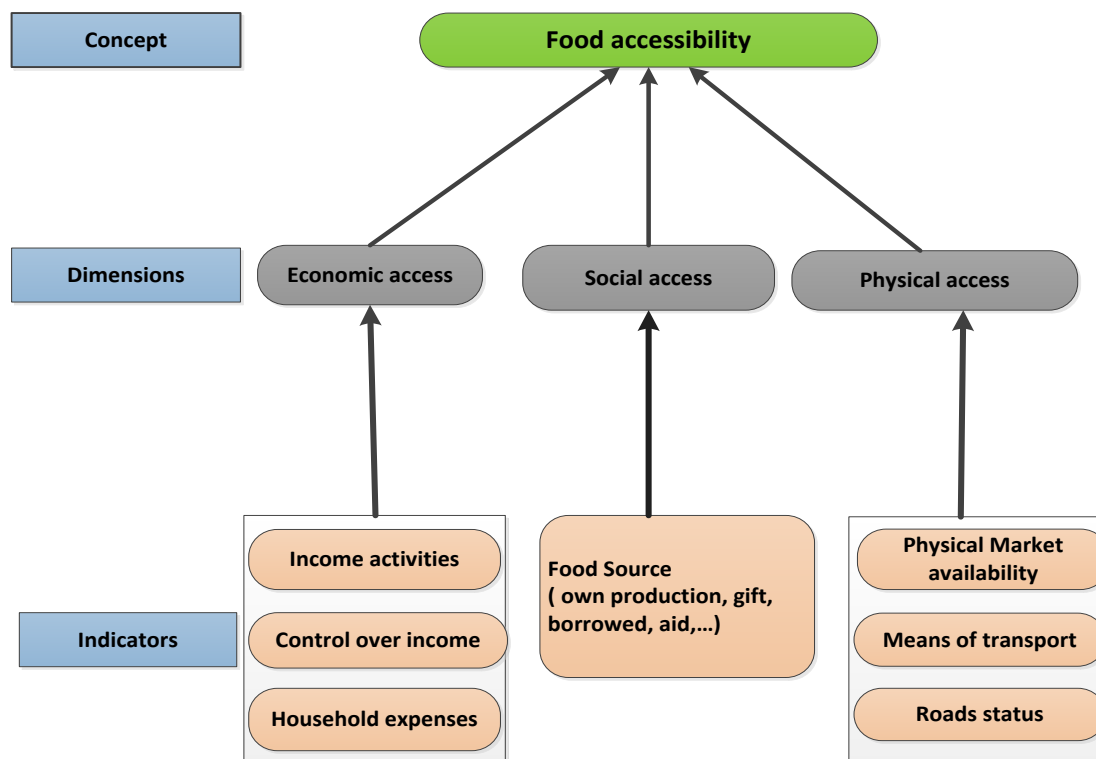
2.2.3. Physical access

Physical access means the availability of physical infrastructure like the physical market and availability of roads that facilitate people to reach the market (Schonfeldt, 2003). According to FAO, IFAD and WFP (2013) physical access is determined by infrastructure availability such as roads, ports, food storage facilities and other installation that facilitate the operating of the market.

The market plays an important role in sustaining food accessibility. It links different stakeholders including producers, traders and consumers. It helps producers get agricultural inputs for farming and selling their products after harvesting. On the other hand, consumers including farmers use the market for purchasing foods and other non-food stuff to enhance food security and sustain their living standards (Ahmed, et al., 2017). In food desert areas, temporary markets known as farmers' markets are an important tool to help people improve their food accessibility and they help small local farmers increase their income. They are a great source of various fresh and nutritious foods suitable for community members and they help community residents in getting food easily without spending much time seeking food to so far other places (Kantor, 2001).

Infrastructure availability influences food security in the rural economy as it enables production, consumption and distribution of foods. Rural residents are most vulnerable due to their dependence on one livelihood source and income and shortage of other opportunities, lack of information and high transport costs. It has been seen that poor infrastructural services are the key challenges of food security in rural areas. Limited transport has been identified as one of the causes of food insecurity in rural areas and making difficult the transport of foods to the market (Selepe, et al., 2014). Their study in South Africa showed that it is difficult for small-scale farmers to supply on time their produce to the market due to poor access to public and private transport resulting in spoilage of the production. The poor road network and transport facilities in most rural areas of South Africa are the constraints to farmers, local businesses that affect the foods' transport to the market, leading to food shortage, increased food prices and decreased food accessibility.

Figure 1. Operationalisation of Food accessibility



Source: Author, 2020

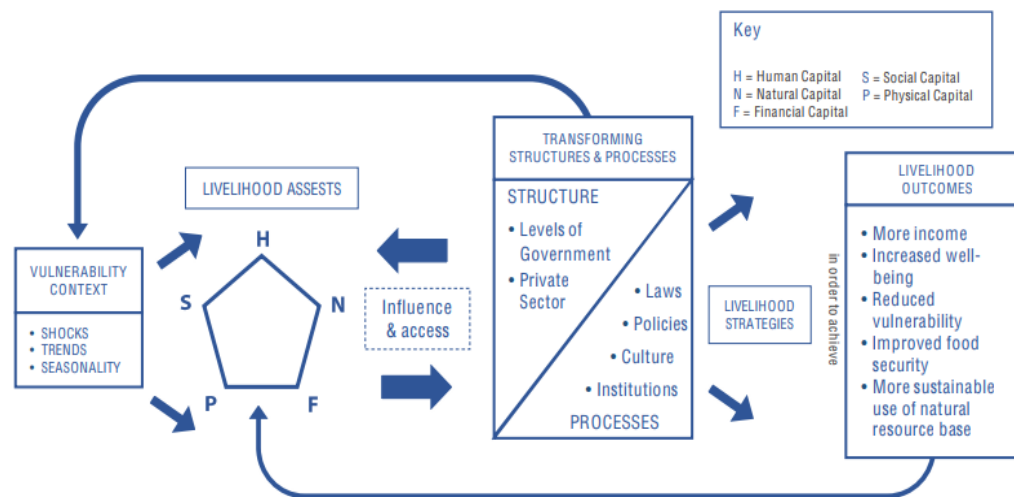
2.3. Sustainable Livelihood Framework (SLF)

It is an analytical structure that helps to understand factors that restrain or enhance people's livelihood and to study how these factors relate to each other. It includes skills, resources and methods that can be used by people to live (UNDP, 2017). SLF helps to identify factors hindering or improving livelihood opportunities and to show how they are linked to each other (Krantz, 2001).

According to Serrat (2017), Sustainable Livelihood Framework is composed of five components:

1. **Vulnerability context:** refers to insecurity in the individuals' and households' welfare caused by external factors. It involves shocks (eg. Drought, diseases, death, etc), seasonalities (e.g: price fluctuation, employment opportunities) and trends (e.g: economic, environment, demographic, etc.).
2. **Livelihood assets:** including financial capital (e.g: savings, loans, etc), human capital (e.g: education, health, knowledge and skills), social capital (e.g: network and connections), natural (e.g: land, water, forest, biodiversity) and physical capital (e.g: farming equipments, transport facilities, house and other infrastructures).
3. **Transforming structure and processes:** include levels of public and private organisations and policies, laws, norms, institutions that affect livelihood.
4. **Livelihood strategies:** strategies used to achieve livelihood outcomes. Eg: diversification, off-farm activities, migration and remittances.
5. **Livelihood outcomes:** includes improved food security, sustainable use of natural resource use, increased income, reduced vulnerability and improved well-being.

Figure 2. Sustainable livelihood Framework



Source: Sustainable livelihood Framework. Graph from DFID (1999)

In this research, SLF was used to analyse livelihood assets of cassava small-scale farmers in Nyamiyaga sector, Kamonyi district and their coping strategies used to understand how to improve food security in the community.

Physical asset such as livestock plays an important role in maintaining households' food security. On one hand, it provides milk and meat for household consumption and on the other hand, it is the source of household income when it is sold (Okyere, et al., 2013). The study done in Ethiopia also showed the role of poultry in maintaining household food security. In this country, poultry is the source of food for many families and income used to purchase food when production decreased (Demeke, et al., 2011).

Financial capital increases the ability to satisfy household needs while facing vulnerability. According to Okyere, et al., (2013), financial capital like loan helps households facing shocks like death, crop failure, and loss of livestock. A loan can be used for purchasing food and it can be invested in other income-generating activities that help to improve household food security.

The study of Demeke, et al., (2011) also reveals the role of social capital and financial capital where households who are members of saving and credits associations are more food secure as these associations help them to save money and invest it in farming and non-farming activities resulting in increased production and income. Social network helps people solving internal conflicts and getting mutual support in times of need. It also enables innovation and knowledge development and sharing which contribute to people's well-being (Udoh, et al., 2017).

Islam &Yew (2013) emphasise on the role of natural assets in securing a household livelihood, improving their economic well-being and ensuring food security. The findings from their study done in Bangladesh show that land is used for producing commercial crops and economic fruit trees and water for fishing which are the source of income that help households access the food and other essential no-food needs. This is supported by the results of Lemus & Vieyra (2014) that show that lack of land decreases food production and effects households' food security.

Education is an important human capital and it increases the opportunities of engaging in no-farming activities leading to increased income and thus food accessibility (Senadza, 2012). According to Anaglo, et

al., (2014) the level of education has a positive impact on the implementation of agricultural production techniques and this means that farmers with high education level can adopt improved farming technology more than those with low education level. Bashir & Schilizzi (2013) emphasise the importance of education for food production, accessibility and utilisation. Education helps households to gain income and access food, and it helps households to meet the nutritious food requirement of their children by providing a quality diet, good health services and appropriate hygiene practices. Moreover, educated females are more knowledgeable about the welfare of their household.

CHAPTER 3. RESEARCH METHODOLOGY

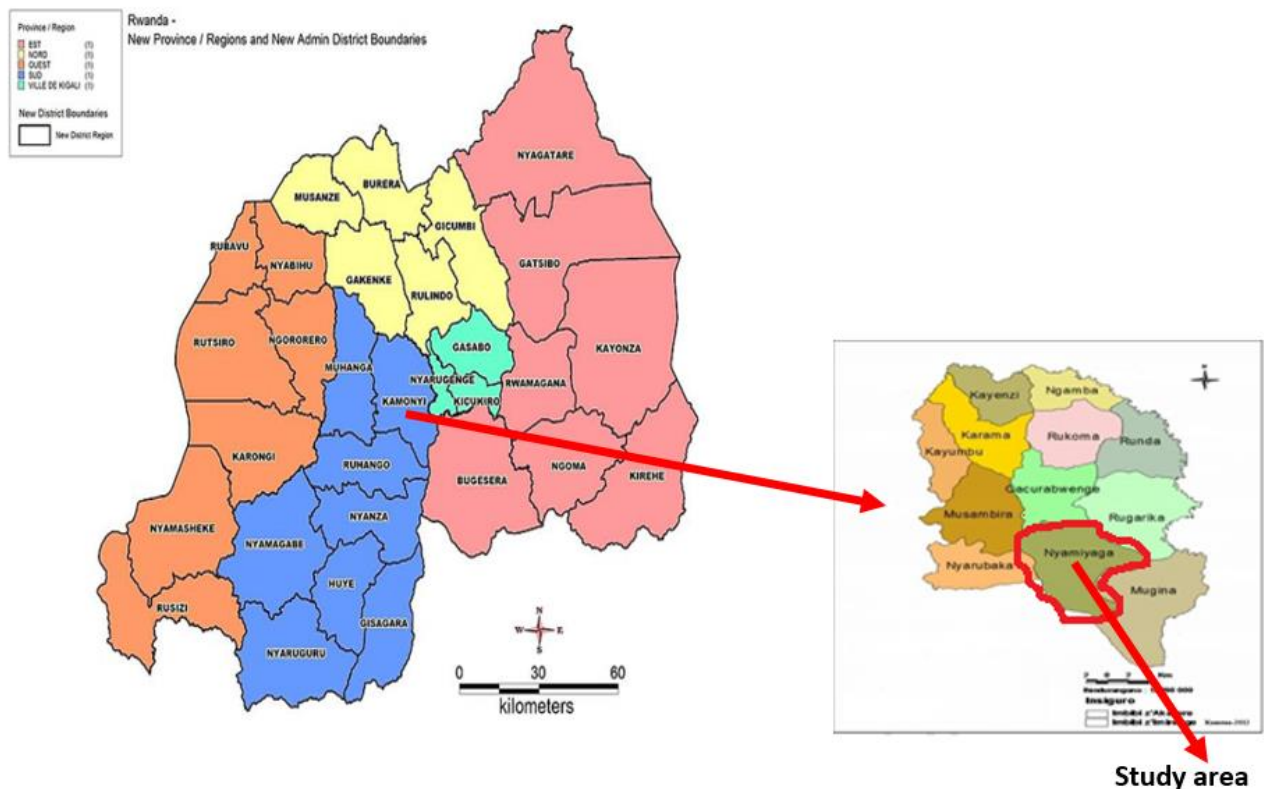
This chapter gives information on the study area and methods used in conducting this research, which cover research strategy, research design, data collection including data collection tools and sampling, data analysis, ethical consideration and limitation of the research.

3.1. Study area

The research was conducted in Nyamiyaga sector, which is one of the sectors of Kamonyi district, Southern Province, Rwanda. Kamonyi district is composed of 12 sectors, 59 cells, and 317 villages. Its residents are 340,501 with 162,189 males and 178,312 females, and with a population density of 519.5 inhabitants/km² (NISR, 2012). Kamonyi district covers the area of 655.5km² and it is bordered by Muhanga at West, Ruhango in the South, Nyarugenge, and Bugesera at the East and Gakenke and Rulindo in the North. It has a temperate climate with humidity varying between 1200-1400mm and the average temperature of 20 °C. The soil of Kamonyi district is mainly humus, permeable and fertile but some parts are occupied by granite ridge and sandy loam (Kamonyi, 2013). Data on precipitation in Kamonyi district indicated that rainfall during March-May 2019 was 420-440mm (Rwanda Meteorology Agency, 2019) compared to 250-430mm in March-May, 2018 (Rwanda Meteorology Agency, 2018).

In 2018, the level of food insecurity in the district was estimated at 23.5% (WFP, 2018).

Figure 3. Maps of Rwanda and Kamonyi district



Source https://commons.wikimedia.org/wiki/File:Rwanda_Districts_Map.jpg

3.2. Research strategy

This research is a case study that seeks to get in-depth information about challenges faced by cassava small-scale farmers leading to food insecurity in Kamonyi district. “A case study is a research method focused around an in-depth investigation on a single issue, individual, group or event” (Laws, et al., 2013). Nyamiyaga sector was selected because it is the most cassava producer in all sectors and this helped the researcher to get a clear picture of the challenges of cassava small-scale farmers based on farmers that were able to increase cassava productivity.

3.3. Research design

The research began by doing a desk study that facilitated to find the research problem and followed by formulating research objective and research questions. Data collection was followed and was done in Nyamiya sector, Kamonyi district. After collecting data from the field, the following steps were findings presentation, discussions and end up with conclusion and recommendations.

3.4. Research methods

The qualitative methods were used for collecting data as the researcher wanted to figure out the existing factors affecting cassava small-scale farmers’ food security in Kamonyi district.

3.5. Data collection

Data were collected through two sources such as secondary and primary sources.

3.5.1. Data source

1. Secondary data

A desk study was used to get secondary data and different documents such as books, journals, government reports, international organisations’ reports like World Food Program, Food and Agriculture Organisation, and United Nations Development Programme were reviewed for understanding, explaining, and operationalising the key concept used in this research.

2. Primary data

Primary data on factors affecting food accessibility of small-scale farmers in Kamonyi district were collected through household interviews, focus group discussions and key informant interviews. These methods were used for triangulation purpose to build confidence in the results. During primary data collection, a participatory approach was used to involve respondents in the research and allow them to share and discuss their points of view on a given topic.

The following tools were used for collecting data at the field:

1. Semi-structured interview guide
2. Food consumption score sheet

1. Semi-structured interview guide

This tool was used to gain in-depth information from individual respondents that has helped the researcher to answer all sub-questions. The semi-structured guide was also used for key informant interviews and focus group discussions. Key informants were interviewed to get information that was compared with information from the household interviews and focus group discussions that helped to answer sub-question (1) how does household income affect food accessibility of small-scale farmers and sub-question (4) how does physical market access influence food accessibility of cassava small-scale

farmers in Kamonyi district. Focus group discussions were used for collecting information that was compared with information from individual respondents and key informants and this has helped to validate data that helped to answer three sub-questions: (1) How does household income affect food accessibility of cassava small-scale farmers in Kamonyi district? (2) What is the impact of income management on food accessibility of cassava small-scale farmers in Kamonyi district? and (4) How does physical market access influence food accessibility of cassava small-scale farmers in Kamonyi district?

The semi-structured interview guide was designed in the English language and translated in the local language (Kinyarwanda) to help respondents understanding questions.

COVID-19 situation in Rwanda

COVID-19 is a challenge in Rwanda as the same as other countries. To slow down the spread of the pandemic, the Rwanda government put different regulations include closing all country's borders, but citizens can return to Rwanda and be quarantined for 2 weeks, keeping 1.5 m socio-distance, washing hand with clean water and soap or hand sanitizer, use of a mask when you are in a public place. Since 1st June 2020, public and private services are working and internal movements between provinces and Kigali city are allowed. In my research area, people can still work and travel while considering government regulations regarding COVID-19.

Because of the COVID-19, I couldn't go back home for data collection so for collecting data from household interviews and focus group discussions I used a research assistant. I sent the semi-structured interview guides to him via email and very well explained them to him and made sure he understands everything. Before conducting the interview, the semi-structured interview guide for the household was piloted on two different respondents to check if questions are understandable. I did the first household interview through research assistant WhatsApp while he was following how I asked questions. The research assistant performed the second one while I followed on his WhatsApp video call the conversation, then after piloting, some questions were reformulated to make them easily understandable.

For household interviews, I did the five first household interviews myself via the research assistant's WhatsApp to get all information needed and because of the poor network in the study area, the research assistant interviewed 20 remained respondents. For collecting data from key informants, I did interviews with them by myself via WhatsApp audio call.

Focus group discussions were done by the research assistant but the researcher followed and participated in the whole discussion by probing on some questions to get all required information through the research assistant's WhatsApp. There was also a note-taker who wrote key points and recorded the whole discussion.

The research assistant is a friend of mine with a bachelor's degree in Environment Management and he is working in Laterite Rwanda which is a private company specialised in data collection and development research projects in East Africa. I chose him to help me in collecting data at the field because he has an experience in data collection where he participated in different data collection projects like 'Impact and process evaluation of the community gender-based violence project Indashyikirwa in Rwanda' and 'Strengthening economic power of women in informal cross border trade sector within the framework of East African community integration project (PROFEMME TWESEHAMWE)'.

2. Food consumption Score sheet

Food consumption score (FCS) is a proxy of food access. It gives information on food items consumed at the household level within the past seven days. It also provides information on food groups consumed (such as main staples, pulses, vegetables, fruits, meats and fish, milk, sugar and oil) and food sources at the household level (Marivoet, et al., 2019). In this research, FCS was used to get information on food groups consumed by cassava small-scale households within the past week and their sources. FCS calculation steps are: first, identification of food items consumed by household members within the past seven days and their sources. Second, grouping those food items in food groups available on the FCS sheet. Third, sum food consumption frequencies and if the sum is above 7 you keep 7 as maximum. Fourth, multiply the sum food consumption frequency with the weight for each food group and sum the weighted food group scores to get FCS.

This information helped to answer sub-question (3) how do food sources affect food accessibility of cassava small-scale farmers in Kamonyi district.

3.6. Sampling

For this research, a purposive sampling method was used to choose the study area (Nyamiyaga sector) and to select the research participants. As the objective of the research was to understand the factors affecting food accessibility of cassava small-scale farmers in Nyamiyaga sector, Kamonyi district, research participants for the household interviews and focus group discussions were selected from cassava small-scale farmers because small-scale farmers are more exposed to food insecurity. As all five cells of Nyamiyaga sector produce cassava, random sampling was used to select cells and participants. The research was conducted in two cells selected by using lottery random sampling. The researcher drew small five papers with 2 YES and 3 NO and the cell that selected yes was considered as a study area. Cell Economic Development Officer (SEDO) helped the researcher to get a list of cassava small-scale farmers. To select participants for (household interview and focus group discussions) from the list, the strategy used was to take the number one on the list and put an interval of 5 and select the next participant until the total number is reached. For ensuring gender balance, the respondents were from single female-headed households and male-headed households. For selected male-headed households, the respondents were either husband or wife.

Sample size: The sample size for the interview was 25. Two focus group discussions were used for this research and each focus group discussion was composed of seven members (Four cassava small-scale farmers, two Farmer Field School Facilitators (FFS facilitators) and one Cell Economic Development Officer). One focus group was for women only and another for men because, in Rwandan culture, women are more likely to give their opinions when they are alone.

FFS facilitators are extension agents at the cell level trained by Rwanda Agriculture Board on modern agriculture practices (good planting practices, use of fertilizers, disease and pests control) with responsibilities of sharing that knowledge and skills to farmers through Farmer Field School (RAB, 2015).

FFS facilitators and SEDOs were chosen to be part of focus group discussions because they are working closely with farmers and they may provide important information regarding the challenge cassava small-scale farmers encountered.

Three key informants were also interviewed: 1 key informant was Nyamiyaga sector Agronomist who coordinates all agricultural activities at the sector level and by working with farmers every day he has a lot of information on the performance of the agriculture sector and challenges faced by cassava small-scale farmers. The second key informant was the Director of Agriculture in Kamonyi district who has

information on agriculture for the whole district. The third was RAB worker who monitors agriculture activities in the district as she has more information on agriculture in the district and challenges faced by farmers.

3.7. Data Analysis

Data analysis was done by using qualitative data analysis methods. The analysis was started at the field by verifying that information written is the same as what the respondents said. After data collection at the field, data from online interviews and audios from focus group discussions were first transcribed. After transcribing, all data from household interviews, key informants and focus group discussions were grouped into themes that helped to answer the research sub-questions. Excel was used to present collected data in the form of tables and figures. Finally, research findings were discussed to formulate a Conclusion. Data analysis was done by the researcher.

For answering the sub-question (3), sources of food were grouped into 7 groups with codes as mentioned on the food consumption score sheet in annexe 5. Those groups are: Purchase=1, Own production=2, traded goods/services, barter=3, Borrowed=4, Received as gift=5, Food aid=6, Other(specify)=7. Other information on how data were collected and processed for all sub-questions is shown in the following table 1.

Table 1. Data collection methods and tools used.

Sub-question	Data collection method	Tool used	From who	Data processing
1. How does household Income affect food accessibility of small-scale farmers?	Household interview	Semi-structured questionnaire	Household	Generating themes
	Focus group discussion	Semi-structured questionnaire	Group discussion	Generating themes
	Key informant interview	Semi-structured questionnaire via WhatsApp online interview	Key informant	Generating themes
2. What is the impact of income management on food accessibility of cassava small-scale farmers?	Household interview	Semi-structured questionnaire	Household	Generating themes
	Focus group discussion	Semi-structured questionnaire	Group discussion	Generating themes
3. How do sources of food affect food accessibility of small-scale farmers?	Household interview	Food consumption score sheet	Household	Coding
4. How does physical market access influence	Household interview	Semi-structured questionnaire	Household	Generating themes

food accessibility of small-scale farmers?	Key informant interview	Semi-structured questionnaire via WhatsApp online interview	Key informant	Generating themes
	Focus group discussion	Semi-structured questionnaire	Group discussion	Generating themes

3.8. Ethical consideration

Before starting the interview and focus group discussions, the research assistant introduced himself to the respondents and explained to them the purpose of the research. He assured them to take into consideration their confidentiality and anonymity and orally asked their willingness to participate in the research. He also guaranteed them that all information collected will be used by the researcher only. For focus group discussions, the participants were explained their rights to participate in the research and everybody was given equal chance to participate. Before starting the discussion, the researcher assistant asked permission from participants to take pictures and record the whole discussion and he remained neutral whatever answer is given. The research followed Rwanda's government rules regarding 1.5 meters of social distance and other precautions to reduce the spread of Covid-19.

3.9. Limitation

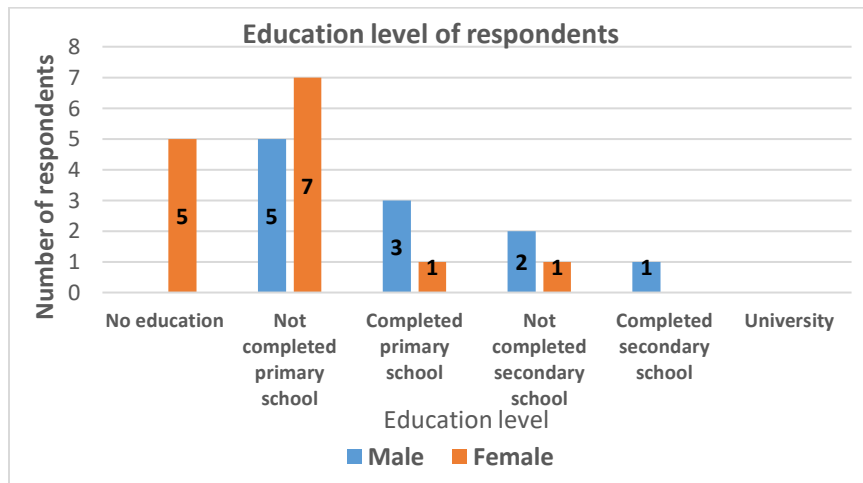
One of the limitations was the fear of some respondents to answer some questions. In my country, we have different social-economic categories (Ubudehe) classified based on household assets, how many times a household eat per day and income source. Depending on the category, people can get government support or not and can pay some services like health insurance at a high or low price. For answering questions about food consumed last week and their source, at the beginning, some respondents would not want to tell all the truth as they thought that the information given could be used for categorising them and maybe putting them in the wrong category. However, the researcher tried again to explain to them that she is a master's student in the Netherlands and all information given will be used for academic purpose only and to give recommendations to Kamonyi district on needed interventions for improving food security in the community. Another limitation was the poor internet. After feedback from the research proposal presentation, the researcher decided to conduct household interviews herself but due to the poor internet network in the study area one interview took a long time and the respondent got bored. Sometimes the conversation was cut off and the researcher decided to let the research assistant conduct the remained 20 interviews. The poor roads in the study area were also a challenge as it was difficult for the research assistant to reach respondents which has increased the budget planned for the research.

CHAPTER 4. RESEARCH FINDINGS

4.1. Identification of respondents

This research involved 25 cassava small-scale farmers from both male-headed households that presented 80% (20 respondents) and female-headed households that were 20% (5 respondents). The respondents were both females and males with 56% (14 respondents)and 44% (11respondents)respectively. The results on the age of respondents indicate that out of 25 respondents, one respondent was a youth aged between 19-30 years old, four respondents were between 31-42 years old and the respondents with between 43-54 years old were fifteen. The respondents with the age of 55 and above were five. Regarding the human capital of cassava small-scale farmers, the findings on the education level of respondents show that 48% of respondents (12 respondents) have not completed primary school, 20% (5 respondents) have not attended the school, 16% (4respondents) have completed primary school. The respondents that have not completed secondary school represent 12% (3 respondents) and 4% (1respondent) completed secondary school (see Figure 4).

Figure 4. Education level of respondents



Source: Author, 2020

Figure 5. Research assistant with respondent



Source: Fieldwork, 2020

4.2. Cassava production in Nyamiyaga sector

Nyamiyaga sector is the top cassava-producing sector in Kamonyi sector and 100% of its farmers produce cassava. Cassava production increased this year 2020 compared to two last years as confirmed by 19 respondents out of 25 (76%) while 6 respondents (24%) said that their cassava production was reduced this year 2020 compared to two years ago. The increase of cassava production may depend on different factors. Out of 19 respondents who confirmed the increase of production, 11 respondents highlighted the use of quality cassava variety and organic fertilizer to be the reason for the increase of their production. Five respondents confirmed the use of quality cassava variety only to be the reason while two respondents confirmed the use of quality variety with both organic and chemical fertilizers to be the reason and one respondent confirmed that sufficient rain was the reason for increasing the production. Both key informants and focus group discussions highlighted the use of quality cassava cuttings and organic fertilizer to be the main reasons for the increase of cassava production in the study area.

“Before I did not use fertilizers and the production was not good but these days I used organic manure bought from my neighbour and quality cassava variety, and this has contributed to the increase of the production and nowadays I can harvest 7 tonnes/0.5ha compared to 4 tonnes I harvested before”- (Respondents 22)

“In previous years, Cassava Brown Streak Disease pandemic damaged cassava production and caused a big loss to farmers. To help farmers to overcome that loss RAB provided quality cassava disease-resistant variety to them and together with the use of organic manure, farmers were able to increase the production”- (KI, Sector Agronomist)

“Rwanda Agriculture Board provided cassava disease-resistant varieties to cassava farmers and we also mobilize farmers to use fertilizers to increase their production. Even at the field, cassava farmers confirm the increase of cassava production this year 2020”-(KI, RAB worker)

The natural capital of respondents includes land used for cassava production. All 25 households interviewed cultivate on a small plot of land where 88% of these respondents (13 male-headed households and 9 single female-headed households) own the land of between 2501-5000m² while 22% (1 male-headed household and 2 single female-headed households) have the land of between 501-2500m² (see Table 2). Two respondents from female-headed households indicated that they use their land for cassava production only while twenty-three respondents use their land for producing cassava and other crops including maize, beans, banana, sorghum, sweet potato and vegetables (see annexe 6).

All 25 respondents confirmed to sell a part of their production. 60% of respondents (15 respondents) sell their production to middlemen while 28% (7 respondents) sell their production to the local cassava processing plants located in the Nyamiyaga sector and 12% (3 respondents) sold their production at the local markets located in neighbouring sectors. Many farmers prefer to sell their production to the middlemen because they come to take the production at farmers' homes and pay immediately compared to the factory that may pay between 3 to 7 days. As markets are far from farmers therefore, some farmers do not like to pay extra cost for transport but they prefer to sell their production to other clients.

All the respondents confirmed the increase of cassava price this year 2020 compared to two last years due to the high demand of cassava flour at the market. Key informants and focus group discussions also confirmed the increase of cassava price mainly caused by COVID-19 pandemic that limited the importation

of cassava production from other countries resulting in high demand compared to production available within the country.

“We have two small cassava processing plants in our sector that produce cassava flour and this time I sell my production to the factory at 90 rwf/kg (of fleshed cassava tubers) which is higher than 80 rwf/kg (flesh cassava) that was in 2019” -Respondent 6

“Before some traders import cassava from neighbouring countries and that consequently decreased the price of cassava production at the market within the country. In this period due to COVID-19, it is not possible to import cassava from outside the country . All traders cassava processing plants and consumers depend on the production available in the country and this has increased the cassava price at the market”

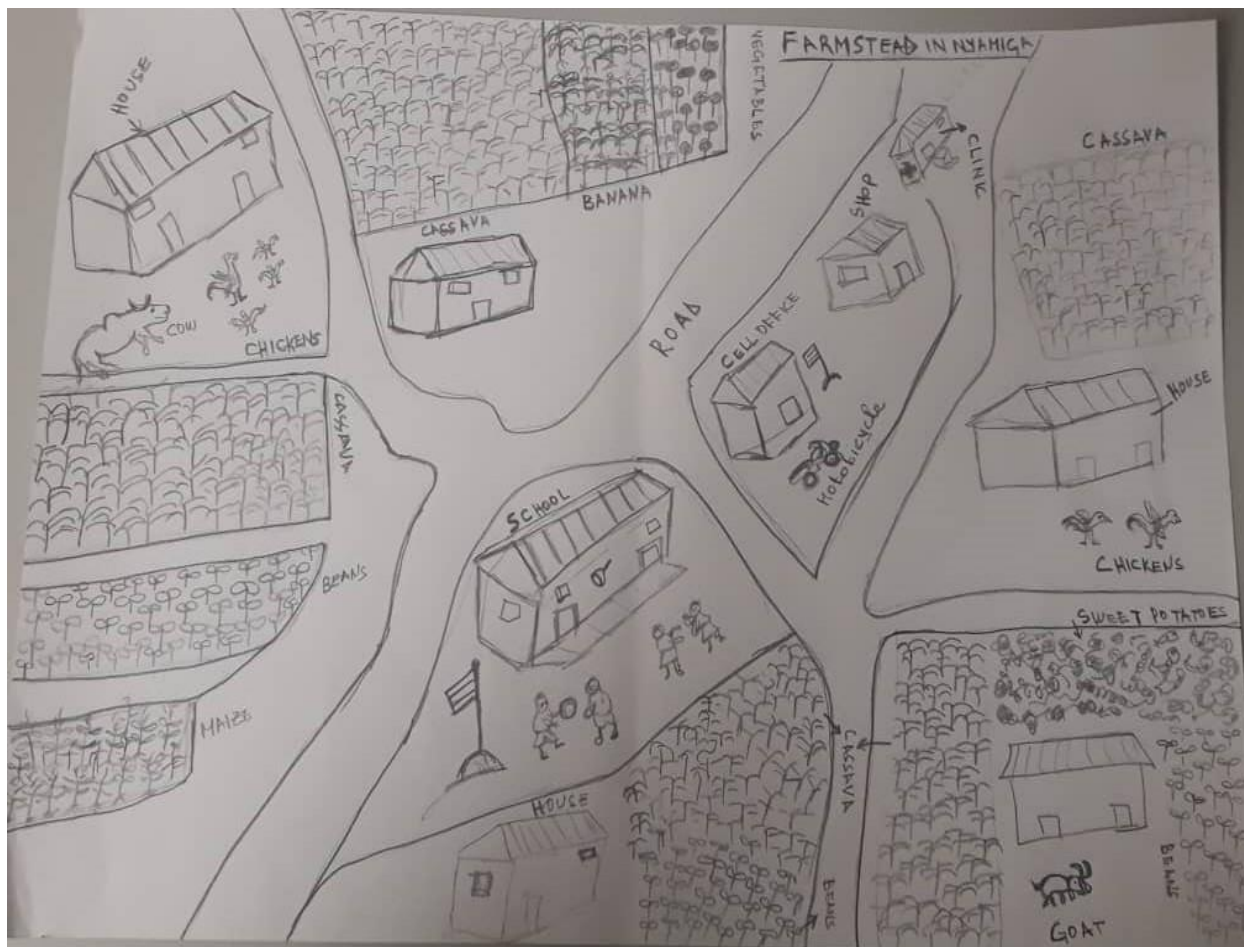
- KI, Direct of Agriculture

Table 2. Land size of cassava small-scale farmers

Household type	Land size		
	1-500m ²	501-2500m ²	2501-5000m ²
Male-headed household	0	1	13
Female-headed household	0	2	9
Total (n=25)	0	3	22
Percentage	0	12%	88%

Source: Author, 2020

Figure 6. Layout of farmsteads in Nyamiyaga sector



Source: Author, 2020

The Figure 6 shows a typical farmstead in Nyamiyaga sector where some cassava small-scale farmers produce mainly cassava and other few crops (maize, beans, sweet potatoes). It indicates also some of the livestock in different cassava small-scale farmers' households. Physical capital available for cassava small-scale farmers includes houses, livestock (cows, goats, chicken), school, clinic, small shops and agricultural equipments.

Figure 7. Men focus group discussion



Source: Fieldwork, 2020

Figure 8. Women focus group discussion



Source: Fieldwork, 2020

4.3. Income-generating activities of cassava small-scale farmers

The financial capital of cassava small-scale farmers includes income from cassava, livestock and non-farming activities and loan from VSLA. The results from the households interviews indicate that 52% (13 respondents) depend mainly on cassava farming while 32% (8 respondents) depend on cassava farming with livestock (such as poultry, goat, rabbits, cow) and 16% (4 respondents) depend on cassava farming with the combination of other non-farming activities such as tailoring, transportation and trading (see Table 3). Both key informants and FGDs confirmed cassava production to be the first source of income in the study area and livestock farming comes as a supportive source of income (the second one) as some farmers practice small domestic livestock that helps them to get money and organic manure for farming. Moreover, some respondents have social capital, as 40% of respondents (10 respondents out of 25) are members of Village Saving and Loan Associations (VSLA), which helps them to get loans.

“Cassava crop is very important for us in this area. After harvesting, I keep a part of the production for family consumption and sell the other part to COMINYA cassava processing plant. We use the income from cassava production to buy other types of food that we do not produce and to cover other family needs” – (Respondents 1)

“Cassava is our main source of income but also my family got a little money from selling eggs as we have 4 chickens” – (Respondents 9)

“Farmers in this community mainly produce cassava but as they cannot eat cassava only they sell a part of their production to get money for buying other different food items at the market and cover other household’s needs”- (KI, Sector Agronomist)

Table 3. Income-generating activities of cassava small-scale farmers

Income-generating activities	Number of respondents	Percentage
Cassava farming	13	52%
Cassava farming and livestock	8	32%
Cassava farming and no-farming activities	4	16%
Total	25	100%

Source: Author, 2020

4.4. Household income management

From the household interviews, 76% (19 respondents) confirmed that both husband and wife generate income while 20% (5respondents) confirmed wife to be the only one who generates income (this was seen in single-female-headed households) and 4% (1 respondent) confirmed household income to be generated by husband, wife and children.

From 19 households confirmed income to be generated by both husband and wife 79% (15 respondents) indicated that both husband and wife generate equal income to total household income while 10.5 % (2 respondents) confirmed that the husband generates more income than wife and also 10.5% (2 respondents) confirmed wife to generate more income than husband.

From the household that revealed income to be generated by husband, wife and children it was confirmed that husband generate more income, followed by wife and then comes children. Furthermore, there are few people working (1-3 people) relative to the large number of household members where the average of the number of household members per household is equal to 7 in Mukinga and Bibungo cells (see Table 4).

“Both my wife and I generate income in our family. My wife is selling clothes while I am involved in farming but what I can say farming generates more income (70% of total income) than trading that has about 30%” - (Respondent 8)

From household interviews, 56% of respondents (14 respondents out of 25) confirmed that the management of household income is done by both male and female where many respondents said that as partners they sit together and see what is needed within a family and decide together what to do with their income. 24% (6 respondents) confirmed that male is the one who decides how the income will be used without female agreement, while 20% (5 respondents) confirmed that female as the head of the family (single female-headed household) manages income alone (see Figure 9). All the focus group discussions also emphasized that in many households in the study area, both male and female are equally involved in the management of household income. FGD’s participants said that only families with conflicts between male and female can have a problem on the management of income but other families, male and female discuss together what to do with their income depending on family’s needs.

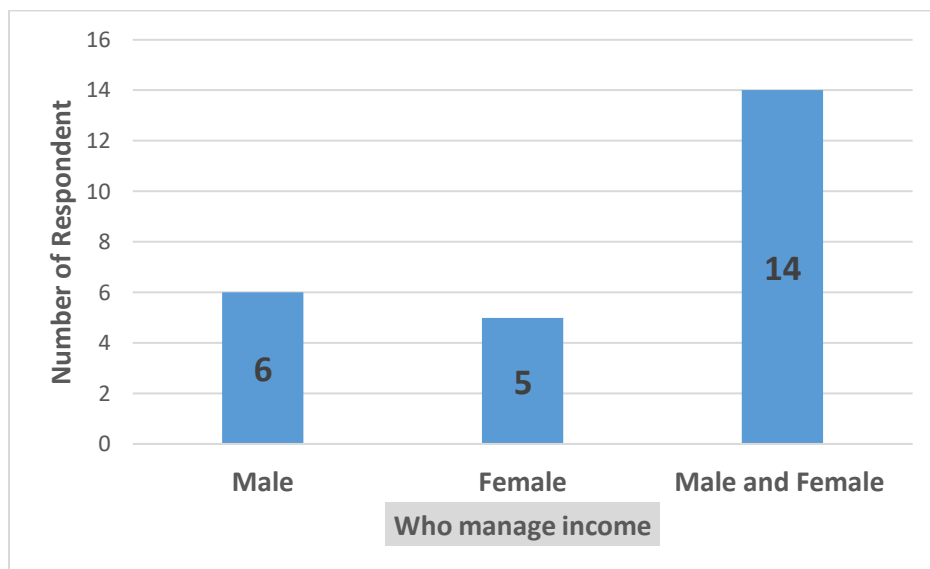
The respondents were requested to list the top six household needs from the most important to the least one and the results showed that 16 out 25 respondents confirmed ‘purchasing food’ to be the first household need followed by ‘farming’ and paying health insurance’. School fees come at the fourth place, ‘paying loan’ at the fifth place and the least important need is ‘buying livestock’. The results from focus group discussions also highlighted ‘purchasing food’ as the first important household need in the study area. FGD participants confirmed that all they do is first to get food and other needs come after. The results on household top needs are illustrated in Figure 10.

Table 4. Household size

Household members	Repetition (n=25)	Percentage
4	4	16%
5	4	16%
6	9	36%
7	4	16%
8	1	4%
9	2	8%
10	1	4%
Mean=7		

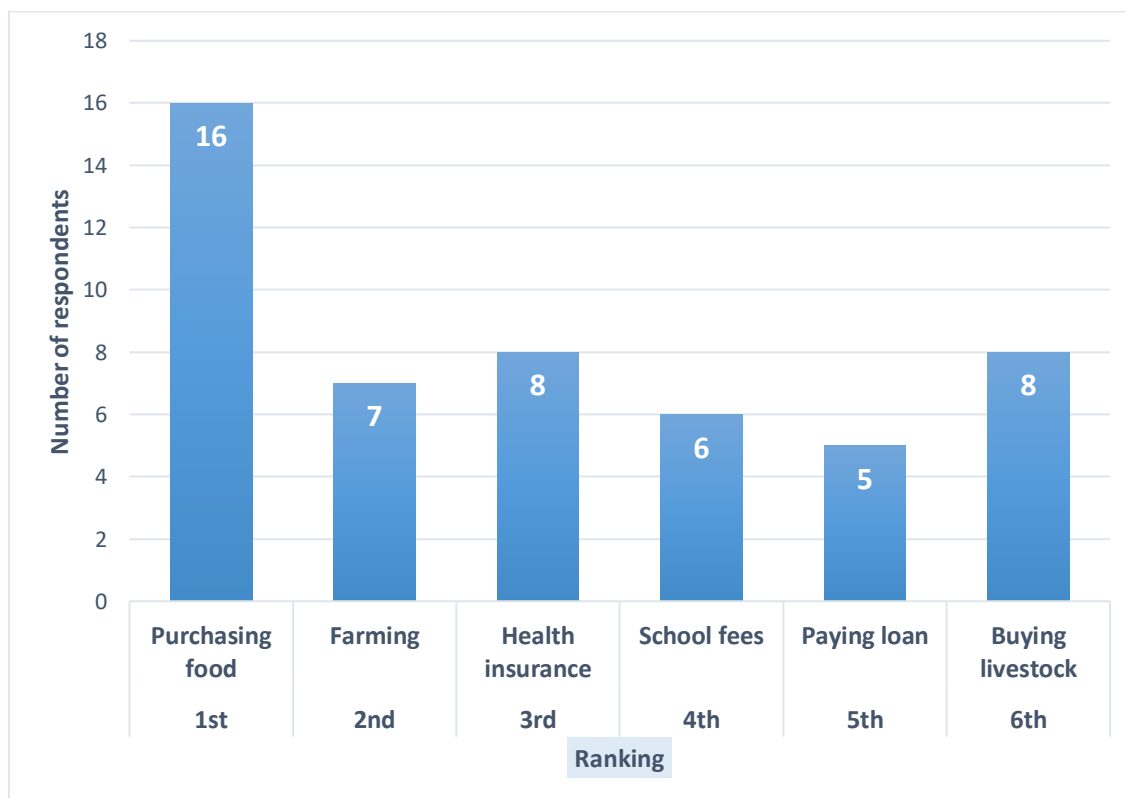
Source: Author, 2020

Figure 9. Household income management



Source: Author, 2020

Figure 10. Household top needs



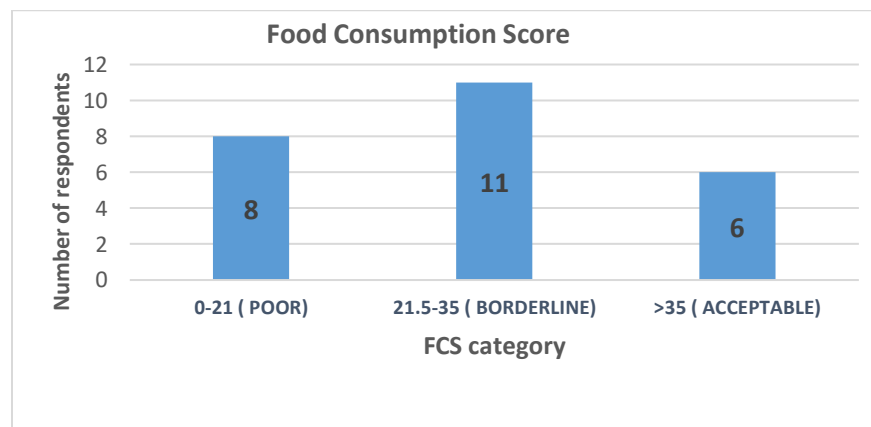
Source: Author, 2020

4.4. Food consumption score and food sources for cassava small-scale farmers

The results indicate that out of 25 respondents, 44% (11 respondents) have the FCS that belongs in the borderline category while 32% (8 respondents) are in the poor category and 24% (6 respondents) fall under the acceptable category (see Figure 11). The results also show that all female-headed households have poor food consumption score. Most of the food items consumed are under food group of 'main staples' such as cassava, maize and sweet potato and followed by 'pulses' such as beans as these food items are produced in the study area. Milk and vegetable groups are not much consumed compared to main staples while meat, fish, fruits and sugar are rarely consumed. I did not take the portions but based on the findings, respondents consumed mostly starch. Furthermore, households interviewed get food from 2 sources where 84% of respondents confirmed 'purchase' as their main food source while 16% get food from their 'own production' (Table 5).

"Is difficult to get fish as we do not have lakes in this area and meat is very expensive, we eat them when we have a party or on new year day, only rich people can afford them" –Respondent 25.

Figure 11. Food consumption score of cassava small-scale farmers



Source: Author, 2020

Table 5. Food sources of cassava small-scale farmers

Food source codes	Number of respondents=25	Percentage
Purchase (1)	21	84%
Own production (2)	4	16%
Barter(3)	0	0
Borrowed (4)	0	0
Received as gift (5)	0	0
Food aid (6)	0	0
Other (7)	0	0
Total	0	100%

Source: Author, 2020

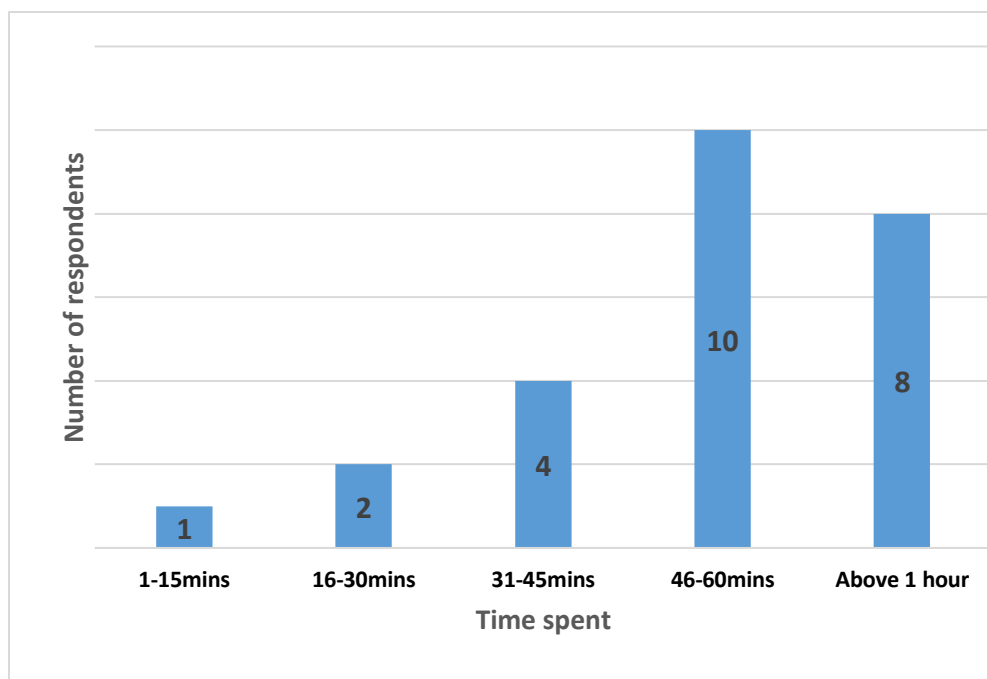
4.5. Physical market access

All Individual respondents, key informants and FGD indicate that there is no market in the study area and farmers from this community go to two local markets located in neighbouring sectors (Mugina and Rugarika sectors) for selling their production and buying other food items. The findings from household interviews show that most of the farmers walk a long distance by foot to reach the market. 10 respondents out of 25 confirmed to spend 46-60 minutes to go to the market, while 8 respondents out of 25 take above 1 hour. The long-distance seems to be a barrier to farmers in the community to get different food items. The roads are not good as well in the study area. The results from household interviews, key informant interviews and FGDs also reveal that different food items are mainly available at the market during the harvesting seasons where also the prices are affordable. They also confirm that few months later after harvesting, farmers experience a food shortage because they cannot depend on their own production as they cannot store it for long. Some food items are not available or even available in less quantity which increases food price at the market.

“Because of the small land, I only produce cassava and beans and buy other foods at the market. Except for this period of COVID-19 where the price has increased, normally I sell a big part of my cassava production during harvesting time at a low price because it is contaminated with aflatoxin when I try to store it. Few months after harvesting I buy foods at the market on the high price while my income source is limited which affects the food security of my family”-Respondent 7.

The time spent by small-scale farmers to reach the market is presented in figure 12 below:

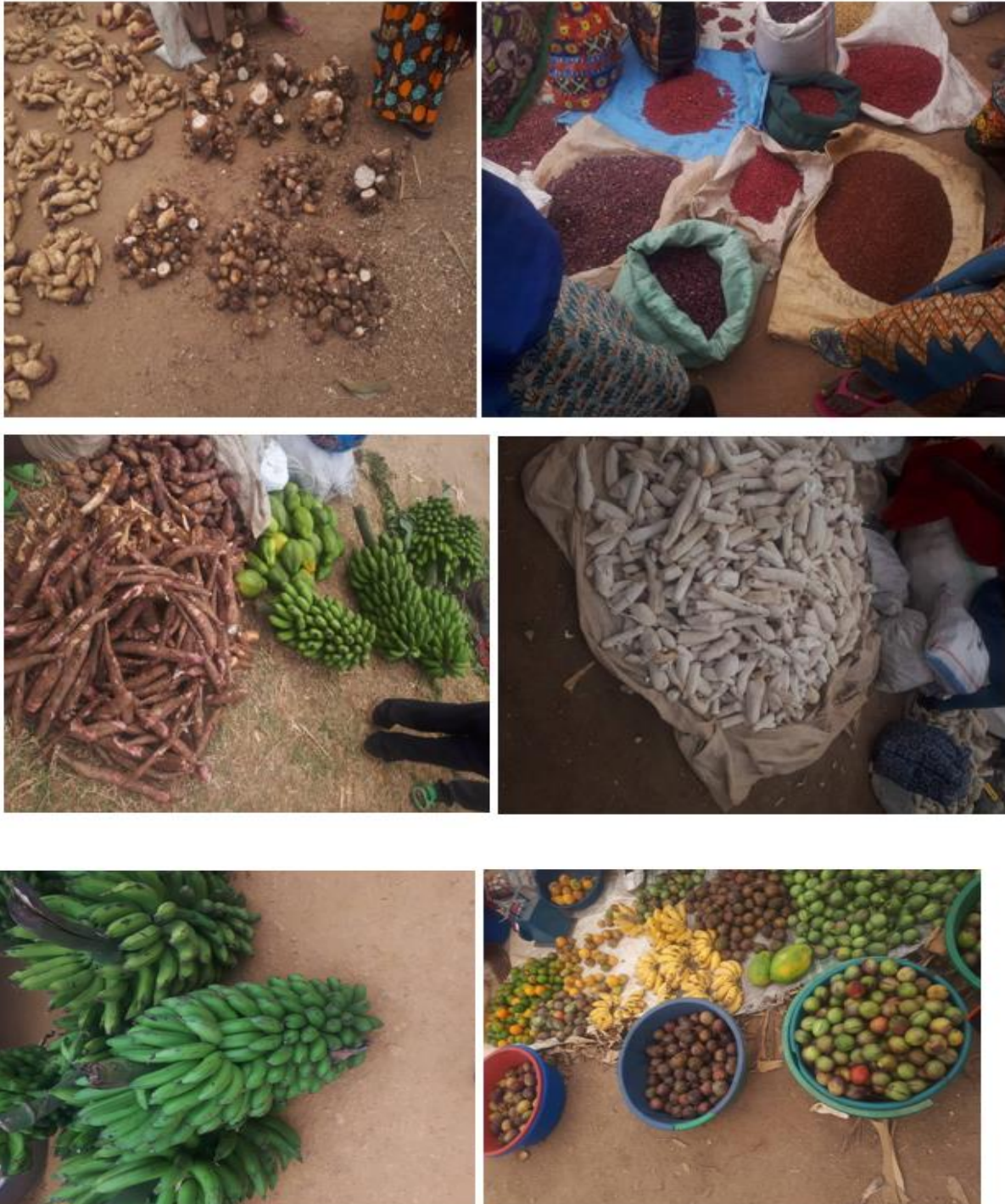
Figure 12. Time spent to reach the market



Source: Author, 2020

Figure 13. Different food available at the market

Figure 13 shows different food items available at the market located in one neighbouring sector (Rugarika) such as sweet potatoes, taro, beans, sorghum, cassava, banana and fruits (papaya, tree tomatoes, passion fruits and orange).



Source: Fieldwork, 2020

CHAPTER 5. DISCUSSION ON FINDINGS

Effect of household income on food accessibility of cassava small-scale farmers in Kamonyi district

The findings show that cassava production increased this year 2020 compared to the last 2 years mainly as a result of using good quality cassava disease-resistant variety provided by the Rwanda government and the use of organic manure as highlighted by many respondents, key informants and Focus Group Discussions. After harvesting, cassava small-scale farmers sell a part of their production to get income for buying other food items. Cassava price has increased this year 2020 due to the COVID-19 pandemic as mentioned by Key informants and FGDs because it is not possible to import cassava from neighbouring countries. Even though cassava price has increased, the income from cassava production is still not sufficient to cover all their households' food needs. This is because their lands are too small to generate sufficient revenue thereby affecting their food accessibility. According to Ahmed, et al., (2017), the key factors causing food insecurity, are not only insufficient food available but also the inability of a household to access it. Premanandh, (2011) also indicated that having an abundance of food does not guarantee access to it, as food accessibility depends on the level of individual or household income.

The results on income-generating activities indicate that agriculture is the main source of income in the study area where 52% of respondents confirmed cassava farming as their main income-generating activity. Some cassava small-scale farmers use other coping strategies to survive where 32% of respondents depend on cassava production and livestock, and 16% depend on cassava and non-farming activities (tailoring, transportation and trading). These findings are similar to the results from the study of NISR (2011) showed that the household income in Kamonyi district was driven by agriculture (54%), followed by wage income (20%), business income (10%), rents (9%), private transfers (6%) and public transfer income (1%).

Furthermore, the research findings show that few months later after harvesting, farmers experienced food shortage as some food items at the market are available in small quantities compared to consumers in needs, which increase the food prices that are not affordable to cassava small-scale farmers due to their limited income sources. This is in line with the study done by Chijioke, et al., (2011) stated that in many Sub-Saharan African countries, a decrease in production considerably increase food prices and thus decline food access. Food accessibility is influenced by income sources available and non-farm jobs are the main coping strategies employed to diversify household income to improve food accessibility and reduce food insecurity. (IROHIBE & AGWU, 2014).

Impact of income management on food accessibility of cassava small-scale farmers in Kamonyi district

The findings on household income management show that 52% of respondents confirmed that household income is managed by both male and female while 28% said that in their households income management is done by male and for 20% respondents, females are those who manage household income, as they are the head of households (single-female headed households) (see Figure 9). Based also on findings from FGDs where participants confirmed that in most households husband and wife discuss together on how to use household income, the researcher realised that income management may not affect food accessibility in the study area.

The findings on household size show that the average of household members per household is 7 in Mukinga and Bibungo cells and persons who can generate income within the household are 1-3. As the findings show that the sources of income for cassava small-scale farmers are limited, the researcher realised that there is a higher dependency in many households that may lead to food insecurity in the

study area. This finding can be compared to the results from the study done by Bashir et al., (2012) confirmed that addition of one person to household size reduced the chance to become food secure in rural Pakistan. According to Sharaunga et al., (2016), having a big household size adversely affect food security, as more people need to be fed by available food. The dependency ratio within a household can lead to food insecurity, as they are only few working people to feed the big number of people (Tawodzera, 2011).

The results on the education level of respondents show that respondents have low education level and women have the lowest education level compared to men as illustrated in (Figure 4). The low education level of respondents in the study area may be one of the factors causing food insecurity as it reduces the opportunities to diversify in other income-generating activities. The lowest educational level for women may not only limit access to income but also decisions on how they spend their money. According to Bashir & Schilizzi (2013), Education helps households to gain income and access food, and it helps households to meet the nutritious food requirements by providing a quality diet, good health services and appropriate hygiene practices. Moreover, educated females are more knowledgeable about the welfare of their households. The results from the study done in Zimbabwe showed that households with one or more members with tertiary education are more food secure compared to those with members with either low education or no formal education as people with education have opportunities to earn more income and access food (Tawodzera, 2011).

Women empowerment was seen as a mechanism to increase food and nutrition security because empowered women are involved in crop farming and household dietary diversity. Besides their reproductive tasks, women are involved in productive work like small livestock production and petty trading of livestock, livestock products and have shops of food and non-food items, which help them to diversify their source of income (Sraboni, et al., 2014).

Effect of food sources on food accessibility of cassava small-scale farmers in Kamonyi district

From the research results, a big number of respondents (44%) are under borderline category and 32% are under poor category and 'purchase' is the main food source in the community therefore households need more income for purchasing other than what they produce in their farms for a balanced diet. The research findings on land size show that 100% of respondents own small land (less than 5000m²). Cassava small-scale farmers mainly depend on the purchase because their own production is not enough due to their small land that limits crop diversification and this may be one of the factors that may increase food insecurity in the study area. Similar results were confirmed by the study of WFP (2018) indicated that households with small land size are likely to be food insecure due to the limited opportunities of growing different crops or livestock. This also is in line with Shone, et al., (2017) said that households with small land size risk 2 times to be food insecure compared to those with big land size.

As purchase is the main food source, and household income in the study area seems not enough to cover all household needs including the purchase of nutritious foods. The findings indicate that many cassava small-scale farmers do not consume some nutritious foods like meat, fish, fruits and sugar because are expensive. The researcher realised that the main food source applied by cassava small-scale farmers may negatively affect food accessibility. According to FAO, IFAD and WFP (2013), economic access is determined by household income and food price. In food importing and low-income countries, consumers use a high percentage of their income for purchasing food, so an increase in food prices affects the consumers' ability to meet their food needs. When food price increased, consumers shift from more expensive and high nutritious foods to cheaper and poor nutritious food, which increase the risk of

micronutrient deficiencies and other forms of malnutrition such as anaemia, stunting that affect people's health.

Influence of physical market access on food accessibility of small-scale farmers in Kamonyi district

The research findings from household interviews, key informants and FGDs showed that there is no physical market in the study area and many respondents (10 out of 25) walk between 46-60 minutes and others (8 out of 25) above one hour to reach the market as the transport cost is high due to poor roads in the community. This can be a barrier for cassava small-scale farmers to get foods that may lead to food insecurity. According to Ahmed et al., (2016) long distance from the farm to the nearest market and transport cost negatively influence market access to farmers. Hlongwane et al., (2014) also highlighted the effect of long-distance where their study done in South Africa showed that an increase of 1 km of distance to market results in 0.775 reduction to access market. According to Dave, et al., (2010), food insecurity is caused by different factors including poor infrastructure and high transport cost. Selepe, et al., (2014) identified limited transport as one of the causes of food insecurity in rural areas and making difficult the transport of foods to the market.

The findings also show that normally cassava small-scale farmers sell their production at a low price during harvesting time (except this time of Covid-19 pandemic where the price has increased) to avoid aflatoxin contamination due to the lack of storage facilities. According to FAO, IFAD and WFP (2013), physical access is determined by infrastructure availability such as roads, ports, food storage facilities and other installation that facilitate the operating of the market. The study of Selepe, et al., (2014) done in South Africa showed that it is difficult for small-scale farmers to supply on time their produce to the market due to poor access to public and private transport resulting in spoilage of the production. It also indicated that poor road network and transport facilities in most rural areas of South Africa are the constraints to farmers, local businesses that affect the foods' transport to the market, leading to food shortage, increased food prices and decreased food accessibility.

Self-reflection as a researcher

The research was an opportunity for me to put into practice what I learnt in class. It started by doing a research proposal where I was confused to get a clear research topic and how to formulate research questions. The struggle continued with finding a literature review to clarify and support my problem statement. With comments from my peer group and the guidance from my supervisor, I was able to finish my proposal, submit, and present it successfully and got a Go ahead for data collection. The research was conducted in the period of COVID-19 pandemic therefore, I couldn't go back home for data collection the reason why I found a research assistant to support in data collection activities. My idea was to ask the research assistant to collect all data and sent them to me for analysis. However, the feedback from my assessor during thesis proposal presentation advised me that using a research assistant only I may lose important information was an eye-opener to me and helped me to think about other methods I can use for collecting data myself where it is possible, without not much depending on the research assistant.

On 15th July 2020, I had an online meeting via Zoom with the Director of Agriculture in Kamonyi district and research assistant to make an overview of data collection activities and request for facilitation for the research to be successful. My organisation supplies agriculture inputs in this district and this was an opportunity for me because I was welcomed by the Director of Agriculture whenever I called him and he helped me to reach my target group.

After receiving permission from the Director of Agriculture, I called the Agronomist of Nyamiyaga sector where my research was conducted to introduce the purpose of my research and to connect to him with my research assistant. 16th July 2020 the research assistant went to Nyamiyaga sector to meet Cell Economic and Development officers (CEDOs) to select two cells where to conduct the research. While waiting to get lists of cassava small-scale farmers, the questionnaire was translated into Kinyarwanda language and I explained it very well to the research assistant and highlighted ethical points to take into consideration during data collection. A sample size of 25 respondents and 8 people who were supposed to join other focus group discussions' members were randomly selected from the lists of cassava small-scale farmers provided by CEDOs. Before starting data collection, the research assistant and I piloted a questionnaire on 2 respondents to check if it is understandable. Through WhatsApp video call, I conducted the first household interview where we used the research assistant's phone and he was following how I asked questions for him to understand how I want interviews to be conducted. The research assistant made the second one and the WhatsApp video was also on for me to listen to how he did it then after piloting, the questionnaire was revised to make some questions easily understandable.

For household interviews, I did five first interviews myself via the research assistant's WhatsApp to get all information needed and because of poor internet networks in the study area I could not conduct all household interviews but the research assistant continued with 20 remained respondents. During household interviews, some respondents were reluctant to answer freely the question on food-consumed thinking that information provided will be used for socio-economic categorisation (Ubudehe). To guarantee them that it is not the case, I spoke to them via research assistant WhatsApp video call to ensure that I am a student, the information provided is confidential, and it will be only used by the researcher for academic purpose until they accepted to continue the conversation with the research assistant. On the side of my personal growth, this challenge helped me to improve my skills on how to approach different people and problem-solving skills. At the end of each day, the research assistant gave me all responses he collected that day, I checked them and then we reflected on data collection process and challenges he met for improvement the following day.

Three key informant interviews were also carried out to validate information. Two were very cooperative but there was one whenever we had an appointment for an interview he always postponed it until when

I thought that maybe he would not find time for me. I did not give up but I continued to remind him by using what I learnt from the compassionate communication lecture on how to request in a good way until he accepted to do that interview. This time I realised the importance of being patient and focused to achieve what you want.

Two different FGDs were done, one for men and another one for women with seven participants each (4 cassava small-scale farmers, 2 FFS facilitators and 1 CEDO). FGD with women went well and when the research assistant introduced to them the purpose of the research and asked permission to take photos of them and record the discussion, participants were very surprised by saying that in other meetings nobody asked that permission. This made them feel respected, welcomed very well the research assistant and greatly participated in the discussion with important information. On the other hand, FGD with men was a bit challenging. While the research assistant introduced that he is collecting data for some else, participants were wondering why they can give information to someone they do not know and asking what will they benefit from the research of a student who lives in the Netherlands. Because I was following the discussion online, the research assistant gave me a time to explain that I could not move from the Netherlands to Rwanda due to the COVID-19 pandemic but I am with them online and I continued to explain the objective of the research. As CEDO was a part of the group and he had a good collaboration with the research assistant he intervened and emphasized that the research results will help the district to design appropriate interventions to improve food security that is a benefit to them too. Because they were familiar with him, they trusted what he said and agreed to continue the discussion. This helped me to reflect on the role of team working, as sometimes they are problems that a person cannot handle alone but need other people's contributions to be solved.

After getting all data from the field, analysis part followed. In my previous education, I was familiar with quantitative analysis but thanks to the mini-research lecture that equipped me with qualitative analysis skills that helped me to analyse my research findings. Data collection used 3 different methods (household interviews, focus group discussions and key informant interviews) for triangulation purpose. The research findings from these three methods are linked and consistent which ensure the validity and reliability of the quality of this research.

Looking back at the research process, I realised that a research is not a straightforward work but it is something that required a lot of time, much concentration and big attention to end up with positive outcomes. I also realised that data collection can have an impact on the research results if it is not done in a good way. When using another person for data collection, it is very necessary to make a follow-up every time to ensure that information being collected is the same as what is expected.

This research gave me insight on the challenges faced by small-scale farmers and I am sure the study will help Kamonyi district authorities to design appropriate interventions to help cassava small-scale farmers improve their food security if suggested recommendations are taken into consideration.

From the research process, I improved my communication, team working, leadership, critical thinking, problem-solving skills, probing skills to get more information and qualitative data analysis. This knowledge will be helpful in my future professional career and further researches I will do.

CHAPTER 6. CONCLUSION AND RECOMMENDATION

6.1. CONCLUSION

This research gave me an insight into factors affecting food accessibility of cassava small-scale farmers in Nyamiyaga sector, Kamonyi district to recommend to Kamonyi on needed improved interventions to help cassava small-scale farmers enhance their food security. Therefore, I come out with the following conclusion:

How does household income affect food accessibility of cassava small-scale farmers in Kamonyi district? Income of many cassava small-scale farmers is mainly from cassava production and it is not enough for farmers to buy all other food items required for a balanced diet and cover other household needs. Some cassava small-scale farmers diversify their income through livestock and other non-farming activities but all these sources of income are still insufficient as their family size are large and this limits food accessibility of cassava small-scale farmers.

What is the impact of income management on food accessibility of cassava small-scale farmers in Kamonyi district? In many households of cassava small-scale farmers, income management is done by both male and female, which does not affect food accessibility as it was found that together they discuss how to spend their income and purchasing food was highlighted to be the top household need. The level of education of respondents was found to be low especially for women respondents and this was found to be one of the factors affecting food accessibility as for these households it is hard to diversify in other income generating activities.

How do food sources affect food accessibility of cassava small-scale farmers in Kamonyi district?

The main food source for many cassava small-scale farmers in the study area is purchase and FCS for many households is under borderline and poor categories respectively. Purchasing food is a limiting factor to food accessibility for households of cassava small-scale farmers with inadequate income.

It is also found that many households in the study area are consuming mainly starch rather than other nutritious food such as meat, fish and fruits which is linked to limited income and low education level of cassava which lead to malnutrition and thus food insecurity in the study area.

How does physical market access influence food accessibility of small-scale farmers in Kamonyi district?

The lack of a physical market and poor roads increase the transport cost in the study area. Cassava small-scale farmers walk a long distance to reach the nearest markets located in neighbouring sectors as they are not able to pay the transport cost and this adversely influences food accessibility. Poor storage facilities push cassava small-scale farmers to sell their production at a low price during harvesting period (except in this period of COVID-19) which also hinders food accessibility of cassava small-scale farmers.

By concluding, factors affecting food accessibility of cassava small small-scale farmers in Nyamiya sector Kamonyi district are the following:

1. Limited income-generating activities. A large number of cassava small-scale farmers depending on cassava farming that generates small income as it is done on small land size thus it cannot cover all household needs.
2. Large household size. Households of cassava small-scale farmers are big with few working people that earn small income to feed all the family members.
3. Limited food sources . Lack of other food sources (like a gift, food aid...) and land shortage that limits cassava small-scale farmers to depend on their own production lead them to purchase foods at the market. With their insufficient income, they can buy cheap food only and rarely eat some nutritious food like meat and fruits.

4. Limited crop diversification. Due to land scarcity, cassava farmers grow few crops and buy other food with their limited income resulting in decreasing food accessibility
5. Lack of a physical market and poor roads in the study area that increase the transport cost to the neighbouring markets and make difficult the market access.
6. Limited storage facilities at the household level. Due to poor storage capacities, cassava small-scale farmers sell their production at a low price during harvesting time to avoid aflatoxin contamination and this lead to low income and food shortage in the coming days.

6.2. RECOMMENDATIONS

The researcher came out with the following recommendations to Kamonyi district:

- ❖ Capacity building on small businesses would help cassava small-scale farmers to diversify their income to increase food accessibility and be able to cover other household needs.
- ❖ Capacity building specifically for women on tailoring and handcrafts such as traditional baskets (uduseke) and traditional home decors may help them to diversify their income as there is a big market in the country where different people, museums and hotels used them for decoration and they are private companies that export them.
- ❖ Capacity building on nutrition education would help women to improve their families nutrition status as they are they one mainly concerned with food for family members.
- ❖ Provision of small domestic livestock (goats, chickens, and rabbits) can help cassava small-scale farmers to get organic manure, diversify their diet and increase their income.
- ❖ Strong mobilisation on home gardens to grow vegetables as they do not require a big land size may be a good solution for diet diversification and another source of income to increase farmers' food accessibility to nutritious food.
- ❖ Due to the shortage of land, cassava farmers cannot fallow their farms, adversely affecting soil fertility and thus productivity. Capacity building on composting could be a good solution to help cassava small-scale farmers sustainably getting organic manure instead of spending money buying it.
- ❖ Strong mobilisation through FFS facilitators on the use of both organic and chemical fertilizers could be a good solution to increase cassava production in the study area.
- ❖ Organisation of small local markets in each cell and renewing available roads in the study area may help farmers selling their production and accessing other food items at the market.
- ❖ Capacity building on storage facilities may help cassava small-scale farmers deal with the problem of aflatoxin therefore they can wait when the price is high instead of selling their production at a low price immediately after harvesting.

Further research

This research focused only on food accessibility but food security depends on four dimensions (food availability, accessibility, utilisation and stability). From secondary data, it was found that food availability is not an issue in the study area therefore the researcher recommends for further research on food utilisation dimension as it can also influence food insecurity.

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ANNEXE

Annexe1. Semi-structured interview guide

Hello. My name is Irene MUTUYEDATA, a master's student in Management of Development with specialisation in Food and Nutrition Security at Van Hall Larenstein University of Applied sciences in Netherlands. For completing my studies, I am required to do a research in food and nutrition security domain. Therefore, my research is to understand the factors affecting food accessibility of cassava small-scale farmers in Nyamiyaga sector, Kamonyi district. I need your help for answering questions related to my research in order to be able to give recommendation to Kamonyi district on appropriate interventions required for improving food security in the district. Your participation is voluntary and all information provided will be kept confidential.

I guarantee you that the discussion will be short, between 35-50 minutes and you can stop any time you want. If you do agree, we can start.

Respondent identification

Cell.....

Name of respondent.....

Age of respondent: a) between 19-30 ☐ b) between 31-42 ☐ c) between 43-54 ☐

d) 55 and above ☐

Sex: M ☐ F ☐

Education level of respondent

a) Complete university ☐ b) complete secondary school ☐ c) not completed secondary school ☐

d) complete primary school e) not complete primary ☐ f) no education ☐

Household type

a) Single female-headed household ☐ b) Male-headed household ☐

Household size:

Land size

a) 1- 500m² ☐ b) 501-2500m² ☐ c) 2501-5000m² ☐ d) 5001 m² and above

- Is this land used for cassava production only or for producing other crops?

Household interview questions

Category 1: Household income

Q1. a) How is the cassava production this year compared to 2 last years?

1) Increased ☐ why? (e.g: use of quality varieties, organic manure, chemical fertilizers, other government intervention (specify))

2) Decreased ☐ why? (disease, drought, flooding, illness in the family, others)

3) still the same ☐

Q2. Do you sell cassava production at the market?

a) YES ☐ If yes how is the cassava price at the market compared to 2 last years ago?

1) price has increased ☐ 2) price is still the same ☐ 3) price has decreased ☐

b) NO ☐ Why?

Q3. What are your household income-generating activities?

a) Agriculture ☐ b) livestock ☐ c) trading ☐ d) bike transport ☐ e) others (specify) ☐

Q4. Do you have access to other source of income? (E.g: loan, remittance and others)

Category 2: Household income management

Q5. How many people do earn income in your household?

a) Nobody ☐ b) 1-3 ☐ c) 4-7 ☐ d) above 7 ☐

Q6. a) Who generates income in your households? % of total income

1) Husband ☐ 2) wife ☐ 3) husband, wife and children ☐

b) Who manage income in your household (both income from cassava and other activities)?

1) Male ☐ 2) Female ☐ 3) Male and Female ☐

c) Do income managed by a particular person mentioned above has influence on your household's food accessibility?

Q7. What are the essential needs on which do you spend your household income? List the top Six

Category 3: Household Food consumption score

Q8. Food groups consumed by household and their sources (Using Food consumption score sheet)

WFP's Food Consumption Score

9.1 Food consumption data collection module

The following table presents an EXAMPLE of the Food Consumption module, which should be adapted to each context.

The question should be phrased like the following¹⁰:

I would like to ask you about all the different foods that your household members have eaten in the last 7 days. Could you please tell me how many days in the past week your household has eaten the following foods?

(for each food, ask what the primary source of each food item eaten that week was, as well as the second main source of food, if any)

Food item	DAYS eaten in past week (0-7 days)	Sources of food (see codes below)	
		primary	secondary
#.1 - Maize			
#.2 - Rice			
#.3 - Bread/wheat			
#.4 - Tubers			
#.5 - Groundnuts & Pulses			
#.6 - Fish (eaten as a main food)			
#.7 - Fish powder (used for flavor only)			
#.8 - Red meat (sheep/goat/beef)			
#.9 - White meat (poultry)			
#.10 - Vegetable oil, fats			
#.11 - Eggs			
#.12 - Milk and dairy products (main food)			
#.13 - Milk in tea in small amounts			
#.14 - Vegetables (including leaves)			
#.15 - Fruits			
#.16 - Sweets, sugar			

Food source codes:

Purchase =1	Own production =2	Traded goods/services, barter =3
Borrowed = 4	Received as gift= 5	Food aid =6
Other (specify) =7		

Category 4: physical market access

Q9. Are physical markets available in this cell?

a) Yes ☐ No ☐

Q10. How many minutes do you or your household's member use to arrive to the market?

a) 1-15mins ☐ b) 16-30mins ☐ c) 31-45mins ☐ d) 46-60mins ☐
f) above 1hour ☐

Q11. a) What are food items available at the physical market?

b) Are the food available always at physical market?

Q12. What transport means do you use for getting to the market?

a) by feet ☐ b) by own bike ☐ c) own motorbike ☐ d) private bike ☐
e) Private motorbike ☐ f) public transport ☐

Annexe 2. Focus Group discussion guide

Hello. My name is Irene MUTUYEDATA, a master's student in Management of Development with specialisation in Food and Nutrition Security at Van Hall Larenstein University of Applied sciences in Netherlands. For completing my studies, I am required to do a research in food and nutrition security domain. Therefore, my research is to understand the factors affecting food accessibility of cassava small-scale farmers in Nyamiyaga sector, Kamonyi district. I need your help for answering questions related to my research in order to be able to give recommendation to Kamonyi district on appropriate interventions required for improving food security in the district.

The discussion will only take between 30-45 minutes so feel free to share your opinions and everyone is encouraged to participate.

Topic 1. Discuss as a group the influence of cassava production on food accessibility in this cell.

- 1) a) How is Cassava production compared to 2 years ago?
 - 1) Has increased
 - 2) still the same
 - 3) Decreased
- b) What may be the reason for the situation mentioned on Q1 (a)?
- 2) a) In this cell do small farmers sell their production at the market or not?
 - b) How is cassava price at the market this year compared to 2 years ago?
 - c) Do you think farmers get income from cassava production in this cell? Explain your answer
- 3) What are the main income-generating activities to small-scale farmers in this cell?

Topic 2. Management of household income

- 1) In most households, who earns income in this cell?
- 2) In most households, who manages income in this cell?
 - Why this person?
- 3) In this cell, What are the priority needs do households spend their income on? List top six
- 4) How does income management contributes to households' food accessibility?

Topic 3. Physical market access

- 1) Are physical market available in the cell? If yes, how do many households get to the market?
 - a) by feet ☐
 - b) by own bike ☐
 - c) own motorbike ☐
 - d) private bike ☐
 - e) Private motorbike ☐
 - f) public transport ☐
- 2) How many minutes do many households use to reach the market?
 - a) 1-15mins ☐
 - b) 16-30mins ☐
 - c) 31-45mins ☐
 - d) 46-60mins ☐
 - e) 61-75mins ☐
 - f) above 1hour ☐
- 3) a) What are the food items available at the market in this cell?
 - b) Are the food available all time at the market?
- 4) What are challenges do households face to access food at the market?

Annexe 3. Key informant interview guide

Hello. My name is Irene MUTUYEDATA, a master's student in Management of Development with specialisation in Food and Nutrition Security at Van Hall Larenstein University of Applied sciences in Netherlands. For completing my studies, I am required to do a research in food and nutrition security domain. Therefore, my research is to understand the factors affecting food accessibility of cassava small-scale farmers in Nyamiyaga sector, Kamonyi district. I need your help for answering questions related to my research in order to be able to give recommendation to Kamonyi district on appropriate interventions required for improving food security in the district.

If I get your permission, we can start and I will use only 20-30 minutes for the discussion.

Q1. How is the cassava production this year compared to 2 years ago?

Q2. What are the reasons for the answer mentioned in Q1?

Q3. Do you think small farmers make income from cassava production compared to what they have invested in this community?

a) If yes, explain why?

b) If no, explain why?

Q4. What are the sources of income for small-scale farmers in this community?

Q5. Are physical market available in this sector?

Q6. What food items available at the market in this community?

Q7. Do those food items available at the market all the seasons?

Q8. What are the challenges do cassava small-scale farmers face to access physical market?

Q9. What do you think is the reason of food insecurity in this district?

Annexe 4. Cassava production

Sector	2015	2018
	Production (T)	Production (T)
Gacurabwenge	5016	9550
Mugina	14498	40525
Musambira	8184	11400
Nyamiyaga	19250	41000
Nyarubaka	8074	12450
Rugalika	11242	19900
Runda	2156	2950
Average	68420	137775

Source: Kamonyi district 2015; Kamonyi district 2018

Annexe 5. WFP's Food Consumption Score

WFP's Food Consumption Score

9.1 Food consumption data collection module

The following table presents an EXAMPLE of the Food Consumption module, which should be adapted to each context.

The question should be phrased like the following¹⁰:

*I would like to ask you about all the different foods that your household members have eaten in the last 7 days. Could you please tell me **how many days** in the past week your household has eaten the following foods?*

(for each food, ask what the primary source of each food item eaten that week was, as well as the second main source of food, if any)

Food item	DAYS eaten in past week (0-7 days)	Sources of food (see codes below)	
		primary	secondary
#.1 – Maize			
#.2 – Rice			
#.3 – Bread/wheat			
#.4 – Tubers			
#.5 – Groundnuts & Pulses			
#.6 – Fish (eaten as a main food)			
#.7 – Fish powder (used for flavor only)			
#.8 – Red meat (sheep/goat/beef)			
#.9 – White meat (poultry)			
#.10 – Vegetable oil, fats			
#.11 – Eggs			
#.12 – Milk and dairy products (main food)			
#.13 – Milk in tea in small amounts			
#.14 – Vegetables (including leaves)			
#.15 – Fruits			
#.16 – Sweets, sugar			

Food source codes:

Purchase =1	Own production =2	Traded goods/services, barter =3
Borrowed = 4	Received as gift= 5	Food aid =6
Other (specify) =7		

The Food Consumption Score (FCS)

Food Items (examples)		Food Groups (definitive)	Weight (definitive)	Sum of consumption frequencies - see data sheet(s) (max value is 7)	Food group scores (a times b)
			a	b	c
1	Maize, maize porridge, rice, sorghum, millet pasta, bread and other cereals	Main staples	2		
	Cassava, potatoes, sweet potatoes, other tubers, plantains				
2	Beans, peas, ground nuts and cashew nuts	Pulses	3		
3	Vegetables, leaves	Vegetables	1		
4	Fruits	Fruit	1		
5	Beef, goat, poultry, pork, eggs and fish	Meat & Fish	4		
6	Milk, yoghurt, other dairy	Milk	4		
7	Sugar, sugar products, honey	Sugar	0.5		
8	Oils, fats and butter	Oil	0.5		
9	Spices, tea, coffee, salt, fish powder, small amounts of milk for tea.	Condiments	0		

The food Consumption Score

0

(sum of column c)

The Food Consumption Group

Typical threshold values

Food Consumption Score	Profile
0-21	Poor
21.5-35	Borderline
> 35	Acceptable

As discussed in the Technical Guidance Sheet thresholds need to be tested and possibly modified based on the context and dietary patterns of the population in question.

Annexe 6. Type of crops produced by respondents

Types of crops	Number of respondents
Cassava only	2
Cassava and beans	4
Cassava, beans and maize	5
Cassava, beans and sorghum	2
Cassava, beans and sweet potatoes	8
Cassava, banana and vegetables	4