



Household livelihoods and food security in jeopardy

Farmers' perspectives on impacts of land scarcity on household livelihoods and food security in rural Rwanda.

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Abstract

Land scarcity is a global challenge that has implications for rural household livelihoods. This study explores how land scarcity impacts not only rural livelihoods, but also food security for smallholder farmers and their households in Rwanda. Empirical data was collected for this project through four focus group discussions with smallholders, and 20 semi-structured interviews with individuals in order to detail the causes and effects of land scarcity, as well as the strategies devised to overcome these problems. The research for this study was carried out in the Southern Province, in the villages of Kimina and Kanyampongo. The findings of this research show that land scarcity resulted from land subdivisions due to inheritances over a long period of time, and that the shrinking of arable land has affected food security and livelihoods of rural households. The status of food security is undermined because small farms do not generate enough food. Household livelihoods are also impacted because agriculture as a source of income is less productive. Most households use crop production for home consumption because they cannot eat and sell at the same time. The study revealed that rural households use various mechanisms to deal with the issue of land scarcity and associated constraints. Diversification of livelihoods is found to be an important mechanism that is used by most households but still with some limitations to poor households. Non-farm and off-farm activities help smallholders to obtain some additional incomes that can be used in the households. Moreover, migration and selling assets are also used as a mechanism to overcome shocks. But, all of these diversification strategies first require capabilities to do so. The study shows how cultural capital, social capital and economic capital enable rural households to undertake responses to land scarcity and food security challenges. As poor smallholder farmers are more vulnerable, this study reveals how support from the state to transform the structure of rural livelihoods, could help create more favorable conditions and increase resilience towards land scarcity problems.

Keywords: Smallholder, rural livelihoods, diversification, rural household food security, land scarcity

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Abbreviations

ARCGIS	Aeronautical Reconnaissance Coverage Geographic Information System
CFSVA	Comprehensive Food Security and Vulnerability Assessment
DDP	District Development Plan
DDS	District Development Strategy
DFID	Department for International Development
ECA	Economic Commission for Africa
ECE	Economic Commission for Europe
EICV	Integrated Household Living Conditions Survey
FAO	Food Agriculture Organisation
GDP	Growth Domestic Product
GoR	Government of Rwanda
IFPRI	International Food policy Research Institute
IFRCRCS	International Federation of Red Cross and Red Crescent Societies
MINALOC	Ministry of Local Administration
MINAGRI	Ministry of Agriculture and Animal Resources
NGO	Non-Governmental Organisation
NISR	National Institute of Statistics of Rwanda
Rwf	Rwandan Francs
SLF	Sustainable Livelihoods Framework
UNCCD	United Nations Convention to Combat Desertification
UNDP	United Nations Development Programme
USAID	United States Agency for International Development
USDA	United States Department of Agriculture
WFP	World Food Program

1. Introduction

1.1 Background of the study

Land constitutes an important resource for social and economic development, as it contributes significantly to the livelihoods of most of the world population. Rwanda is an African country where economic development is primarily based on agriculture as the main source of income to its citizens (Abbot and Mugisha 2015:11). Rwandan agriculture contributes to 33% of its Growth Domestic Product (GDP) and employs more than 70% of the country's population (World bank 2019:6). Agriculture remains the main source of livelihoods for more than 90% of the Rwandan population (NISR 2012a). Rwandan agriculture is dominated by subsistence production and generates 90% of the food consumed in the whole country (USAID 2018:1).

The average farm size for Rwandan rural households is 0.6 hectares, but 46% of those households cultivate on less than 0.3 hectares (NISR 2012:28; Abbot & Mugisha 2015:11). Consequently, the majority of Rwandan households exercise their farming on small plots that cannot produce enough food nor generate sufficient incomes for their members (Government of Rwanda 2009). However, there are many studies that confirm more productivity in smaller land parcels than in the larger farms. For example, World Bank research in Rwanda shows that the quality of land and yields are higher on small plots than on big farms (Ali & Deininger 2014:5-6). For example, Ansoms et al. (2008: 28) conducted research on farm size and productivity in Rwanda and found that: *"if farm size doubles, then productivity in monetary terms decreases by 60%, and productivity in caloric terms contracts by 50%"*. Maxwell and Wiebe (1998: 19-21) found the cause for this to be an abundance of labour, and argue that the concentration of cheaper household labour on smallholders' own plots leads to higher productivity on smaller farms than on bigger ones. However, the problem is to know whether this inverse relationship between productivity and farm size can (in all contexts) allow producers to achieve adequate food security and therefore sustainable livelihoods. Additionally, productivity increases do not necessarily mean that farm outputs are enough to enable growers to meet food preferences and other household needs.

The Government of Rwanda (2009) estimates that “the critical threshold below which a farmer can no longer meet his family’s basic nutritional requirements from agricultural activity alone is approximately 0.75 hectares”. Nonetheless, by making a comparison, the average farm size for household in Rwanda is below the national requirement to meet household food demand and earn required livelihoods. The scarcity of arable lands is considered as a serious hindrance towards achievement of agricultural productivity and food security in Rwanda (Brown & Hughes 2017: 10). According to Bizimana, Nieuwoudt, & Ferrer (2008) and FAO (2013:5), state investment is needed to create rural off- farm jobs to support the population to mitigate persistent land scarcity problem. Moreover, Land Policy and Land Law in Rwanda should be effective in allowing the poor to produce enough food (Musahara 2006:15).

This thesis seeks to explore the way in which small holder farmers in Kimina and Kanyampongo villages understand and mitigate the impacts of land scarcity on household livelihoods and food security. It is essential to understand how the scarcity of arable land affects rural dwellers and the mitigation strategies used to protect household members from hunger and livelihood insecurity.

1.2 Problem statement

Rwanda is a highly populated country of 12 million inhabitants, with a population density of 415 inhabitants per square kilometre in 2012 (NISR et al. 2018:8). This is one of the highest population densities in Africa (Bizimana, Nieuwoudt, & Ferrer, 2004). Due to increasing population, land has become a scarce resource unable to meet the demands of the citizens (NISR 2012a; FAO 2016).

Besides the scarcity of land, researchers have estimated that 50% of all lands are affected by soil erosion because of the hilly topography of the country (Musahara et al 2014; USAID 2018:1). Furthermore, overexploitation of agricultural lands leads to deterioration of land quality (NISR 2012c; Musahara et al. 2014; Abbot & Mugisha 2015). As a result, 50% of farmers in Rwanda experience decreased productivity due to the degradation of soil (Clay 1996); and the situation becomes worse in mountainous regions where 80% of households are prone to severe soil erosion. Consequently, soil erosion affects country’s ability to nourish more than 40,000 people every year (GOR 2004). Other factors that impede productivity include low use of inputs, lack of mechanization, inaccessibility to credits and storage facilities among others (World Bank 2011).

Based on these factors, the government still worries about the problem of low farm productivity (Ansoms et al 2008). Improved productivity is almost impossible on smaller plots if farmers cannot afford improved technology and required agricultural inputs (NISR 2012). In the same line, the research conducted by Musahara (2006:15) in the whole country, showed that more than 70% of

interviewees confirm that their lands could not generate enough food for their families. The same researcher concluded that it is quiet common that “*many households have land that cannot feed their families, either because there is not enough land or the land is not productive enough, or both*” (Musahara 2006:15).

As Rwandan rural household livelihoods are mostly based on agriculture, it is important to investigate implications of land scarcity on household food security and livelihoods. It is equally valuable to investigate how rural households understand and mitigate this stress. The following part of this thesis discusses the aim, and research questions that guide this study.

1.3 Aim and research questions

1.3.1 Research Aim

The aim of this research is to explore how smallholder farmers understand and mitigate impacts of land scarcity on rural household livelihoods and food security in the villages of Kimina and kanyampongo. The study also aims to shed light on shocks and risks of smallholder households, and strategies applied to enhance food security and secure household livelihoods.

1.3.2 Research questions

To study the research problem, the thesis answers the following research questions in regard to farmers’ perspectives, in the rural villages of Kimina and Kanyampongo:

1. How do smallholder households experience and perceive land scarcity and food security?
2. What are the impacts of land scarcity on rural household livelihoods and food security?
3. What are the strategies that rural households deploy to mitigate the impacts of land scarcity on livelihoods and food security?

Exploring experiences of farmers, not only revealed their understanding of the phenomenon but also revealed responses that households devise to overcome or cope with effects that the scarcity of cultivable lands cause on food security and rural livelihoods. The following part provides details on the limits of this study, while describing which aspects are included or excluded.

1.4 Delimitation of the research

The scope of this thesis is limited to the perspectives of smallholder households on impacts of land scarcity on food security and livelihoods. The study is limited to the villages of Kimina and kanyampongo as the case studies for this thesis. These villages are situated in Nyamagabe District in the Southern Province of Rwanda. The major concern here is to explore how the problem of land shortage for rural households, is perceived and how it affects household food security and livelihoods. Land scarcity in this context is not only taken as a shortage or smallness of arable lands, but also the quality of cultivable lands. Other aspects like soil erosion, and lack of technology and inputs to improve productivity are treated as factors affecting land quality and accelerating the scarcity of arable lands as it is discussed in this study.

Food security is studied at the household level, and primarily focusses on access, availability, utilisation and stability of food. The national, local, and regional levels were disregarded even though they have great impact on household and individual food security. This thesis used food insecurity experience-based measurement scales as a qualitative measure (FAO 2003; Jones et al. 2013: 497), because is a measurement that captures insights of people affected (FAO 2003), which reflects an important aim of this project.

Finally, this study explores how land scarcity has shaped crop and livestock farming as the main type of livelihoods in rural Rwanda. Livelihood is defined as a means of obtaining a living (Chambers and Conway 1991: 5). This project reveals how land scarcity might have pushed people to find other ways of living through diversification of livelihoods. Therefore, the study highlights detailed diversification strategies and how they contribute to food accessibility, availability, and stability. Any kind of mechanisms used by the households to support household food security are taken into consideration.

1.5 Thesis layout

This thesis starts with an introductory chapter that includes the background, the problem statement, research aim, and research questions. The second chapter comprises literature review on food security, land scarcity and rural livelihood diversification. The third chapter of this work describes the study context while chapter four addresses the theory and concepts applied in this study. The sustainable livelihood framework, and the concepts of food security are discussed in this chapter. Chapter five is about methodology and explains the sampling techniques, and data collection methods used in this project. Chapter six refers to the presentation of results while chapter seven is the discussion of the findings. Finally, conclusions and recommendations come in the chapter eight.

2. Literature Review

2.1 Land scarcity and smallholding

Land is an important resource sustaining life on earth. It has always been connected to people's development, as the most basic element of living (UNECE 1996; UNCCD 2017: 14). According to UN-habittat (2012:1-2) and Lowder, Sánchez & Bertini (2019:4), there is an increasing pressure on rural land due to the rising population, decreasing soil fertility, the demand for fuel and food security, development activities, land policies, and climatic factors that cause the continuous decrease of farm sizes and the total number of farmlands in general. Consequently, land has become unable to accommodate economic activities of people in need (Hubacek and van den Bergh 2005:6) and agricultural land is the most affected.

Today, small farms occupy the largest proportion of the farms worldwide (Nyambo, et al. 2019:1). There are 570 million small farms worldwide and smallholders remain important actors of the world agriculture (Ibid). However, the definition of a smallholder farmer remains dynamic, as it changes depending on the country, its context, farming systems and ecological zone among other things (Republic of South Africa 2012:1; Nyambo et al. 2019:1). A smallholder farmer is defined as *“a person involved in farming a small piece of land, cultivating food crops, sometimes with small varieties of cash crops”* (Nyambo et al. 2019:1). Small farms are defined as *“agricultural holdings that encompass fewer than 2 hectares of farmland”* (IFAD 2011; HLPE 2013; Lowder et al. 2019:12). In general terms, smallholders are defined based on their limited resource endowment compared to other farmers in the sector. However, they constitute a large part of economy of many countries.

The agricultural sector in Africa is dominated by smallholders and generates around 75% of agriculture production and 50% of livestock products (Nyambo, Luhanga, & Yonah 2019:1). However, the land of smallholders has been decreasing and is expected to continue reducing in the future (FAO 2015:5; Nyambo et al. 2019:1). This declining land size has implications for smallholders, agricultural sector, and household livelihoods in general.

2.2 Implications of less land for livelihood security

“In rural areas land is a basic livelihood asset, the principal form of natural capital from which people produce food and earn a livelihood” (Quan 2000 see Musahara 2006:2-3). Land is a source of food production; it provides pastures for livestock farming; and generates employments to rural workers or urban poor as a source of livelihood (Ibid). 70% of the population living in developing countries are subsistence farmers relying on land to feed their families and meet other household needs (ECA 2004:4). Nonetheless, small farms are among the factors limiting the capacity of production and hence the ability to have enough food and revenues. That is why, the landless, subsistence farmers, or herders always struggle to meet their basic needs (FAO 2015:21). According to Jayne et al. (2014:5) land and labour remain the main assets of the poor. Therefore, the shortage of one asset could affect another and constitute a barrier to improved livelihoods.

Smallholders concentrate more labour in their small farms because they have limited choices (FAO 2015:15). Limited access to mechanization and inputs uses in Africa push smallholders to combine more labour and less capital per hectare for agricultural production (FAO 2015:19). Despite all these efforts deployed, agriculture alone still fails to meet their basic needs (Ellis 2000). Therefore, smallholder farmers choose to combine agriculture with other activities generating incomes. This is how diversification has attracted many smallholders to build a system that could promise the security of household livelihoods (Chambers and Conway 1991; Ellis 2000).

2.2.1 Diversification of livelihoods

Diversification is a process of undertaking various activities to control existing livelihood constraints or improve household or individual living conditions (Barrett, Reardon & Webb 2001: 316). Factors pushing rural household to shift from one activity to another or to combine numerous activities and assets to stabilise incomes are mostly rooted into the low capacity to withstand or overcome livelihood uncertainties (Barrett, Reardon & Webb 2001:316). For example, smallholder farmers can decide to use the labour on their own farms and hire some labour out for off farm jobs, especially when their land is small, compared to the number of family members (Barrett, Reardon & Webb 2001:321). Nonetheless, the presence of commercial or industrial activities, and cities around a given rural area, are among the pull factors that stimulate the rural households to diversify their source of incomes (Barrett et al. 2001: 316). Ellis (2000) and FAO (2015), highlight four main sources of income in rural household: farm production; off-farm jobs; labour in the non-farm sector; and transfers and remittances. All these sources of incomes are mostly combined with crop and livestock production. *“Within the context of the rural economy, the livelihoods of smallholders depend on their*

choices on how to allocate their labour and few assets across farm and non-farm activities and generate the highest income possible given the constraints they face” (FAO 2015:21).

Some research findings confirm that diversification from agriculture contributes 40% to 45% of the total household income in Africa (Reardon 1997:737; Little et al. 2001). According to Ellis (1999: 4), 30% to 50% of rural household incomes in Sub-Saharan Africa, come from non-farm activities and this can reach up to 90% in Southern Africa. These figures, clearly show importance of non-farm incomes in generating a living to rural dwellers. However, diversification strategies are more likely to prevail if the family has more assets, are therefore reduced in poor households because of limited resources (Reardon 1997:743; DFID 1999; Barrett et al. 2001: 324). Migration is another strategy that households use to make a living; and its impact has been remarkable all over the world.

The research conducted by Reardon (1997:739) for 10 locations within rural African countries, showed that migration contributes to 20% of the total nonfarm household income. Earnings from migration have always been an important factor in household investment on farm or nonfarm enterprises, as remittances were used to buy some equipment, inputs, livestock and initiate other small businesses that could bring more earnings to the household (Reardon 1997:743). In Nepal, remittances play a key role in national economy. From 2011 to 2012, remittances contributed to 23% of GDP; and contributed greatly to poverty reduction and food security in the households (FAO et al. 2013:34). Family size and its structure are highlighted among the factors stimulating migration in the rural household (Reardon 1997:743). Diversification impacts food security as discussed below.

2.3 Household food security

The concept of household food security appeared in rural development discourse during the 1980s. As there has been disagreement between organizations and developmental partners on how to operationalise food security in development objectives, a complexity of thoughts on the meaning of the concept and its measurement has resulted (Maxwell and Smith 1992). In the beginning food security was treated as national and global food availability. Later, many scholars realised that availability of food is not enough to ensure household food security (Jones et al. 2013:483). Sen’s (1981) research revealed that poor people might lack access to food when there is a shortage of job or lack of entitlements in a country where food is abundant. This highlights the role of people’s resources and incomes in food security. *“Food security is achieved when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life”* (FAO 1996).

This definition emphasises availability, access, utilisation, and stability of food as the main components of food security.

Food availability refers to the physical presence of food from the smallholders' own farm, markets, or stocks (IFRCRCS 2006). Food access signifies acquiring enough food (Maxwell & Smith 1992). Food access refers to the strategies people use to secure food in their homes, and it is linked to the resources and income that the household possess (IFRCRCS 2006). Food utilisation describes the way food is handled and used by consumers (IFRCRCS 2006), while Food Stability refers to the capacity to overcome shocks and stress to achieve food security so as to maintain adequate food and nutrition (FAO, 2006). The vulnerability dimension of food security is becoming more dangerous in the situation of climate change where problems of soil erosion, floods, droughts are causing high production and incomes losses in vulnerable areas and for vulnerable people (FAO et al. 2013:22). Changing weather conditions have affected food availability and increased food prices on the markets, and the poor smallholders are among the most affected groups (FAO et al. 2013:22). Therefore, the losses and inability to cope with that stress decrease smallholders' capacity to invest in new agricultural technologies and eventually leads to reduced production (FAO et al. 2013:23).

2.4 Land, agriculture, rural household livelihoods and food security in Rwanda

Currently, more than 90% of Rwandan households possess land and their title deeds (Niyonsaba et al 2013; Abbott et al. 2014). The concept behind titling is to improve the security of tenure and revitalise investments through financial credits - even by the smallholders (GoR 2004, Musahara 2006). However, the high density of the population and the shortage of land are common problems that threaten household farming so far practiced on very small parcels (GoR 2004, Musahara 2014:6). Land is mainly used for agriculture production.

Rwandan agriculture remains the pillar for economic growth and uplifting citizens' livelihood (MINAGRI 2018). Almost 90% of the population in Rwanda do subsistence farming (WFP 2020). Agriculture in Rwanda is often still characterised by traditional technology, and small lands play a big role in ensuring livelihoods for most rural population - as they can be rented or sold in times of shocks or vulnerability. Furthermore, "as heritable asset land is the basis for the wealth and livelihood security of future generations" (Quan 2000 see Musahara 2006:3).

The Ministry of Agriculture (2013) argues that the tiny size of the farms constitutes a handicap to the agricultural business in Rwanda. People rely on small and fragmented lands, and land fragmentation is a sign of land scarcity that affects

agricultural productivity in different ways. Scattered lands could be one of the mechanisms that farmers use to adapt to climate change or manage its risks like outbreak of pests and diseases (Demetriou 2014 in Brown and Hughes 2017:10). On the other hand, fragmentation brings extra costs to the business (E.g. protection, supervision and transportation of the production and agricultural inputs) and renders farming less productive to the farmers (Bizimana, Nieuwoudt, & Ferrer 2004). Additionally, fragmentation hinders the adoption of agricultural mechanization which also negatively affects agricultural productivity (GoR 2004). Consequently, incomes that would come from farming are reduced and the household life is heavily affected. People are necessarily obliged to search for other alternatives because the small and unproductive plots could not accommodate all people and solve household needs. Therefore, other sources of incomes help rural households to improve livelihoods in many aspects - including buying food, livestock, and purchasing agricultural inputs to increase farm productivity (Clay et al. 1995: viii). The following chapter provides the descriptions of the case studies.

Based on the fourth Rwanda population and housing census, Nyamagabe is the most populated District in the Southern Province (NISR, 2012). Altitudes of Nyamagabe vary from 1800 to 2700 meters and the slopes range from 60° to 120° (DDP 2013: 8). The steep slopes contribute to the development of soil erosion and land degradation in this region (DDP 2013: 8). The mean temperature is 18°, and annual precipitations range from 1300 to 1450 mm (Ibid). 78% of inhabitants of Nyamagabe, subsist on agriculture as the major economic activity employing more than 71% of the district population (DDP 2013:10). 56% of the farmers work on their own farms, while 17% of the population perform non-farm jobs (DDS 2018:6). Many food crops are grown in this region, but the most prominent are common beans, irish potatoes, wheat, maize, bananas, sorghum, cassava, peas, and soyabean (DDS 2018: 6). Agriculture is predominantly subsistence and performed on very small farms (DDS 2018: 37).

Hilly terrains, forests, acidity of the soil, soil erosion, population pressure, limited access to inputs and mechanization accelerate the scarcity of arable land in the district (Mpambara et al 2017: 4). 41% of the district land is covered by forests (DDS 2018:5). Consequently, most farmers grow their crops on hilly and degraded lands which affect productivity and reinforce the scarcity of agricultural land in Nyamagabe (DDS 2018:37). Though the EICV3 report, estimates that the average farm size for household amounts to 0.51 hectares as, but still more than 57% of households in this District cultivate less than 0.3 hectares (NISR 2012). The scarcity and smallness of agricultural lands are also a result of high population pressure and land fragmentation caused by inheritance of land from grandparents to parents and from parents to children (Mpambara et al 2017:4). That shortage of cultivable lands provokes overexploitation of available plots using traditional methods which result in low productivity and low production (DDS 2018: 37). Poor farm productivity prevents farmers from producing enough food to feed the families and produce a surplus that can be sold on the market (Mpambara et al. 2017:4). The level of food insecurity is high and Nyamagabe is the district that has the highest stunting level (51.8 percent) in the whole country (DDS 2018: 41).

Poor soil fertility, soil acidity, and unmodernised agriculture are among the biggest challenges facing farming activities and food production in this area (DDP 2013:10,33; Mpambara et al. 2017:4). Furthermore, rain fed agriculture is still characterised by low skills in modern agriculture and limited access to finance that inhibit agricultural improvement (DDP 2013:33). Moreover, this agricultural situation coincides with high poverty rate in the district. 73% of the population are poor, which is the highest poverty rate in the country (EICV 3) (Mpambara et al. 2017: 4). As the economy of the district is based on agriculture, then low productivity of agriculture automatically hampers economic development of the whole district (DDS 2018:23). The following part reflects on theory and concepts used for this study.

4. Theory and concepts

The concepts of food security and livelihoods theory are the major analytical tools used to analyse how land scarcity has an impact on both rural household livelihoods and food security. In this regard, sustainable livelihood framework (SLF) has helped me to understand this phenomenon from the perspective of the households.

4.1 Food security concepts

“Food security is achieved when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life” (FAO 1996). There are four components of food security: food availability, food access, food utilisation and food stability (FAO 1996, 2008, 2013). Food availability entails the physical supply of food through production, available stock, and trade (FAO 2008). It is the food that is visible in a given place (IFRCRCS 2006:7). Food utilisation refers to the way people use food, and it depends on food quality (preparation, storage, sanitation) and nutrition (IFRCRCS 2006; FAO 2008; FAO et al. 2013). Food access refers to different strategies that individuals use to acquire food (IFRCRCS 2006). Purchasing power is an important factor to food access (Webb et al. 2006:1405; FAO et al. 2013:20). People can access food through home production, barter, borrowing or aids (IFRCRCS 2006). Food stability is defined as the capacity to cope with threats to availability, access and utilisation of food, as well as the ability to continuously acquire adequate food (FAO 2006). Therefore, people are food insecure when they fail to cope with shocks to availability, access, and utilization of food (Webb et al. 2006:1405). These food security concepts are used to understand how access, availability, utilisation and stability are threatened or maintained in a situation of limited land resources.

Food insecurity experience-based measurement scales/FIEBMS is a qualitative method used to study household food security in this research. This method consists of gathering information based on lived experiences and behaviours of household members vis à vis their food security status (Jones et al. 2013: 497). FIEBMS was invented and firstly used in United states of America by researchers from Cornell and Tufts Universities and later applied in different global regions (Pérez-Escamilla & Segall-Corrêa 2008). Through this method households are grouped into three

categories: *food secure, food insecure with hunger and food insecure without hunger* (Pérez-Escamilla & Segall-Corrêa 2008). This qualitative approach was chosen for this study because it gives the advantage of understanding and analysing the perceptions of food insecurity and hunger by the people most affected (FAO 2003). Applying a livelihoods framework in this method helps to explore the vulnerability of households in relation to risks and shocks that undermine food security. Integrating a livelihoods approach also helps to build an understanding of how people cope with shocks in order to access food, as discussed in the following Sustainable livelihoods framework.

4.2 Sustainable livelihoods framework

Livelihood is the combination of different activities and resources, as a mechanism to make a living (Scoones 2009: 172). This interpretation shows that people themselves have different ways to deal with issue of living depending on their context and available resources. People's ability to undertake livelihood activities is described as a capability by Ellis (2000). Livelihood activities also result from availability of assets. Chambers and Conway (1991:7) define assets as "*the set of resources both material and immaterial that constitute the basis for people's activities*". Assets are also described as capitals by (Bourdieu 1992; Ellis 2000) and may take various forms based on different authors. Bourdieu (1992:119) defines capitals in three or four basic categories which are cultural capital, economic capital, social capital, and symbolic capital. Cultural capital symbolises human interests or aptitude based on acquired knowledge, education and skills. Social capitals refer to the capacity of people to interact with the rest of the society - like belonging to a social network or horizontal and vertical relationships. Economic capitals entail the stocks of resources and any other source of finance. Physical capital, natural capital, and financial capitals fall in this category of economic capitals (DFID 1999:5, Ellis 2000). Specifically for smallholders, physical capitals can be the farm tools and machinery that people possess to perform agricultural activities, while financial capitals include the stocks of cash or any means that can avail money (e.g. cattle, savings, credits, etc.) (Ellis 1999; Ellis 2000:). Finally, natural capitals refer to the natural resources - like land, trees, and water (Ellis 1999; Ellis 2000:). When economic, social and cultural capitals are subjected to recognition or prestige, they become symbolic capitals (Bourdieu1992:119).

Rural livelihoods are commonly the combination of various efforts. The results of what people, their capitals and capabilities can produce, constitute what is actually described as a living or livelihoods (Chambers and Conway 1991: 7). This SLF helped to understand how people combine their capitals and capabilities to undertake livelihoods activities. It shows how people may decide to perform *non-*

farm, off-farm and farm activities or may choose to combine different activities so as to secure livelihoods (Ellis 2000).

4.2.1 Diversification as a rural household livelihood strategy

“Rural livelihood diversification is a process by which, rural households construct an increasingly diverse portfolio of activities and assets in order to survive and to improve their standard of living” (Ellis 2000:15). The combination of assets and activities appear to be the key elements in these definitions. According to Ellis (2000), diversification may take two dimensions: On-farm diversification and diversification away from farming. On-farm diversification includes the intensification or adding value to existing farm activities for better outcomes, while diversification from agriculture includes performing non-farm or off-farm activities (Ellis 2000). Off-farm activities are those related to farm employment, gathering or firewood collection among others... while non-farm activities are those that take place outside agricultural activities (Ellis 2000). Diversification happens because people want to overcome risks and seasonality in natural resource-based livelihoods, which in other way proves the failure of agriculture to procure expected livelihood to practitioners (Ellis 2004:1). Therefore, diversification contributes to reducing vulnerability by improving risk and minimizing the impacts of shocks on household livelihoods (Ellis 2004) to ensure sustainability.

4.2.2 Livelihoods and sustainability

“A livelihood is sustainable when it can cope with and recover from stresses and shocks, maintain or enhance its capability and assets, while not undermining the natural resources base” (Chambers & Conway 1992:6). This study focuses on economic and environmental sustainability. “Environmental sustainability focusses on effects of livelihoods activities on resources and other assets” (Chambers and Conway 1999: 9). Economic sustainability exists when “livelihoods are able to cope with shocks and stress and retain its ability to continue and improve” (Ibid).

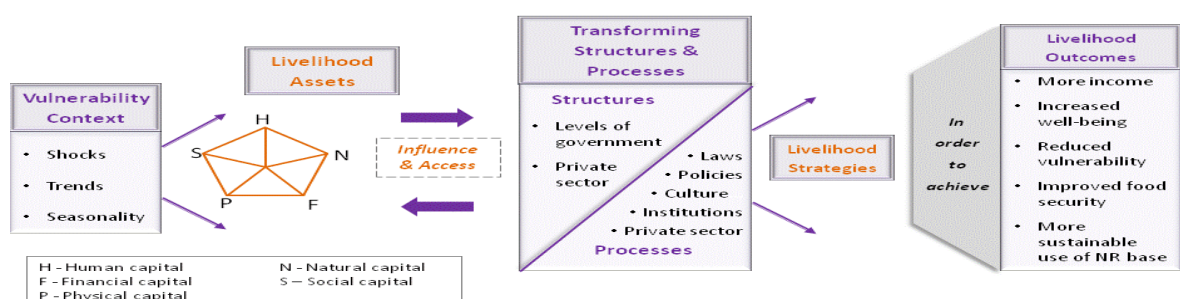


Figure 2. Sustainable livelihoods framework, retrieved from (DFID 1999:1)

The SLF is a tool that helps to understand how people earn a living (DFID 1999:1). It describes the key factors affecting people's choices on livelihoods and the relationship existing between them (DFID 1999; UNDP 2015). This sustainable livelihood framework is a very important tool to analyse our case studies because it comprises most features of rural household livelihoods. It covers aspects of activities, assets, strategies, vulnerability, which are the key elements to scrutinize this phenomenon. SLF also reveals how institutions and social norms shape access and choices made by households (Yaro 2004:28). This framework is used in this study to understand all the dimensions of vulnerability for rural households; by tracking key shocks associated with livelihoods, and food security. It sheds more light on the mechanisms that households apply as responsive measures to shocks. An ethnographic approach has helped to understand the life context of households as described in the following part of research methodology.

5. Methodology

5.1 Epistemology

This thesis takes an ethnographic approach (Hammersley and Atkinson 2007), even though the research is mainly based on interviews mediated through internet tools, because of the pandemic situation. The interviews, however, are supplemented with my own personal experiences of the lives of the smallholders in the villages I have studied. “Ethnographic work investigates some aspects of the lives of people who are being studied, so as to find out how these people view the situation they face” (Hammersley and Atkinson 2007:3). “To accomplish the task of ethnographic study, the field work requires spending enough time with the group of people to be studied in order to document and interpret their ways of life” (Hammersley and Atkinson 2007:1). I lived in Nyamagabe for five years, from 2015-2019. The time I spent working with farmers in these villages, allowed me access to gaining information about their livelihoods and the challenges smallholders face. Spending time in these farmers’ daily lives also permitted me to explore their everyday actions in their specific contexts. This inquiry tried to rely on interviewees’ views as much as possible. The process has been to describe the current situation of land scarcity, and how the people concerned see and talk about the problem and their own responses to these problems. Creswell & Creswell (2018: 48-49) argue that the different meanings that people ascribe to a given problem, expose the inquirer to the complexity of views rather than narrowing meanings into a few categories or ideas. That is why this thesis placed the reflections of smallholders at the centre, in order to have a broader range of perspectives that allow to draw conclusions.

5.2 Reflections on methods for data collection

5.2.1 Identification of respondents and Sampling techniques

The identification phase of key informants involved highlighting the type of information needed and specific people who could avail that kind of information. The decision was made based on my research questions and my prior knowledge of

the site. I also collaborated with people living and working in the study area in order to see the feasibility and availability of the interviewees. I worked with one agronomist from an NGO, whom I choose to be my field assistant and helped to identify respondents who were aware of the situation of the site and could provide the data that represent the whole community while meeting the purpose of the research. This is what Bernard (2017: 196) calls purposive sampling. *“We almost always have to rely on purposive sampling in the study of hard-to-find populations”* (Bernard 2017: 196). The thesis adopted purposive sampling or judgemental sampling as a method that selects the respondents based on the kind of information needed or based on the purpose to be served (Bernard 2017: 147). Purposive sampling is also called non-probability or deliberate sampling (Kothari 2004:15). In a purposive sampling, the researchers use their imagination to determine the representative sample that can meet the research criteria (Vehovar, Toepoel & Steinmetz 2016: 330). Therefore, the study interviewed three types of respondents: Farmers, District officials, and NGOs working in that specific region. However, in order to obtain a variety of insights from households, the study sought to diversify respondents based on their age, gender, education, socio-economic importance. Because of low mobility due to the COVID-19 pandemic, non-probability sampling helped in selecting respondents that have much information in the context of the study area, and who can represent the entire population at least for group discussion. what is expected is to have the insights of people experiencing the life conditions being analysed for this thesis. 20 individual interviews (two district officials, two NGOs and 16 farmers) and four focus group discussions were conducted.

5.2.2 Preparation of interview guide and data collection process

Preparation of questions for data collection was done based on type of materials to be collected. Some questions were common for all respondents, while others were specific to key informants. The study used two types of questionnaires as interview guides: one addressed to the farmers and another for specific key informants. Questions addressed to the district officials and NGOs are mostly centred on key challenges to food security and household livelihoods, as well as interventions of the State and NGOs to the community for improving livelihoods and food insecurity. Questions addressed to farmers covered social and economic dimension, perceptions on land scarcity and effects to food security, shocks and then rural livelihood strategies to cope with shocks. All questions were prepared in English and then translated in Kinyarwanda, the local language in which the interviews were being conducted. One field staff from an NGO working in the study area, was trained to assist in data collection as a mediator. His role was to make appointments and visit households in order to link me with the respondents. Through his smart phone, I could interview farmers on my own.

5.2.2.1 Interviews and group discussions

Group discussions and interviews were organised through zoom, Microsoft Teams or WhatsApp calls. As the work was done remotely, the informants used mediator's smart phone. Through my laptop I could interview all informants and record every discussion. The study used in depth and semi structured interviews in order to allow the informants to provide many details on guided topics. 20 individual interviews were covered. Two interviews from NGOs, two interviews from District officials and 16 interviews were with farmers from Kimina and Kanyampongo Villages. All individual interviewees were smallholders, members of households doing agriculture as the main source of livelihoods. I interviewed either a man or a woman in the household. However, most households were headed by males and are the ones who mostly tried to participate in the discussions. Before starting interviews, I, my field assistant and village leaders made a list of respondents, but during the process, the availability of the informants sometimes changed, and we either looked for other respondents who were available on site or reschedule the appointment. Most of respondents were in the category of the poor. In a Rwandan economy ethnicity does not play any role. Notable though, is that all respondents belong to the christian religion - either Catholic or Protestant.

The focus group discussions were held to analyse how group members reflect on the problems in an interactive way. According to Bryman (2015:501) the aim of a focus group is to explore the way people express themselves and construct a meaning on a particular issue in a group. Four group discussions were held in total, with two being held on Microsoft Teams and the remaining two taking place over Zoom. Two groups of women and two groups of male farmers (two groups in each village) participated. Each group discussion involved between six to eight people (Silverman 2015:206). The group discussions included members of village committee or other model farmers who were aware of community challenges related to land and food security and livelihoods.

Semi -structured and in-depth interviews both consisted of open-ended questions, and the interview guide helped to orient the discussion. However, not all questions were asked to the groups in the same way, everything depended on the reflections of respondents. Every time when important points were highlighted in the discussion the researcher could ask for clarifications and additional inputs, as there was flexibility to ask more questions or omit some parts based on informants' opinions. The table below illustrates the list of interviewees and their background.

Table 1. Description of respondents involved in interview during the period of data collection (Author 2021)

Interviewees	Gender	Age	Level of education	Marital status	Family size	Land size/ ha	Access to land	Key assets	Main livelihood activities	Village	Date of interview
Respondent 1	Female	48	Post-primary	Married	7	0.5	Inheritance	Forest, livestock	Agriculture and casual labour	Kanyampongo	25/05/2021
Respondent 2	Female	47	Primary 6	Married	9	0.5	Inheritance	None	Agriculture	Kanyampongo	25/05/2021
Respondent 3	Male	60	Primary 6	Married	7	1.0	Inherited, bought, rented	Forest	Farming	Kanyampongo	25/05/2021
Respondent 4	Female	38	Primary 6	Married	7	0.4	Inherited	Small forest	Agriculture, casual work	Kanyampongo	25/05/2021
Respondent 5	Male	49	Primary 6	Married	9	0.7	Inherited, bought rented	Forest and pigs	Agriculture plus vegetable selling	Kanyampongo	25/05/2021
Respondent 6	Male	38	Illiterate	Single	1	0.3	Inherited		Agriculture	Kimina	14/09/2021
Respondent 7	Male	72	Primary	Married	6	0.4	Inherited		Agriculture, casual work	Kimina	14/09/2021
Respondent 8	Male	30	Secondary 3	Married	3	0.6	Inherited, bought rented	Forest and pig	Agriculture and commerce	Kimina	14/09/2021
Respondent 9	Female	38	Primary 6	Married	6	0.5	Inherited, bought	Cow and forest	Agriculture, selling beer	Kimina	02/10/2021
Respondent 10	Male	54	Primary 6	Married	7	0.7	Inherited, bought, rented	Forests, pig, cows, chicken	Agriculture and livestock	Kanyampongo	02/10/2021
Respondent 11	Female	54	Primary 6	Widow	7	0.2	Inherited		Agriculture	Kimina	16/10/2021
Respondent 12	Female		Primary 6	Widow	5	1.0	Inherited, bought	one pig	Agriculture	Kimina	17/10/2021
Respondent 13	Female	47	A0	Married		3.0	Inherited, bought	forests, pig, ships, cows	Teacher, farmer and merchant	Kimina	17/10/2021
Respondent 14	Male	27	Secondary 6	Single	1	1.0	Bought		Farming	Kanyampongo	17/10/2021
Respondent 15	male	73	Primary	Married	4	0.4	Inherited		Agriculture	Kimina	17/10/2021
Respondent16	Male	52	Primary	Married	5	1.0	Inherited, bought	Pig, cow, and forest	Agriculture	Kimina	17/10/2021

5.2.3 Validity of results

Validity refers to a strategy used by inquirer to ensure the accuracy of results in a study (Creswell and Creswell 2018). To make sure that interviews and group discussions produce valid data, I aimed to interview people with different social and economic background. This helped to ensure that all social categories are represented; and allowed the tracking of similarities and divergences between informants' responses. Similarly individual interviews and focus group discussions as two different methods produced information that helped in triangulation. Triangulation is technique of combining data from different sources to generate more comprehensive research results (Silverman 2015). The data from focus group discussions and individual interviews, helped to gather more insights from different perspectives - which according to Yin (2014: 192) increases confidence that the research produced accurate data. Another point highlighted by Creswell and Creswell (2018: 314) is that "the more experience that a researcher has with participants in their settings, the more accurate or valid will be the findings". Therefore, as I come from the study area, this gave me an opportunity to understand the background of respondents and to make sense of meaning attributed to some traits. However, this position as an insider might be associated with some limitations such as neglecting to ask detailed questions, in believing that I already understand the context adequately. To reduce this bias, I tried to focus on explanations provided by informants, rather than relying on what I already knew about the context. As data was collected in the native language for both I and interviewees, the opportunity to grasp insights of informants without relying on interpreter, was still greatly increased.

5.2.4 Analysis of the data

All empirical materials were recorded, and I took time to listen to them and transcribe the data. After transcribing the interviews, the data was grouped into themes in order to facilitate analysis. The repetitive readings of interviews transcripts allowed me to understand and compare data from different informants. That helped to track similarities between the data and be able to group them into main themes. According to Creswell and Creswell (2018) a good researcher would reflect on how his/her background will not affect interpretation of the study findings. Therefore, listening to the records carefully and reading the transcripts many times allowed me to grasp the meaning of what people said during interviews rather than being influenced by prior experiences.

5.2.5 Ethical considerations

In group discussions, individual interviews, and analysis of results the views of informants have guided the whole process. Ethical considerations were given priority during data collection and analysis. Before any interview, the informants were given an introduction on the purpose of the research and asked to participate in the interview by their free will. The permission to record the discussion was asked before interview, and all respondents agreed to such terms. Additionally, the names of informants were omitted in this research in order to protect the respondents' identities.

6. Presentation of the findings

6.1 Perceptions on land scarcity

All group discussions and individual interviews mention that without land rural households cannot survive. Even though the land patches are small but still sustain the livelihoods of most rural dwellers. A woman who lives in Kanyampongo village explains the importance of land in rural household:

“As we do not have any other jobs, land is what gives us a living. As for me, I cannot live without land because money alone cannot make me live, because at some point will finish. You cannot live without land and have a safe and secured life” (respondent 1, 25/05/2021).

Same thinking is shared with another woman in the same village, emphasising the role of inheritance of land:

“Land is where we work, where we operate all activities to support the family and livelihoods...I would choose to stay with my land even if it is small instead of receiving money; because land you continue to use it with your children and grandchildren, but money runs out” (respondent 2, 25/05/2021).

The results revealed two sources of land acquisition. There is land that people received from their parents, and other land that they purchased themselves. All focus group discussions and individual interviews confirmed this. This farmer from Kanyampongo village explained how he acquired land through inheritance and bought another portion by his own:

“Regarding the land I have, a small portion of it was inherited from parents while other portion was purchased: inherited land is estimated to 30 Ares, and the total size of the land held is approximately 70 Ares” (respondent 5, 25/05/2021). Another woman from Kimina village said the same: “One part of land is inherited from our parents; another part is purchased. After we got married, we worked together and joined saving and borrowing groups. When we have borrowed money, we used to buy livestock and resell it if we see someone who is selling the land, in order to buy it ... We used to sell the cow and buy the land, and all the farms we purchased resulted from that process” (respondent 9, 02/10/2021).

The same ideas of buying and having inherited the land have been prominent in the group discussions. However, in the context of these smallholders not everyone can purchase land. Those who try to buy new land are considered as rich people in the community. In the focus group discussion, men from the village of Kanyampongo confirmed that few people can buy land. Additionally, they argue that purchasing land increases the gap between the poor and the rich and hence deepens poverty among the poor. They said:

“This land we have is a gift, it was inherited from our parents...Some people bought land, but it is in a limited number. However, purchasing land is one of the things that impoverish people, because if one person can have 50 or 100 parcels in the village, you understand that all those people who are dispossessed become poorer than before” (FGD 1, 1/04/2021).

But land is small, in size!

Having a land is one thing but owning the one that is large enough to make a living is another important factor in this community - as it might be the same situation in some other countries. Even though the results of this study showed that many people possess land; there is a big constraint of land size in the region. *“The land that I possess is unfortunately too small to make better livelihoods for my family. You know, I would have increased its size but no financial means available”* (respondent 5, 25/05/2021). This is a response of one male farmer in Kanyampongo Village, when he was asked if the land, he has is enough to make a living. Another farmer in Kimina Village responded the same:

“[...] Oh, land is too small! I grow maize, beans and potatoes in three separate plots...but the land is not enough for me...a place on which I can’t produce five kilograms of beans, or thirty kilograms of maize, do you think is not too small? it is!” (respondent 7, 14/09/2021).

When asked if the size of land is sufficient to supply enough food to the family, a 48-year-old woman said the following:

“No, our land is very small, it is like a half hectare. Such small plot is not enough to feed I, my husband and seven children we have. We like growing beans, potatoes, maize, vegetables, and other crops, you see that all these crops cannot fit in this small field. So, we cultivate this and eat what we harvest from it, and then we look for other small jobs to see if we can increase what we got from that farm (respondent 1, 25/05/2021).

The problem of land shortage is not only mentioned by individual farmers but also it guided the debate during all group discussions. A group of women in the village of Kimina confirmed that their patches of land are too small in a such a way that someone who is considered a rich cannot have beyond one hectare of land (FGD 3, 11/09/2021). Similarly, all key informants contacted from the district and NGOs emphasized the challenge of land scarcity in the community; and they explained how this affect their interventions and people’s lives in this study area. One lady from NGO said: *“...but the land is not even enough! whoever is called a rural resident depends on agriculture and the truth is that land is very small”* (informant 1, 30/01/2021).

6.1.1 Causes of land scarcity

“...Saying that land is scarce means that people are many compared to available farmland. The place that should be used for agriculture is now for home construction...If you see the place where the houses are placed, is greater than the land we cultivate. People are many while the land is small! Most people have 10 to 15 Ares as agricultural land...” (FGD 1, 01/04/2021).

All informants highlighted the problem of high population as the main cause of land scarcity in this region, and in the country in general. Women in the group discussion stated that: *“Land is scarce because of the increase of the population while the land is not increasing; and yet*

there is lack of financial means to buy a new one ...You see that a lot of land is used to build houses” (FGD 2, 01/04/2021).

Both group and individual interviews revealed that land scarcity is a very big problem as there are many people who are almost landless. Many respondents stated that the reason is because family planning has been ignored by parents and grandparents (FGD 3, 11/09/2021; respondent 8, 14/09/2021):

“The main reason for this, is that old mentality of non-family planning. you find a man with a mountain of land, and when comes to reproduction he gives birth to 15 children. When he divides that land to his children; and his children give birth to many children and divide the same land as well. Finally, you see that every person remains with a small piece of land...” (respondent 8, 14/09/2021).

Land sales

The rise of the population is considered as an important cause of land shortage; nonetheless some informants believe that selling land is another factor that reduces arable land. There are rich people who buy land and plant forests, and this affects agricultural land (respondent 3, 25/05/2021; FGD 3, 11/09/2021; respondent 7, 14/09/2021). An old man in Kimina village in his seventies explained this:

“The problem of land started like in 1973 because people continued to increase quickly!... Those rich people who continued to purchase land, are the ones who caused this problem. They come and buy land and plant forests, and this prevents us from finding where to rent!” (respondent 7, 14/09/2021).

Loss of land quality leads to scarcity of arable land

Beside the population increase and land sales, some other interviewees consider climate change and lack of agricultural inputs as factors contributing to land scarcity. A man living in Kanyampongo Village explained this:

“The smallness of land is due to increase of the population and giving inheritance. Secondary, it was related to selling land by our parents. There are also other causes that reduce arable land and lower production: insufficiency of fertilisers and organic manure, lack of improved seeds, climate variability that cause more rain or droughts, are also big challenges (respondent 3, 25/05/2021).

Women in the group discussion declared that land scarcity is also caused by degradation and steep slopes in this region. They mentioned that terracing the land would increase the size of agricultural land as they provided illustrations:

“...It is not easy to estimate the size of land needed to suffice the family, but if we could get at least one hectare, that would help. But it is not possible to get that land!” One lady in the group intervened and said: “there are places that had been terraced and increased the land for agriculture. However, there are still places that are no longer used for agriculture because of high slopes and unfertile soils. If they could build terraces in those places, I think the land would increase. There are parcels that are on steep slopes, and when you cultivate erosion washes the soil and fertilisers into the valley [...] Even though terraced places did not increase the production as required, but it improved the situation. Again, terracing works help people to earn some money and be able to buy food for at least one day (FGD 2, 01/04/2021).

6.2 Agricultural production and Household food security

6.2.1 food production and problem of availability and accessibility

Land is mostly used for agriculture and is the main source of food and income for all households, according to the respondents. However, most of the informants agree that there are specific crops for earning money, while there are other crops not sold on the market because they are very important for household food consumption. One woman living in Kanyampongo elaborates on this:

“We grow maize, beans and potatoes and we can easily harvest one bag and half of maize... Maize produces much money while beans are stored in the house, we do not sell them....” (respondent 2, 25/05/2021). Another woman from the same village said the same: “I harvest like 200 kilograms of maize production if conditions are good... We harvest 50 to 60 kilograms of beans, and we keep them at home, we do not sell them because are the food that we love ... We like selling maize, cabbages, and potato, that is what we bring to the market.... We eat a small portion and carry other part to the market in order to get soap, salt and farm inputs” (respondent 1, 25/05/2021).

When she was asked if 200kg of maize cover the whole year, the woman said that there are months that the household enjoy the production, especially in the periods of harvesting, but there are other months when the household experience hunger. And there is no hope for improvement she said:

“As I told you, we actually eat it in one season, and it is over, and we are obliged to look for other ways to survive. In April and May, the food we produced from the farm is already finished; again, in October and November there is no food available in the house, there is hunger because of rainy season It is difficult and it requires patience! It is living in a bitter life, a very bitter life indeed! We will live in this life until we die; until God removes us from the earth” (respondent 2, 25/05/2021).

There is another man when he was asked if 300kg of maize harvested, lasts for the entire year, he described how people reduce the quantity of food consumption, and skip meals as a mechanism to increase the number of days that food will last:

“... That is starvation I was talking about! Only eating during the night and eating very little food, that is how people live here. Of course, it is not for every family, but most of the people eat only once a day, during the night” ...” In January, February and March the situation is good because of beans and maize harvest, but in the end of March the food harvested from those small farms are finished. In May the price of beans increases, then in the dry season of July, August and September there is severe hunger problems because the stock of our produce is over....” (respondent 3, 25/05/2021).

6.2.2 Access to food is threatened

Many of the informants declare that there is a very big problem of shortage of food in the households and they mostly link this to the shortage of land and lack of financial incomes. A lady from Kanyampongo village who is 48 years old and has seven household members, stated:

“No, land is not enough, because we eat once a day in the evening or during the day. We do not eat twice a day, and again one keeps on adding what comes from the wage labour. It cannot satisfy us if one does go elsewhere to look for small jobs. The household is not self-sufficient in terms of food production. I would

start from my own household; I cannot be self-sufficient if there is no extra job found.... Most of the food we eat comes from my farm, however, we do not eat enough quantity as rich people, because I am not able to get money to buy more food stuffs” (respondent 1, 25/05/2021).

Another man, when asked about availability and accessibility of nutritious food in the household, he described how there is shortage of food both in quantity and quality, and he said that the family eats extremely little:

[...] We only eat a very little food at night, we don't take any food during the day...Here in our place, if we get one cup of sorghum beer it is enough, the rest is kept for the children.... That is how we live! Even the elders are stunted ...If you get maize dough and beans you do not think about the dessert, you can't even get one cup of tea after your supper"...Of course eating once a day is the origin of stunting! if you eat maize with beans and you do not have tea nor the dessert, is this life complete?" (Interviewee 3, 25/05/2021).

All interviewees confirmed the level of food insecurity to be high, and the same problem was raised in all focus group discussions with emphasis on lack of access to food. Male farmers elaborated on this in the followings:

“There are so many people eating once a day, and even some can spend the whole day without eating. Households that eat lunch are few, maybe households that have people who has monthly salary can eat lunch but others no! Here in Munyege There is no tea, no banana that can help people to get money to feed family members. Hunger is a very big problem! Like today you cannot see any parent who can stay at home during the day, because they fear that if the children ask for food what they are going to say or to offer. People prefer to disappear and come back in the night....and if there is something like food it is offered to the children, other people must be patient” (FGD 1, 01/04/ 2021).

Licking and not eating! lying the stomach!

One man from the Kimina Village explains how the food is very insufficient, and signs of malnutrition appear among children:

“Sometimes you buy two kilograms of beans and potatoes, and you go and lick! only children can take something in the morning, a man and his wife calm down. In the evening we add more water to the food in order to increase the quantity, so that we do not sleep empty stomach!... Eheeee! hunger has many consequences to our children! some children lose weight others are stunted and sometimes they quit the schools. All this happened to me. I have two children who abandoned the school because of lack of food... It also happens that old people lose weight due to hunger... (respondent 7, 14/09/2021).

Women in their discussions said: *“Agricultural production is not enough; People do not eat and get satisfied”* (FGD 2, 01/04/2021). When I asked them if food is really insufficient they all laughed at me and responded: *“No, no, impossible! none eat and be satisfied, it is just to lie on the stomach! most of the time we keep the food for children so that they don't spend the night crying. It is not easy”* (FGD2,01/04/2021).

A woman in her group discussion explained how hunger is very severe and she tried to show periods that are more sensitive to hunger:

“Hunger is always there; we can spend little time when we are still eating the few produce we harvested but this cannot last more than 2 months. And we cannot store for the future because the production is very low. There are some months that are severe and others that are moderate. October, February, and April are the months that cause troubles. In October there is hunger because planted beans are not yet ready for being

harvested; then in February it rains too much, and it is not possible to get wage labour, while in April because of rainy season all maize will have finished in the farm. In the Summer there is hunger as well because nowhere to do farm labour... Almost all months are full of hunger” (FGD 2, 01/04/2021).

Men feel shameful

To be regarded as a “real man” in a rural household means that he must produce enough food from his own farm to be able to feed his family. A man from Kimina village in his seventies explained this as follows:

“The household of a man must have potatoes, and beans from own farm so that you feed your children. If you don’t have such things, you are not a man! ...However, there is a very big problem of hunger! Sometimes we can spend the whole day without eating. Even the children they accept and sleep without eating anything! This can happen two days a week!” (respondent 7, 14/09/2021).

Although most interviewed farmers confirmed the level of food insecurity to be high in this study area, two informants, one from Kimina another from Kanyampongo, said that there are people who can at least eat twice a day. Among those households include theirs. And so they said:

“It happens that in some households because of food insufficiency, they may be compelled to take one meal a day and the preference is on children. Some may also go sleeping empty stomach. However, in my family, we take 2 meals a day: lunch and dinner and sometimes children take breakfast in the morning before going to school...” (respondent 5, Kanyampongo, 25/05/2021).

Forget about food quality!

All individual interviews and focus group discussions revealed that people struggle to get food to eat, and do not even think about the quality of the meals they eat. A man who lives in Kimina village highlighted this in his individual interview:

“Nutritious food! forget about that! Where can you find a complete meal? You only struggle to get something to eat! You always struggle to see if children can go to bed! If you get those potatoes and beans nothing else, you care about!” (respondent 7, 14/09/2021).

6.2.3 Causes of food insecurity in the study area

During the group discussions people elaborate on the main causes of food insecurity in the household. Low production, lack of financial incomes and household size are the points that were most highlighted:

“Hunger exists because you do not get income and you continue consuming what you don’t produce. And yet, you do not have any saving that can help you to do other activities to support lives”. Another man said: the thing that causes the hunger is the laziness, people spend many hours sleeping and few hours working. And again, people who work are few compared to many consumers in the household.... There is a high number of jobless people, like many youths do not have jobs; old people and children are in the group of consumers and do not produce and again these form the biggest number in the household. In addition to that, their farm is small” (FGD 1, 01/04/2021).

One lady from Kanyampongo believes that hunger is related to land scarcity, and lack of agricultural inputs to improve productivity of small land:

“What causes hunger is that land is very small, and we do not get enough fertilisers and improved seeds. If you cultivate without fertilisers crops do not grow well and the production becomes very low. There is also development of pests that lead to the disastrous losses” (respondent 2, 25/05/2021). Another man stated: “You see, the main causes of insufficiency of production include lack of enough fertilizers and small land. I certainly agree that small size of the land is one of the factors that lead to family food insecurity, and big families are mostly affected” (respondent 5, 25/05/2021).

Skills matter

All informants agree that a low capacity to improve productivity reinforces the shortage of food. One informant from Kanyampongo emphasized the role of skills and lack inputs as the key factors that deepen unproductivity of small land:

“Yes, there is a link between the small land and hunger. But another problem is in the mindset. If you do not think you perish. The small land can generate good production when you use improved seeds and other required inputs. We farm in a bad way. For example, you buy local seeds, and these seeds are grown six to ten times, when you plant them, they perish, and yet your manure is not enough. How can you expect good production? (respondent 3, 25/05/2021).

Shocks and stress

According to the interviewees climate variabilities additionally challenges food security:

“Erosion is a big problem here. You see that land is too small and continues being eroded and degraded. To address this problem, we need land terracing and anti-erosive ditches. (respondent 5, kanyampongo, 25/05/2021). Another farmer said:“...In the period of drought there is no water to irrigate our crops, if people had water tanks and access to water for watering vegetable gardens in the dry period, the households would not lack vegetables every day. It could reduce the stunting problem in this area, but the problem is that we cannot access the tanks because they are expensive... Climate variability is also a big challenge. For example, we grew common beans and now they are damaged because the rain is too much in this region, it will be difficult to have enough food in this period, as long as there is no any monthly income ...The life of a farmer is based on that small land she/ he cultivates, when the climate disappoints her/him and the inputs become few, the hunger is obvious and that is why this District has permanent hunger” (respondent 3, Kanyampongo, 25/05/2021).

Another thing highlighted as a barrier to food security and livelihoods, is the limited household incomes. Though people always rely on other jobs to afford at least a meal once a day, one woman clearly stated that alternatives to get jobs are very limited, almost inexistent:

“Jobs are not available; they are only found in some places and on some occasions. Sometimes when there is job for land terracing, ditches creation and other small jobs like in construction of houses and farm works. It is not easy at all! there is extreme misery” (respondent 1, 25/05/2021).

A man in the Kimina village confirmed that the severity of droughts, pests, and flood are shocks to food security and livelihoods in general (respondent 7, 14/09/2021).

6.3 The impacts of Land scarcity on rural household livelihoods and food security

6.3.1 Link between land scarcity and food (in)security

The interviewees agree that there is a link between land scarcity and food insecurity, because small land produce low production that could not cover household food needs. Women in the focus group discussion elaborated on this by saying:

“Small land disturbs household life. Land is small and the production is not enough. We do not have enough space to cultivate our crops and finally hunger attacks the households; and that is what causes people to look for other ways to find food” (FGD 2, 01.04.2021). “It is very true! The scarcity of arable land affects our way to find a living. The land is small, and the population has increased. the consumers are so many while the land to produce their food is very small” (Women FGD 1, 1/04/2021).

Not only in the group discussions but also in the individual interviews, farmers continue to show that food insecurity in rural household is mainly associated with land scarcity. One woman in Kanyampongo Village said: “... *the problem of food shortage exists because the land we have is small. We can only grow one or two plants; we can't find a space to cultivate everything we need*” (respondent 4, 25/05/2021).

Both group discussions and individual interviews showed that the scarcity of land not only affects the quantity of food produced but also the quality of food - as most of legumes and vegetables are ignored:

“You do not plant all the crops you want, because of the problem of small land. When you plant maize, you do not get another place for beans (Kanyampongo FGD 2, 01/04/2021). [...] You see with small land you will not have a plot to grow legumes and vegetables, you choose to grow those potatoes. Hunger is related to the smallness of land! When you have a big farm, you can take one plot and grow banana, you take another part and grow potatoes, and grow beans in another plot...when land is very small it can't generate a required living Someone who has a big farm grows maize and harvests like three bags of maize production; he can harvest one bag of beans; he can have potatoes. Frankly speaking, he can't have any problem of hunger/starvation” (respondent 7, 14/09/2021).

6.3.2 Incomes and livelihood as a whole are affected

Many interviewees believe that land scarcity affected their capacity to earn incomes from farm works. They declared that the smallness of land reduced the number of people who would be able to get jobs in the farm. “*The scarcity of land has caused many consequences because it prevents people from being able to get farm jobs; and where farm job is available they employ a few number of people*” (respondent 7, Kimina 14/09/2021). Even the farmers who seem to be self-sufficient, claimed that small land prevents people from earning a lot of money from their farm enterprises. A young man who cultivates maize, passion fruits and tree tomato in Kimina said:

“The impact of land scarcity on my household is that I can't cultivate and harvest much production...I cannot earn much money that I want... if I had two hectares of land, I would cultivate them and harvest more

production! You also understand if I can harvest like two tones of production and take them to the market, I can really develop!” (respondent 8, 14/09/2021).

Women in their focus groups realized that small land affects all corners of life in the household. Food production, and the education of children are threatened:

“Other problem with small lands is that the production is always insufficient, and that affects education of children. You cannot send children to school while they have spent the night without eating. It is difficult to find school fees and food to nourish children. You won’t be able to pay school fees while children passed the night without eating...” (FGD 2, 01/04/2021).

One man confirmed that the shortage of land pushed him to migrate to look for more jobs because of low incomes, and this negatively affected his wife:

“Three years ago, I went to Bugesera district and spent two months because my household was very hungry. I did farm works, and the wage was very low. Very little money, 1000 Rwfs (0.9USD) a day and you need to live on it. How can you save? What I can say is that my wife had a lot of troubles, because one person cannot support the household when she does not have a diploma or any job” (respondent 3, 25/05/2021).

However, in further discussions the informants showed that small land not only limits the production but also affects the capacity to access some assets like livestock and growing more crops in the small field. Interviewees explained how accessing big land is more beneficial:

“...Having enough land is important! When you have enough land it is possible to ask someone to give you a cow and keep it for him in order to get organic manure for that land. With more land you get space to grow fodder and more crops. Otherwise with small land you could not have plots for crops and pasture at the same time (respondent 1, 25/05/2021).

6.3.3 Land scarcity undermines self esteem

An old man from Kimina Village explained how having small land affect their consideration in the society. He said:

“I can’t tell you how they consider someone who doesn’t have land! You also you can understand! They despise you! they see that you are incapable of doing anything! None can invite you nor share a beer with you! When you have land, you really have something to say!” (respondent 7, 14/09/2021).

Another young man who declared himself to be self- sufficient, described how people who do not have enough land and do casual labour are despised:

“In fact, someone who is landless and does casual work, you see that is someone that people despise. Someone who cannot afford what he/she needs... I do not know in which category I can put him/ her. He is impoverished, very poor indeed!” (respondent 8, 14/09/2021).

6.4 Household strategies to improve livelihoods and food security

6.4.1 Improving productivity and agricultural incomes

In the context of land scarcity, all informants showed that, they do their best to improve productivity of small land they have by using agricultural inputs and applying agronomic practices. However, most of them highlighted the problem of lack access to inputs in order to achieve improved productivity. One man in kanyampongo village said:

“To deal with the existing problem of farm size, one has to use fertilizers and compost to get enough production...! I preferred growing cash crops mainly to earn incomes and reduce food insecurity in my family. I got initial capital from sales of livestock and crop production” (respondent 5, 25/05/2021).

The following is highlighted by a man living in Kanyampongo. He describes how farming as the main occupation, along with saving preserve them from difficult times:

“Agriculture is the only occupation I have, there is no other occupation aside. The money I get from vegetable sales helps me to solve family issues. The way we use is to save a certain amount through saving groups, and later on my savings are used to buy animal which can be sold to meet the needs when arises. This saves us from tough times...Apart from farming activities, there is no other alternative for earning money to overcome food insecurity, except from saving groups” (respondent 5, 25/05/2021).

Most informants confirmed that growing crops in the nearby marshlands, is an important opportunity that helps them to overcome food shortages and income uncertainties. There is a marshland called Mushishito that is mostly used by people who are in cooperatives:

“That Mushishito valley is another source of production and incomes. We harvest maize and potato and sell them to get money. However, beans production is not sold it is stored for home consumption. We also produce vegetables and children get vegetable; by the way they are even good to the old people because they prevent loss of vision. In our poor family vegetables replace meat because one kilogram of meat here is expensive” (respondent 1, 25/05/2021).

A man in Kimina village, although he doesn't cultivate in the marshland, but he confirmed that the production from the marshland is very important in availability of food and casual works for people surrounding Mushishito marshland. He said:

“The marshland of Mushishito helps in many things: when they harvest potatoes I used to go and buy like three kilograms; and when I arrive at home, I know that children will eat at night and in the morning. When they have cultivated beans, we do not worry about anything, and when maize is harvested, we do not miss them. You can't miss a compassionate person who can give you some maize to grille. When they harvest you can transport the production and then when you come back the give you what you will eat... In fact, when they have harvested none can die with hunger!” (respondent 7, 14/09/2021).

6.4.2 Selling assets as a mitigation strategy, but also as a source of insecurity

Household assets are very crucial to the life of rural farmers. Most of the assets highlighted in this village are livestock, land, forests, houses. When the households do not have such assets, they always feel uncomfortable with no future nor pride in the society (respondent 3, 25/05/2021; respondent 5, 25/05/2021). All our informants highlight the importance of some assets like animals, land, and forests in supporting households, both in normal life but also in harsh conditions. A farmer in an individual interview said the following:

“For myself, pigs and forest are the real assets that support me in tough times. The forest helps a lot! when a need arises, we can sell trees to meet that need. This happens mostly when time get tougher, and you request the buyers to provide money in exchange of trees. You know, some people may decide to sell the entire forest including land while others sell only trees” (respondent 5, 25/05/2021).

The female farmers in Kanyampongo village continued to detail the role of household resources in solving household needs:

“There are small forests, but they are not enough. They solve some of the problems we have such as health insurance, problem of famine at home, and paying school fees for the students” (respondent 4, 25/05/2021). Another woman said: “When my husband has sold a forest, many household problems get solved. Without forest there is no life in the household, we need firewood, shelter for animals, house fences, in fact a forest is an important asset in the house... when you have a goat in the house or when you have a piglet or the chicken and some other small livestock; you immediately take them to the market during hunger period.... Hum...Every time when times are hard, like in rainy season we take them to the market” (respondent 1, 25/05/2021).

However, selling assets comes only after seeing that the production is not generating incomes as expected. One female interviewee said:

“It depends on the production, when you harvest a lot, you go to the market but when it is not enough you leave it for home consumption. You bring them to the market according to what you harvested. When there is hunger or other problems, we can sell livestock or trees and save our lives. For example, all my children are students; we recently sold the forest to find school fees for children” (respondent 2, 25/05/2021).

Though farmers agree that assets like forests help the households in hard times, because of poverty and insecurity in the households some trees are cut when are not mature and this affect the environment and the income that comes from that tree selling. A man who lives in Kanyampongo village explains this:

“You understand that when you do not have enough production you have nothing. The solution is to start selling immature trees from the forest... Then instead of waiting for ten years to harvest a forest, you decide to cut trees and accept the risk of fighting with local government... Because of poverty, when there is shortage of food, I sell trees so that I can get food for my children, and that is why forests do not get mature because I cut trees beforehand” (respondent 3, 25/05/2021).

Though smallholders appreciate the importance of selling assets, but they criticize themselves for having sold their land in order to gain a livelihood, as it increases insecurity as one woman mentioned:

“Land is very small and cannot increase... Even the forests are for rich people. when the poor have small forests, they give them to those who have money to get a survival. Then tomorrow the poor does not know where to go again. Selling the forest is being foolish!” (Respondent2, 25/05/2021).

During the group discussion all group members appreciated the importance of assets for the livelihoods of the family. However, they do not see the solution to livelihood problems because they live in continuous poverty. They do not hope to prosper. Food, school fees for children, health insurance associated with lack of employment prevents them from getting out of poverty. Selling assets doesn't ensure sustainable living. There is no hope for future, men said:

“[...] Suppose someone has four children, and now in Rwanda all children must go to school then think about school fees, cloths, books, notebooks and health insurance. Children need food before going to school, and need supper in the evening when they are back. Imagine what it costs! who do this? Only mother and father are the ones who are responsible...One forest is harvested once in five years; it cannot help in this time. We decide to sell one beef at 200,000Rwfs (200 USD) and remain poor.... When you have a student in secondary school you will need to pay at least 100,000Rwfs per each term. When do you think, this poverty is going to end? And again, after school the student who caused this poverty, will be unemployed and come back in that poor family and become poor; and implicate poverty to his young brothers and sisters...How will these things take an end?” (FGD1, 1/04/2021).

6.4.3 Activities and incomes

Because of the problems in farm-based livelihoods, some farmers try to initiate small activities to earn additional incomes in order to cope with the constraints associated with farming. However, it seems that starting those activities require some resources which emphasises that people who have more resources can easily start those businesses. The following excerpt came from a man possessing 1.0 hectare of land, including 0.5 hectares for farmland and 0.5 hectares of forest. He explains how this helped him to access the loan from the bank to build a business house.

“Now I have a project. I am constructing a coffee shop; I will put one flask of tea to see if I can get money that can support my family during this elderly. I took one part of the forest and sold it to build that small shop. I thought that through this project I will be earning twenty thousand each month, like that I will be able to buy beans and salt for household nutrition... I took a loan from the bank and sold my forests in order to build those houses...” (respondent 3, 25/05/2021).

Most informants agree that initiating small activities that can generate money is very important, but has many limitations including lack of start-up capital among others. The woman living in Kanyampongo explains:

“In favourable conditions, small activities can bring little money if someone has a capital. But today in our country there is a bad disease that prevents people from seeking a living. We used to sell sorghum beer, and banana beer but today it is no longer happening because of this Covid19. To get something to do it is painful, it is difficult! maybe if it was in the time of peace and there were not so many things closed; we would search small jobs to sustain life” (respondent 1, 25/05/2021).

Casual work

Working for others in order to find food and money is a common strategy in the study area. Males discuss this in the focus group discussion. “...*In fact, household life in Munyege is about working for others, because few people are self-sufficient! ...the means of living are limited, so the solution is to look for farm jobs*” (FGD 1, 01/04/2021). Women in their focus group discussion said:

“We live on agriculture and working in the farms of wealthy people (this what is called guca incuro in their language). We cultivate the small land we have and then look for farm jobs because that small land is not enough, cannot help us. We do farm works for people who have more land, and they give us money or food” (FGD 2, 01/04/2021).

A male in focus group discussion in the Kanyampongo village said: “*As the land is very small, people take few days to till this land and then spend another time in looking for jobs outside the farm or working for others who can give them money*” (FGD 1, 01/04/2021). Another man from the Kimina village said:

“Some people seek where they can transport material or do farm works. In fact, they work for wealthy people who live here: they take care of their livestock by looking for fodder and cutting grasses for animals; they try do many small jobs so that they survive” (respondent 8, 14/09/2021).

From the village of Kimina, a respondent explained how he provides farm work to many poor people, and that the incomes of men and women differ:

“Many people are the ones who do farm labour...Those who do casual labour, their farm production is not enough while we who offer them jobs our production is enough...In this place, most of the citizens live because have done casual works. You call that poor person and give him a job. In this region the woman earns 600RwfRs while a man earns 700RwfRs a day. Sometimes you find that all people in the household live on casual labour” (respondent 8, 14/09/2021).

Another man from the village of Kimina, who is 72 years old, emphasized off-farm casual labour as a way to access food:

“To have food requires doing casual work, and if you don’t work you are in danger, you starve. Life is all about working for other people! I work in the farm, and then when they give me six hundred Rwandan francs I can go and buy potatoes, and if you work two days you can also buy beans and bring them to your wife for cooking. When you don’t get where to cultivate you sleep empty stomach! ... Life is not easy for many people here! most of farm labour ends at twelve, I plough my land in the afternoons, so that when they pay me I can buy seeds for planting in my field” (respondent 7, 14/09/2021).

However, off, and non-farm employments are limited in this region, and this affects food security and stimulates erosion of assets, as one man said:

“There are no projects providing jobs in this region. If we had jobs, we would get health insurance and food in the household.....I do not earn any single coin, I am jobless I do not have anywhere to get money. It has been two years without finding anywhere to work... There are many household expenses compared to my household incomes... But what can I do? I gave birth to children, and they are mine, I cannot accept that my children die. I take one or two Ares of land and sell them to help us to get food until the next harvest” (respondent 3, 25/05/2021).

Remittances and Migration only for men

All interviewees agreed that migration is a good strategy that supports most of household to buy food, and some other assets. There is a lady from the Kanyampongo village that explained how migration helped her household to increase the portion of land they had:

“My husband migrated and spent five years away, and that is how we got the land we cultivate, because inherited land was three acres. My husband used to send money and purchase new lands. We ate that money and used remaining amount to purchase more land and livestock” (respondent 1, 25/05/2021).

However, all individual and group interviews confirmed that the migration of men creates big gaps in the household and forces the woman to bear the burden of managing all household works. One lady from Kanyampongo said:

“I had to take care of the children and do all household works alone! That money from remittances helped me to hire the labour to help me to do farm works. It bothered me but I did it. It is not easy but we, as farmers we must be painful, because farm works are so many you cannot find money to pay the labour if you do not do it by yourself” (respondent 1, 25/05/2021). Focus group discussion revealed the same. Women said: “Yes, migration exists! Men migrates and women stay sweating with children, and if men earn something they send it back or some do not come back nor help the family.... Women cannot migrate! Where can you put your kids? do you think you can carry them in the basket?” (FGD 2, 01/04/2021).

6.4.4 Social strategies

Government and NGOs support and others

Government and non-government organizations implement the projects that can help the citizens to improve livelihoods and food security in particular. The following excerpt describes what the farmers said they have received from those organizations. Women in the group discussion argued that there is no specific support regarding food and livelihoods, except credits on seeds and fertilisers (FGD 1, 1/04/2021). However, one man confirmed that the government supports people who are in the first and the second social categories (respondent 1, 25/05/2021). This was also confirmed by an old man in Kimina who said: “*There is no thing the state helps us with in as far as food security is concerned! May be old people receive money from the district*” (respondent 7, 14/09/2021). But all respondents were not able to explain the kind of support they receive. However, the key informants from different organisations stated that households receive inputs on subsidies (informant 3, 16/10/2021; informant 4, 23/10/2021). Another informant from Kanyampongo confirmed that the only support they get from NGOs and government is accessing inputs on credits: “*Partners in agriculture provide fertilizers, and payments are to be done after harvesting. We don't have problem with payments because we do it slowly without pressure. However, you understand that payment may become complicated, when the production is low because of drought*” (respondent 5, 25/05/2021).

Kinship, neighbour support and trust

During the group discussions informants confirmed that mutual support does not exist between neighbours because all people are poor. “*There is no mutual help because there is nothing to share. Can you support someone while you also need a support?*” (FGD 1, 1/04/2021).

However, trust between neighbours and relatives generates some benefits like renting livestock for getting manure. Some wealthy people can rent their livestock to the poor in order to help them benefit from manure or have their own animal after giving birth. This is built on trust as unintegral people can sometimes sell rented animal and declare that they were stolen or dead. Livestock owners must know that the tenant is trustworthy before renting animal (respondent 8, 14/09/2021). One individual can rent a small or big animal to the poor who cannot access it and then agree on how they will share the results from animal keeping. They share small animals after giving birth, and this helps the poor to find organic manure for his farm as well as milk or money when he sells animals. This is what Rwandese call “*kuragiza*”. The following is an interview excerpt from a male farmer in the Kimina village, who used to borrow livestock, in order to improve farm productivity:

“I was incapable of getting manure, I immediately approached someone who had ability to buy a cow, and he bought a bull for me, and I grazed it. I used the manure until it was time to sell the bull... if a cow is bought for 100,000 Rwfrs (approximately 100 USD) and sold for 250,000 Rwfrs (250 USD), the owner takes away his capital and then you share the profit. With this, I buy what I need like seeds and so on... This means that the rich man who has money, refuses to put it in the bank and buys a cow that will bring him the profit... When he rents you a cow you get more profit. he will first of all take the calf from the first birth and then you take the second” (respondent 8, 14/09/2021).

Renting a farm is also a common practice in the Rwandan context. Smallholders who have land can rent it to those who are in shortage, and they will then receive a certain amount of money each year. This is called “*kwatisha*” in Kinyarwanda language. One informant said: “*Yes, I rent the farm. I rent nearer farms from my elder brother, and it allows me to grow maize, beans and potatoes. I pay him like 20,000Rwfs every year*” (respondent 3, 25/05/2021). Farm rent is not only for poor people, but also for rich people who intend to increase production or extend their business. A male interviewee from Kimina explained this:

“My land is not enough, I also rent the big part that I cultivate. I rent 30 acres, where I cultivated tree tomatoes and other passion fruits. It is very expensive because if someone rents you 30 acres of land you may pay him 15,000 Rwfrs (15 USD) per one growing season” (respondent 8, 14/09/2021).

Cooperatives and financial institutions

Joining farmer cooperatives is one of the strategies that people use to access resources that help them to improve their livelihoods. Most of the benefits are resources such as inputs, trainings, information (respondent 2, 25/05/2021). Financial credits are also important mechanisms that people use to improve their lives. They help to initiate business and to buy food. However, the results from these interviews showed that most of the farmers do not have capacity to access bank credits, and only a small minority who have assets can get credits. Therefore, due to poverty smallholders rely on saving groups to solve many livelihood problems. These saving and borrowing groups, are initiatives of people who are in the same social economic category; and decide to save a certain amount of money every week. The saving amount per meeting per person is decided based on financial capacity of group members. The groups have between 20 and 30 people, each with a committee and books for record keeping. Group members can borrow money and pay it back later with interest. To reduce the risks, people provide some

assets as collateral if they borrow amount of money that is higher than their savings. One woman said:” the saving groups help us because when you have the problem you borrow money from the group without going to the bank (respondent 2, 25/05/2021). However, many smallholders said that saving groups could not allow people to prosper because, smallholders do not have the capacity to save much money. The saving group for many, is just a strategy to buy food and other simple things that are needed in the household. One man said the following:

“We participate in a saving group, where they request a share of 250 Rwfs every week. You borrow money from the group and that money is used to buy food and you know, you must pay back with interest. So, when it is time to share you find that you have nothing. at the end of the day, you always stay without savings on your account. That is how we live; we do not prosper instead we stay in perpetual poverty. By the way it is helpful because it supports the family” (respondent 2, 25/05/2021).

Women in focus group said that they need to initiate business but through saving groups they cannot get the capital.

“As women we try to join the saving groups, when I earn a wage of 600 Rwfs I save 200 Rwfs or 250 Rwfs in the group every week. But to reach the time of getting a loan that can help to initiate a small business it is totally impossible. There is no power in these groups so as we provide the capital that can help people to get loan and continue to support the family...” (FGD 2, 01/04/2021).

However, this situation seems to be different between poor and rich households. Rich households use saving groups and can get enough money to help them to develop. The following excerpt comes from a male farmer in his thirties from Kimina, and he describes how saving groups are the sole means that helped them to improve lives. He confirmed the importance of saving groups in their development. He said:

“Before I have rented the land, I saw that working on small land would make me poor. That is how I joined saving groups and borrowed money and rented another land. And I started making money and pay for others who work for me; and I bought my land and I developed in that way... The money I used to buy that land, is the money I saved in the group. I borrowed money and bought chickens and sold them and bought a land. It is that saving group that helped me to achieve this” (respondent 8, 14/09/2021).

However, it was reported that most farmers fear risks of taking credits from the banks because of typically high interest rates. The following is what a woman in her fifties said:

“I do not take bank credits. Can you take the loan without having something to do? How can we pay back the debt? What if we get bankrupt? What can we offer so that somebody’s money is paid back? We are old we cannot work; we live on what we have. Taking a credit is not successful for some people. Imagine if you take it and fail to pay it back, and the land you purchased painfully they come and take it. You would have worked in vain! No, we watch the working environment and learn from what happened to others who took those credits, it is not easy in the life outside there!” (respondent 1, 25/05/2021).

7. Discussion of the findings on land scarcity

The discussion of the findings from this research is based on empirical data collected, existing rural development literature, and the theory and concepts applied to this study.

7.1. Perceptions of households on land scarcity

7.1.1 Access to land by rural households

From the results presented in this research, interviewees mentioned three main ways of acquiring agricultural land in the villages of Kanyampongo and Kimina. The most common way of obtaining land is by inheritance, but all informants repeatedly emphasized the limited area of inherited land due to intergenerational subdivisions of land. This limited land area pushes some households to look for other ways to generate more land holdings through purchasing additional land or renting land from neighbours to increase the size of land under cultivation. Inheritance of land is a common social practice in many African countries. Illustrations from Ethiopia (Headey et al. 2014), Uganda (Holden & Otsuka 2014:93) and Tanzania (Wineman et al. 2017) revealed the same results - that households acquire land either by inheritance, purchasing or renting. Bugri and Yeboah (2017) studied the means of obtaining land by the rural poor in Ghana, and discovered that access has been shifting from customary mechanisms to market mechanisms. During the period between 2005 and 2015, the results of their research showed that 19.5% of the population acquired land by inheritance while 63.5% accessed land by rental or land sales. Therefore, if purchasing and renting land are the ways used to access arable land, it could be concluded that poor families would not be able to afford appropriate land in the case that they do not have enough money. They would only rely on inherited land. Otherwise, *financial capital* is very crucial to buy or rent new farms. This would explain why most households in this study cannot afford to buy additional land, and it may confirm their low *financial capitals*, that prevents them from increasing their land.

7.1.2 Is land really scarce? but why?

7.1.2.1 Inheritance and land sales

All informants pointed out the subdivisions of land from generation to generation as the main challenge contributing to land scarcity. The land has been inherited from ancestors with subdivisions from grandfathers to parents, and parents to children. This has reduced land in a such a way that the current generation could no longer inherit land from their parents; because even the land areas of those who possess land are very small (respondent 8, 14/09/2021). Nara et al. (2021:10) found similar results in the Northern part of Ghana and statements from interviewees showed that land subdivisions between family members have resulted in land shortage and reduced land size for households in the region.

Land sale is another issue that affect availability of arable land in Kimina and Kanyampongo. One old man in Kimina explained that the problem of land scarcity started in 1970 when the population was given permission to sell their land (respondent 7, 14/09/2021). The land was purchased by rich people who most of the time are willing to increase their wealth by planting forests (Women FGD 3, 11/09/2021; respondent 7, 14/09/2021). There is a different observation from land sales in Kenya and Uganda where the results revealed that land sales play a big role in reallocation of land from people who possess more land to those who are in shortage of land (cf. Yamano et al., 2008 in Holden & Otsuka 2014; Baland et al. 2007). If smallholders in Kenya and Uganda can buy land, it means that they have access to relatively high levels of capital, in contrast to the case of Rwanda where purchasing power of smallholders is very low. Therefore, land sales increase the scarcity of land because is a result of distress land sales. Degradation of land is also another cause of land scarcity as discussed below. `

7.1.2.3 Soil erosion and degradation

Respondents suggested that soil erosion and degradation of the land affect availability of agricultural land. Women in group discussions stated that there are some places that are no longer cultivable because of steep slopes and degradation (FGD 2, 01/04/2021). Holden & Otsuka (2014:93) confirm that topographic characteristics may lead to reduced agricultural land.

All these causes of land scarcity as highlighted by smallholders can reflect the capabilities of the population living in Kimina and Kanyampongo. It is obvious to see that households with more capitals could solve many of these problems. Lack of technical skills to maintain land and crops in good conditions is a sign of low human capital; while lack of tools like machinery to perform farm works could mean physical capital is under threat (DFID1999; and Ellis 2000). Economic capital is very important for managing soil fertility and controlling soil erosion. Nonetheless, one would not blame farmers as there are many things (like land

terracing, machinery, extension services, inputs supply, infrastructure, etc) which cannot be accessed without government interventions. That could explain why Ellis (2000) argues that government institutions are mediating factors to achieve sustainable livelihoods. Notably, the support of the Rwandan government in facilitating the citizens to solve problems related to land scarcity is still very low. These unfavourable conditions plus low assets and capabilities of households, do not only increase vulnerability to land scarcity, but also, impact food security (FAO et al. 2013:23). The status of household food security is discussed in the following.

7.2 The Status of household Food security in Kanyampongo and kimina villages

The results of the study showed that food to nourish household members mainly come from own farm production. There is only little food that come from the market. However, buying food from the market requires having sources of income. The respondents in this study reported that both farm production and incomes are very low for smallholders; hence affecting their access to, and availability of food in the households (respondent 1, 25/05/2021). All focus group discussions confirmed the problem of food security, and 12 out of the 15 farmers interviewed reported high level of food insecurity in their households. Most households eat once a day in the evening; and they do not eat enough food (FGD 2, 01/04/2021; respondent 3, 25/05/2021). Men in group discussion confirmed that there are some households that spend the whole day without eating (FGD 1, 01/04/ 2021). In some cases, adults choose to give their food to children because there is not enough food for everyone in the household (respondent 7, 14/09/2021). One respondent in Kimina confirmed that stunting among the children, and loss of weight among adults are common in their village (respondent 7, 14/09/2021). These are all the signs of undernutrition and serious hunger. This data shows serious problem of food availability and accessibility in the households. In one hand this might be caused by the fact that food produced from own farms are not enough to help these households to eat enough all the time. On the other hand, people might not have financial means to buy food. In such a context, Clover (2003:7) Concludes that food insecurity is not only a problem of low production but is a failure of livelihood to guarantee adequate food.

The problem of availability and access to food leaves the gap in household nutrition and leads to undernutrition. According to what all respondents mentioned in individual and group interviews, people do not think much about the quality of food; instead, the most important thing is to find any food to eat (respondent 7, 14/09/2021). This could confirm how food utilization is jeopardized. If households are still falling short to obtain enough quantity of food; it wouldn't be much easier

to think of access to nutritious food. Therefore, Nutrition is still a very serious problem in this study area. This may probably happen because they put much time into searching for food in order to address the problem of energy deficiencies, and neglect the quality of food. It might also be related to low skills in food and nutrition.

The results of this thesis showed that there are periods of severe hunger and some months during which people have some food in the house. During harvesting period and some weeks later, people find easy to nourish their families. The findings also revealed that farmers starve when there is a problem of increased rains and in dry period of July, August and September (respondent 3, 25/05/2021). A man in Kanyampongo stated that people face the problem of hunger when the prices of crop production increase on the market especially in May (respondent 3, 25/05/2021). All these results continue to show vulnerability status of smallholders to be high. Coming back to the definition of food security, these results show that the rural households are incapable of having enough nutritious food all the time. The stability component of food security is highly shaken. Climate shocks, fluctuation of prices on the market, low production and low-income status make smallholders more vulnerable to hunger and food insecurity. Therefore, inability of these rural households to cope or resist to shocks and stress, would indicate lack of resilience as stated by Ellis (2000). Hesselberg and Yaro (2006:48) found similar problems of food insecurity some weeks after harvesting when food reserves are depleted, and sources of incomes are scarce in Northern Ghana. They also found that during the period of starvations elderly people and children can be offered poor meals while the rest of the family participate in forced fasting or reduced meals intakes.

Therefore, this study demonstrates a severe food insecurity in the villages of Kimina and Kanyampongo. This may be linked to the problem of high level of poverty and livelihood insecurity in general. Agriculture as a main source of food and incomes in rural households has not provided a promising result in terms of availability and access to enough nutritious food. In a such situation, Ellis (2000) argues that rural households necessarily need to combine different activities that generate more incomes because agriculture alone cannot procure a sustainable living. Therefore, the high level of food insecurity in Kimina and Kanyampongo would not be attributed to the failure of agriculture to supply food, but also to the lack of other sources of incomes, and livelihoods insecurity in general.

7.3 Impact of land scarcity on livelihoods and food security

7.3.1 Land scarcity affects farm based livelihoods

From these results presented in chapter 6, land is more than a resource. It is an important asset for food and incomes production in the households (FGD 2, 01.04.2021; respondent 8, 14/09/2021). This is in concert with Hubacek & van den Bergh (2005:17) who claim that land is at the same time a product and a factor of production. Land could be seen as a factor of production in the sense that it is the main resource that households rely on to produce food and incomes for their families and fodder for their animals. It is a product because people can sell it to obtain money and solve household problems. However, the scarcity of land prevents smallholders from affording all these benefits. The respondents said that households do not have enough land to graze livestock, they prioritize crop production (FGD 2, 01.04.2021). And again, there is diminished crop production because of small land and infertility of the soil (FGD 1, 01.04.2021; respondent 7 14/09/2021). Consequently, this has reduced the number of livestock per households because there is no land to produce fodder for animals.

These results mean a lot in terms of household livelihood. Low crop production could mean low quantity of food and low food availability in the household. low production could also result in low incomes in the household and limited access to basic needs. Livestock is a resource that households keep in the house to help them to immediately generate cash when the need arises, or when shocks strike the household (Ellis 2000). Therefore, reduced number of livestock may affect household's economic capital and resiliency to shocks. Moreover, agriculture fails to generate enough money for most smallholders. selling the produce seems impossible as long as the productivity is extremely low. Therefore, limited agricultural incomes affects smallholders' ability to meet the needs of household. All informants attributed this to the problem of small and infertile soil which does not allow them to have enough production (FGD 1, 01/04/2021). There is a farmer who raised the issue of land scarcity as the main problem that prevents smallholders from having farm works. Few households have big enough land and that limits the availability of farm works (respondent 7, 14/09/2021). This may be because farm work is a common source of off farm income among the poor smallholders in this region. Therefore, smallholders worry about the future for the new generation.

7.3.2 Worries about the future of agriculture

The lives of future generation are jeopardised because of land scarcity. The results presented in chapter six stated that youth are not interested in agriculture because the capacity to find land is very low (FGD 1, 1/04/2021). This pushes farmers to

wonder what the future of agriculture and agrarian livelihood will be. Jayne et al. (2014:5) noticed that subdivision of land will prevent rural youth from entering the labor force, and again inheritance of land will almost be impossible for the coming population. It is even becoming evident that young people no longer expect to inherit land from their parents; because for example in Kenya a quarter of the youth start their family without receiving land from their parents (Yamano et al. 2009 *in* Jayne et al. 2014:5). The same situation exists in Ethiopia, whereby access to land has become almost impossible for young people who reach adulthood (Holden & Otsuka 2014: 94). If agriculture remains the source of livelihoods, land subdivisions between children could not continue because land sizes become smaller (Holden & Otsuka 2014: 93). One interviewee confirmed that after seeing that the land is small, he advised his sons to migrate and look for jobs in non-farm sector (respondent 13, 25/09/2021).

Bezu and Holden (2013) made an inquiry about youth behaviour vis a vis land scarcity in southern Ethiopia and discovered that rural out-migration has always been the quick response to lack of access to land for livelihood. Young people seem to be vulnerable in many ways because they do not receive inheritance but also their economic capital is still low in such a way that they could not buy more land. If land is not enough for the current population, and youth cannot access it this will necessarily trigger involvement in non-farm-based livelihoods. Unless the government puts measures to find employment for youth; rural outmigration and abandoning agriculture will increase in the future population.

7.3.3. Abandoned land fallows, affected productivity

The fragmentation of land is one of the things that cause farmers to cultivate land during all seasons. This overcultivation causes the depletion of organic matter and soil nutrients which affect the production of the crops. Due to the problem of land scarcity, there is no land fallows anymore (respondent 5, 25/05/2021). This means that smallholders need to always cultivate all available land in order to maximize the production. Informants confirmed that reduced land fallows have affected the fertility of their soil (respondent 5, 25/05/2021). Bugri's and Yeboah's (2017:38) research in Ghana argued that land scarcity is a barrier to productivity. They reported that the scarcity of arable land implicated fertility in a sense that it prevented farmers from doing crop rotation and land fallows which are traditional practices to maintain soil fertility without relying much on fertilisers.

While the results suggest that abandoned land fallows reduced soil fertility and lead to lower productions; Tittonell and Giller (2013) argue that the supply of adequate agricultural inputs would be enough to maintain soil productivity. Hence, they don't see any problem with continuous cultivation of plots. Nonetheless, Headey & Jayne (2014:3) argue that application of synthetic fertilisers for a long period of time can undermine the productive potential of the soil - which would be

another problem that hampering the improvement of productivity as stated by our informants. The following chapter discusses the responsive mechanisms that rural households use in order to survive.

7.4 Strategies to mitigate impacts of land scarcity

7.4.1 Farm and livestock rent as a strategy to mitigate land shortage and food insecurity

The results of this study suggest that there is relationship between food insecurity and land scarcity. Women in the group discussion, believe that large land holdings are a source of enough food to the households (FGD 2, 01/04/2021; FGD 3, 11/09/2021). Similarly, individual interviews claim that having big land equals to having capacity to nourish the family and sell agricultural production to the market (respondent 1, 25/05/2021; respondent 11, 16/10/2021). Therefore, poor smallholders who do not have enough land and do not have capacity to purchase new land, proceed by renting land to mitigate that shortage. Renting land has been an important strategy in helping people to grow various crops to complement food that is harvested from own farms. The same practice is found in Malawi and Zambia where people rent more land so as to expand their cropland (Chamberlin and Ricker-Gilbert 2016). Holden and Otsuka (2014) also confirmed the reallocation of land from land rich to land poor households through informal land rental markets, in Malawi and Uganda.

Renting livestock is also a common practice highlighted in this study. Renting small or big animal benefit both the renter and the lender. The owner of the livestock gets rid of the stress of grazing and taking care of the animal, but will share with the grower the results from those animals (respondent 10, 02/10/2021). On the other hand, the poor smallholder who receives the animal benefits from organic manure to fertilise the plot and at the same time obtains his or her own livestock throughout this process (FGD 3, 11/09/2021). The results showed that most rented animals are pigs, goats and cows.

Nonetheless, renting a farm is associated with a certain cost which might not be obtained by poorer households. To some extent, people with less wealth have difficulties to rent or buy more land. What should be noted here is that the owner of the resources before she/he decides to offer the animal or a farm to the neighbour must check if the tenant will be able to maintain it in good condition. Trust, integrity, and skills of the tenant are very important in this context. Hence, social capital and cultural capitals play a big role in convincing the rich to offer his/her asset to the neighbour(s).

7.4.2 Intensification as a strategy is impaired

From Boserupian analysis, many authors consider the intensification of land as an important step towards improving productivity in the situation of land scarcity paired with an increasing population. However, this strategy is highly demanding and unpractical in some instances. The results from this study showed that some people try to use intensification methods in order to increase the productivity of their land; but the efforts deployed did not produce expected outcomes (respondent 4, 25/05/2021; FGD 3, 11/09/2021). The government and NGOs often highlighted that they provide extension services, and agricultural inputs on subsidies to improve farm productivity (informant 2, 15/04/2021; informant 3, 16/10/2021; informant 4, 26/10/2021). But, individual interviews and group discussions, revealed that seeds and fertilisers are expensive and not affordable by smallholders (FGD 1, 1/04/2021; FGD 4, 11/09/2021). As long as households are very poor, the state still needs to invest a lot in order to establish conducive environment which allows the vulnerable to access extensions services. The results show that only four respondents out of 16 confirmed the use of inputs in recommended quantity in their fields. These included educated people and people who had more land. The research conducted in Ethiopia also showed that wealth and education are among the main factors that push smallholders to spend a lot on agricultural inputs (Headey, Dereje & Taffesse 2014:136). Some reasons for this could be that they have more resources that can help them to buy those inputs, or that they are more informed compared to other smallholders.

In some cases, intensification has contributed to the development of agriculture for people who can access inputs. However, there are very few of these people in this study area. Mellor (2014:71) argues that even in the case of Asia, where the Green Revolution has become prominent and produced successful results, poor farmers were still lagging behind the wealthy farmers. This confirms the role of economic and cultural capitals in the success of intensification. Nonetheless, one could not forget a profound influence of government institutions and policies on access to technology and infrastructures. The following highlights the role of financial resources.

7.4.3 Financial services

7.4.3.1 Financial Credits

Access to credits can boost productivity and improve household livelihoods. The results show that only two among 16 respondents have taken credits to improve household livelihoods (respondent 3, 25/05/2021; respondent 13, 17/10/2021). During an interview with a man from Kanyampongo, he explained how taking a loan from the bank helped him to build a house that can generate incomes for his household (respondent 3, 25/05/2021). All respondents confirm that having access

to credits is not easy for poor smallholders. Only wealthy people who have land and forests can take loans (FGD 1, 1/04/2021). Similarly, in Ethiopia land size is one of the main determinants of access to credits as people with big land have more access to credits than smallholders (Shiferaw, Geberemedhin and Legesse 2015:5).

It is possible that the main cause of not taking bank loan is the lack of collateral and fear of the entire process of applying for credits. As land tenure system in Rwanda allows people to use their land as collateral, this would be a motivation for people who want loans from the bank. However, as most of the respondents are poor and have small land areas, this would not allow them to access the money they need from the bank. Only people with relatively large lands can get a reasonable amount for their projects. Land as natural capital constitutes an important asset to apply for loans. Another important issue is that the confidence of smallholders to use credits and make profit is very low. A lady in Kanyampongo explained that the smallholders learn from what happened to others - where taking a loan would lead to losing small land when people are not able to pay the loan back (respondent 1, 25/05/2021). This is a behaviour that is acquired from their life experience. However, this behaviour could hinder diversification in the case that households do not have other sources of incomes to perform livelihood activities. Failure to work with banks and financial institutions make smallholders rely on informal credits. I discuss this in the following section.

7.4.3.2 Savings groups to improve livelihood and food security

A common strategy for smallholders to access financial resources in this study area, is by using saving groups. Borrowing money from saving groups has been an important strategy to improve farm productivity in some households, but also to have a source of money for solving household problems like purchasing food for example (FGD 1, 1/04/2021). This study revealed that the poor smallholders borrow a little money for solving basic needs in the household while for wealthy people saving groups have been a means to buy more lands, forests, livestock and run incomes activities (respondent 5, 25/05/2021; respondent 8, 14/09/2021; respondent 9, 02/10/2021). Odogola et al. (2004:52), reported the same role of saving associations in improving rural livelihoods in the districts of Mukono and Kumi in Uganda. The results of this study show that males and females join different saving groups and use their loans differently. Women participate in the groups that provide small loans and their loans are mostly used for food expenditures; while males use loans to invest in business, or to buy livestock and other assets. This may prove why informal credits are important in diversification or households' expenditures (Ellis 2000). Saving associations remain an important source of financial capital for both women and men, for both poor and the wealthy households in Kimina and Kanyampongo. These informal credits are more operational in this study area, because it is easier to obtain money from the group

than from the bank. This could explain how belonging to a saving group improves social capital (DFID, 1999; Ellis 2000) of households; and hence helps smallholders to improve their livelihoods.

7.4.4 Shifting labor to rural non-farm and off-farm activities

The non- agricultural sector has been an important source of incomes for people living in the Kanyampongo and Kimina Villages. Most smallholders work in farms owned by wealthy farmers, and do casual work (respondent 10, 2/10/2021). As Haggblade (2005) discussed, rural non-farm activities depend on push and pull factors. In this context the scarcity of arable land combined with limited incomes are the challenges that push people to look for more jobs outside of the agricultural sector. Jayne, Chamberlin & Headey (2014:7) found that in Mozambique and Kenya farm size and family size are important factors that push smallholders to do off and non- farm activities.

Rural dwellers will use labour to do non-farm activities to increase or compensate income that would normally come from agriculture. This explains how labour as a cultural capital becomes an important resource to earn a living. Nonetheless, households said that a lack of education affects their livelihoods (FGD 4, 11/09/2021). This may be due to the fact that educated people are more likely to obtain a formal job and improve livelihoods for their families than non-educated people. Research conducted in Indonesia showed that rural families that have more educated people are more likely to afford enough food and are less affected by small land size compared to poorly educated households (Liu & Yamauchi 2014). The results of this study showed that there is a shortage of jobs and women labourers are less paid than men (FGD 4,11/09/2021). This may result from the fact that a man is considered as having more physical power than a woman. However, a lack of casual work triggers migration in some households - and income from migration can be used to buy food, purchase land or forests and buy agricultural inputs to improve productivity. A lady from Kanyampongo, confirmed that the land they have is a result of remittances (respondent 1, 25/05/2021). Some households do small trades as a means of supporting livelihoods, but there is still a low number of people who were able to start their small business. The reason for limited non-farm incomes might be related to a lack of economic capital. Low incomes affect investment in other non-farm business.

Sustainable livelihoods framework describes the importance of off-farm incomes and non-farm incomes in the household livelihoods. Using many alternatives to have incomes is what most of the scholars call diversification (DFID 1999; Ellis, 2000). Hesselberg and Yaro (2006:46) conducted a study in Northern Ghana and they found that 54% of households are likely to do non-farm activities as diversification strategy during the dry periods. Nonetheless they discovered that 30% of households fail to do diversification from farming because of lack of capital,

low incomes or satisfaction of incomes they get from their main activities. This would partly reflect the situation of Kimina and Kanyampongo; because many households fail to diversify their incomes due to lack of capital.

7.4.5 Depletion of assets as a coping mechanism

Selling assets is an important strategy that rural household use to solve household needs, when people are vulnerable to risks. Livestock, forests and land resources are the main assets sold in adverse conditions (FGD 1, 01/04/2021). The decision to sell assets depends on the severity of the shocks, but most times smallholders start by selling less expensive assets. For example, from small to big livestock, from trees to forests and then to land. Holden & Otsuka (2014:94) suggests that depletion of assets always exists in rural household, but selling the land is the last decision.

7.4.5.1 Selling land as a last option.

Though many respondents confirmed land as an asset of production, but some of them considered it as a final product that could be sold to overcome shocks. All respondents see land shortage as a stress. Shocks like droughts, floods, and soil erosions affect production and cause hunger alongside a loss of incomes (FGD1, 1/04/2021). Land is a product that can be sold as a last option when times becomes tough. One respondent explained that his land has reduced because he used to sell it during hunger period (respondent 3, 25/05/2021). However, this could be connected to how rich people obtain land in this area. They purchase it from people who are constrained and want to solve emergent problem. Land buyers gain more than the sellers because smallholders are under stress, and do not have many options other than selling their land. However, it would be elusive to focus on the gap left by land sale and ignore the problems solved. Even though the bargaining power of people in need is threatened, this seems to be a win-win situation, as the sellers still gain income to help them make a living at least for a short period of time.

Holden & Otsuka (2014: 91) found that selling and buying land in Sub-Saharan Africa has allowed a reallocation of land from big landowners to landless households (Holden & Otsuka 2014: 91). This is contrary to what has been found in this study, where rich people increase their assets and the poor become more vulnerable. This may be due to high poverty and less incomes of poor households in this study area. From livelihoods approach, livestock, land, and forest - which actually are natural and physical capitals - can shift to financial capital instead during the hard situation of failure to meet household needs. More land, forest, and livestock that the household possess, more resiliency and capacity to withstand stress and overcome shocks.

8. Conclusions and recommendations

This concluding section summarises the key findings of this study. It includes the contributions to the body of knowledge and highlights the reasons for having conducted this research and hence provides recommendations for further studies and policy implications.

8.1 Summary of the key findings

This study aimed to scrutinize the impact that land scarcity has on rural household livelihoods and food security in the Rwandan villages of Kanyampongo and Kimina. It intended to understand how that situation of land scarcity affects rural households, and how households themselves construct livelihoods strategies to overcome the constraints associated with a scarcity of arable land. With an ethnographic approach, the study has been able to grasp the insights of smallholder farmers through their everyday experiences. This research has revealed a strong relationship between rural household livelihoods and land, because most of the rural dwellers live on agriculture-based livelihoods. This attaches a very big importance to household land, which is considered as an asset and at the same time a factor of production. The narratives provided in this study around land scarcity, revealed that acquisition to land is mostly by inheritance. Few people can acquire their land through land sales and land rentals. The most pertinent issue highlighted is that the subdivision of land, generation after generations has been the main cause of land scarcity in the Kimina and kanyampongo villages. The land has been divided between children until there is no more possibility to inherit land from parents, because even those who have inherited land, do not have enough to maintain their household livelihoods. However, rural households still confirm that land sales have played another role in land scarcity because some rich people bought land and planted forests which reduced arable land. There is also issue of land degradation and soil erosions that undermined soil fertility and pushed some households to abandon some fields because the maintenance of them was too expensive. This study recognises cultural capital and economic capital to play key roles in accessing agricultural land and being able to maintain acquired parcels.

Given this importance of land in rural households, this study highlights a strong connection between land scarcity and food insecurity in the study area. For

smallholders, land shortage had effects on food production and livelihoods in general. Attempting to understand the status of food security in this case study, the results found households to be severely food insecure. Most of smallholders consume food from their farms although those farms produce little food. Rural households are always worried about how to find enough food or earn enough money to help them to meet household needs. This is a complex situation because farms generate little food, yet farmers are willing to earn money from their production which is very low. In addition to this, there are not many non-farm jobs available in this region. Hunger is a reality in Kimina and Kanyampongo and the signs of malnutrition are observable in the community. Loss of weight and stunting among the children are very high because most informants reported that they only eat once a day and do not eat enough food. Food availability, access, utilisation and stability are under jeopardy. The findings have shown that the scarcity of land affects household food security and livelihood security.

After seeing that agriculture is not able to supply enough food and procure adequate livelihoods for the family members; smallholders try to do different activities ranging from farm works, casual labour and so on. As casual works are rarely available in this area, this pushes some family members to migrate. Remittances and all incomes of the households help people to buy food, inputs, land, forests and solve household needs. The combination of all these activities implies diversification of livelihoods, but it becomes evident that diversification of livelihoods requires having financial capitals. So, diversification is practiced more in households that have more assets or additional sources of incomes. The study highlighted a very big role played by saving groups in rural households, as they help people to buy inputs, food from the market, or invest in some trading activities.

Households in Kanyampongo and Kimina are more vulnerable to shocks and stress. Household assets constitute a pillar for coping with these shocks. Farmers can sell their livestock, forests and sometimes land in times of severe shocks. Natural capitals and physical capitals can easily shift to financial capital when needs arise. However, people with less assets are more vulnerable, and there is a considerable number of those households that lack resilience to shocks.

8.2 Limitations of the study

This research has some limitations related to time, resources, and field data collection. This study addresses the problem of land scarcity, but focuses only on the perceptions of rural dwellers. Therefore, there is no deep quantitative research to measure the impact or the loss brought by land scarcity in terms of food security and rural livelihoods. I think it can add more inputs if both quantitative and qualitative studies were done. Food security is a broad and complex concept. It has been not easy to measure household food security in this study, without addressing

the local and national availability of food. The focus of this study remained on access, utilisation, stability and availability of food at the household level. Another pertinent challenge throughout this study was field data collection. It has been difficult to collect empirical data, during the pandemic period. As a qualitative study, I would have preferred to do observation, but because of travel restrictions in place this could not be done. Interviews were instead conducted through Zoom, video calls, and Microsoft Teams. The lack of physical contact with the respondents or participants in the group discussion may have left some uncertainties, but the fact that every discussion was recorded, provided me with the opportunity to watch the discussions many times and to grasp the meanings assigned to the studied problem. Sometimes interruptions and interference because of poor network connection have affected data collection process; and took longer than expected, which would not have happened if I were physically present on the study site.

The sampling technique used, was non-probability sampling. Because of low mobility of surveyors due to the pandemic, I decided to work with local authority to select the respondents that have much information in the context of the study area and who could represent the entire population at least for group discussions. Throughout this study some respondents could not attend, and new informants had to be found. But in using the non-probability sampling technique, I had flexibility to look for another informant based on circumstances. This study expected to gain insights of people experiencing the life conditions in our study area but who also could provide information representing other villagers.

8.3 Recommendations and policy implication

This research revealed the serious problem of land scarcity. Small sizes of farms and the degradation of their soils threaten productivity and affect food security and incomes earnings of those studied in this project. It is therefore recommended that the Rwandan government invest in research to see what can help smallholders to improve productivity of small land plots and gain more returns from their investments. The key informants of this study stated that the state provides subsidised inputs, yet citizens complain that they still cannot afford those inputs. The government should then put more incentives to help farmers gain access to credits, improved seeds, fertilisers at more reasonable prices in order to increase the number of farmers who utilise agricultural inputs. Supporting smallholders with livestock, planting herbs and grasses that produce biomass, and training the community on composting would increase organic manure and hence improve soil fertility and crop production.

Due to the high level of poverty and inability of agriculture to secure household livelihoods in Kimina and Kanyampongo, there is a need to create more projects that provide non-farm employments to the smallholders in the region, to

accommodate their labour forces and reduce poverty and ameliorate the livelihoods of households in general.

Given the topography of Nyamagabe, along with reduced farm sizes, there is a need to increase land management practices on hillsides in order to protect the soil and increase cultivable lands. Land terracing would prevent soils from erosion and increase the farmlands. Strengthening agricultural extension and education of the farmers would also improve productivity of small lands.

The findings of this study show that, the youth of the two studied villages are not involved in agriculture because of land scarcity, which in turn pushes people to question the future of agriculture in Rwanda. The state needs to establish a system that involve young people in agriculture in order to prepare agriculture for tomorrow and create employments for young people, which may discourage rural out migration.

Problem of food insecurity is very high in this region. Equipping smallholders with the skills and practices of home gardening, and growing vegetables in the bags, would help to cope with the problem of land scarcity, food insecurity and household nutrition. Supporting communities with rainwater harvesting and promoting irrigation, would also increase the ability for households to withstand droughts and have crop production all seasons. Furthermore, subsidized food for poorer households, would reduce the severity of food insecurity among vulnerable groups.

8.4 Recommendations for further investigations

There is a need to study in detail the issue of food security in this area, to cover the status of all components of food security. A deep study could be done in the future and both quantitative and qualitative studies would be very important, to understand the dimensions of food security in the villages under study. It could also be important to expand this study to the regional or district level rather than only focusing on the local and household levels. A detailed study on land scarcity and how it affects all aspects of lives, would be useful. The thesis explored only the perceptions of experienced rural dwellers, and their understandings of the connection between land scarcity, food security and household livelihoods. There is a need for a deep quantitative study on how land scarcity affected food security and livelihoods throughout the rest of the district, and elsewhere in Rwanda. There are no studies on effects of land scarcity on food security in Rwanda, which would be important in order to have a more descriptive analysis on what and how much has been lost, and how it has affected the population as a whole, but households in particular.

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Venuste Rwabukambiza

Appendix 1: Interview guide/questionnaire

My name is Venuste Rwabukambiza, a student at Swedish University of Agricultural Sciences. I am doing research on land scarcity food security and household livelihoods in the villages of Kimina and Kanyampongo. Such a study could not be successful if households do not provide information about their life experiences. This is why you have been chosen for this research. However, participating in this study and providing any information is voluntary and your answers will be used confidentially. The results from your inputs will help to develop the recommendations that might be used by policy makers to improve household food security and livelihoods. If you feel comfortable you will help me to answer the following questions.

1. Questions for individual interviews

1.1 The composition of the households:

Name of a respondent.....

Gender: male.....female..... Age..... Education: illiterate.....
primary..... secondary.....university.....

Marital status: married..... single..... separated..... widow.....

The number of households members: males.....females.....

Parents.....Adults.....children.....

1.2. Land use:

-Do you have the land?.....yes..... no..... if yes

-How did you get it?: inherited.....bought.....other means.....

-What is the size of your land: $\leq 0.25\text{ha}$ $0.25\text{ha}-0.5\text{ha}$ $0.5\text{ha}-0.75$ $0.75\text{ha}-1\text{ha}$ $>1\text{ha}$

-How long have you been using this land?

-Do you think the land you have is enough to produce food and income for your household? Explain?

-When did you start experiencing land shortage in this region?

1.3. Land scarcity and food security:

-Do you think the harvest is enough to cover food need? explain

-Do you buy or get other food from the market or elsewhere? Explain where and which one:

-What is the importance of land in your households? What do you use it for?.....

- Do you think there is a problem of land scarcity in your household? Explain
- What are the causes of land scarcity in the region?
- What are Community Efforts to address Land Scarcity Problem in the region?
- How does land scarcity affect your household?
- How does land scarcity affect food security?
- Did you have to consume just a few foods because you ran out of money?
- Were you unable to offer your children/adolescents a healthy and varied diet because you did not have enough money?
- Did any of the children/adolescents not eat enough because there was not enough money to buy food?
- Did you or any adult in your household ever reduce the size of meals or skip meals because there was not enough money to buy food?
- Did you ever eat less than what you thought you should because there was not enough money to buy food?
- When do you feel your household is food secure?
- What are the causes of food insecurity at household level?
- What are the Periods for food insecurities:

1.4 Land scarcity and livelihoods:

- How does land scarcity affect your livelihoods?
- What are the challenges, shocks associated with land scarcity?
- What are the strategies you use to obtain enough food in the household?
- How do you make a living?
- What is the source of household income?

2. Questions for group discussions

- What is the connotation of land in rural household?
- What do you think about land scarcity and its implications in the household?
- How does land scarcity affect rural household livelihoods?
- What are households' strategies to cope with problems linked to land scarcity?
- What is the link between land scarcity and food security?
- What are the causes of food insecurity at household level?
- What is the period of year that is sensitive to food insecurity and why?
- What are household strategies to address the problems of food insecurity?
- What is the contribution of NGOs and the government to address the problems of land scarcity, food security and livelihoods?

3. Questions addressed to the NGO and government officials

- How do you see the problem of land scarcity and food security in the community?
- What are the causes of land scarcity?
- What are the causes of food insecurity?
- What is the role of NGOs and the state to improve rural household food security?
- What does the state do to reduce the impact of land scarcity to the poor households?

Thank you for your contribution!

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