



**COLLEGE OF ARTS AND SOCIAL SCIENCES (CASS)
CENTRE FOR CONFLICT MANAGEMENT (CCM)**

**AN EVALUATION OF THE EFFECTIVENESS OF AGRICULTURE
SUBSIDIES IN THE IMPROVEMENT OF FOOD SECURITY IN
RWANDA. STUDY: NYABIHU DISTRICT**

**DISSERTATION SUBMITTED IN PARTIAL FULFILLMENT OF THE
REQUIREMENT FOR THE AWARD OF A MASTERS' DEGREE OF ARTS
IN PEACE STUDIES AND CONFLICT TRANSFORMATION**

BY:

Egide HARELIMANA

REGISTRATION NUMBER: 221027824

SUPERVISOR: Dr Innocent NDAHIRIWE

Musanze, June 2021

AUTHORIZATION TO SUBMIT THE DISSERTATION FOR EVALUATION



UNIVERSITY of
RWANDA

COLLEGE OF ARTS AND SOCIAL SIENCE (CASS)

CENTER FOR CONFLICT MANAGEMENT (CCM)

AUTHORIZATION TO SUBMIT THE DISSERTATION FOR EVALUATION

I, undersigned Dr. Innocent Ndashirwe

Hereby testify that under my supervision

Mrs, Mis, Mr. Esde Harelimana

Has successfully completed writing her/ his MA Dissertation entitled

An Evaluation of the effectiveness of agriculture
subsidies in the improvement of food security
in Rwanda: Study of Nyatanga District

Therefore she/ he stands with my authorization to submit required copies to the
Administration of CCM for evaluation

Done at Huye

Date 08/06 /2021

Name and Signature of the Supervisor

Dr. Innocent Ndashirwe

EMAIL: ccm@ur.ac.rw

P.O. Box 56 Huye

WEBSITE: ur.ac.rw

AUTHORIZATION TO SUBMIT THE CORRECTED DISSERTATION



COLLEGE OF ARTS AND SOCIAL SCIENCE (CASS)

CENTER FOR CONFLICT MANAGEMENT (CCM)

AUTHORIZATION TO SUBMIT THE CORRECTED DISSERTATION

I, undersigned, DR. Ignace KABANO member of the panel of examiners of the dissertation done by Mr Egide HARELIMANA

Entitled:

AN EVALUATION OF THE EFFECTIVENESS OF AGRICULTURE SUBSIDIES IN THE IMPROVEMENT OF FOOD SECURITY IN RWANDA. STUDY: NYABIHU DISTRICT

Hereby testify that, he successfully entered the suggested corrections by the panel of examiners and stands with my authorization to submit required copies to the administration of the CCM for administrative purpose.

Done at: Musanze

Date: 21 /June/ 2021

Name and Signature of the Main Examiner,

A handwritten signature in black ink, appearing to read 'Ignace Kabano'.

Dr. Ignace KABANO

EMAIL: ccm@ur.ac.rw

P.O. Box 56 Huye

WEBSITE: ur.ac.rw

DECLARATION

I Egide HARELIMANA, do hereby declare that this research work titled “An evaluation of the effectiveness of agriculture subsidies in the improvement of food security in Rwanda, a study of Nyabihu District” is my original work and has not been submitted by any other person for academic award in any other Institution of Higher learning, college or University

Signed.....

Date.....

ACKNOWLEDGEMENTS

This is a document which received its present form as a result of several people's savings in a variety of dimensions. In particular, I would like to point out to the following people:

First of all, I would like to express my gratitude to my academic supervisor, Dr. Innocent Ndahiriwe. Thank you for this, you have useful insightful and fatherly guidance that you gave to me, which eventually formed the present article.

Secondly, I would like to highlight the partnership and the sacrifices that were made by humans in Nyabihu of their precious time to provide me with the information I need in order to complete this task. Thank you so much.

Finally, I wish to express my gratitude to my family, my wife, and my children, who has sacrificed so much to see me through my carrier and studies. I am forever in your debt. Thank you so much.

DEDICATION

I dedicate to my entire family, who have and continue to be supportive of me in my pursuit of my dreams, a journey that has been long and tedious for us all. As a wife, children's having to be away from my family was hard for us all but we endured the long months as a family. I thank you all for the sacrifices.

ACRONYMS

AIDS	Acquired immunodeficiency syndrome
APTC	Agro-Processing Trust Corporation
AU	African Union
CFSVA	Comprehensive Food Security and Vulnerability Analysis
CIP	Crop Intensification Program
DAP	Di-Ammonium Phosphate
EDPRS	Economic Development and Poverty Reduction Strategy
EU	European Union
FAO	Food and Agriculture Organization
GDI	Gender-related Development Index
GDP	Gross Domestic Product
GoR	Government of Rwanda
Ha	Hectare
HDI	Human Development Index
IFAD	International Fund for Agricultural Development
IFDC	International Fertilizer Development Center
Kg	Kilogram
MINAGRI	Ministry Of Agriculture and Animal Resources
MOPA	Mobile Ordering Process Application
NAP	National Agriculture Policy

NPK	Nitrogen, Phosphate and Potash
OAF	One Acre Fund
PhD	Philosophae Doctor
PRS	Poverty Reduction Strategy
PSTA	Strategic Plan for Agriculture Transformation
RAB	Rwanda Agriculture Board
RADA	Rwanda Agriculture Development Authority
REMA	Rwanda Environmental Management Authority
RISDP	The Regional Indicative Strategic Development Plan
SADC	Southern African Development Community
SDFDS	Strategy for Developing Fertilizer Distribution Systems
SNS	Smart Nkunganire System
UR	University of Rwanda
USAID	United States Agency for International Development
WFP	World Food Program
WHO	World Health Organization
WTO	World Trade Organization

TABLE OF CONTENTS

AUTHORIZATION TO SUBMIT THE DISSERTATION FOR EVALUATION	i
AUTHORIZATION TO SUBMIT THE CORRECTED DISSERTATION	ii
DECLARATION	iii
ACKNOWLEDGEMENTS.....	iv
DEDICATION	v
ACRONYMS.....	vi
TABLE OF CONTENTS.....	viii
LIST OF TABLES.....	xii
LIST OF FIGURES	xiii
ABSTRACT.....	xiv
CHAPTER ONE: GENERAL INTRODUCTION	1
1.1. Introduction.....	1
1.2. Background	6
1.3. Statement of the problem	9
1.4. Objectives	10
1.4.1. General objective	10
1.4.2. Specific objectives	10
1.4.3. Research questions.....	10
1.4.4. Significance of the study.....	10
1.4.5. Research delimitation.....	11
CHAPTER TWO: LITERATURE REVIEW.....	12

2.1. Introduction.....	12
2.2. Definition and overview of agriculture subsidies	12
2.3. Definition and overview of food security	13
2.3.1. Household food security in Rwanda	15
2.3.2. Geographical location of food insecure households in Rwanda.....	15
2.3.3. Food availability in Rwanda	16
2.4. Theory of behavioral model.....	16
2.5. Empirical studies of agriculture subsidies in the improvement of food security.....	17
2.5.1. Gender, food security and use of subsidized input	17
2.5.3. Marital status and food security.....	20
2.5.4. Education and food security for peace resilient.....	21
2.5.5. Household size and food security	22
2.6. Factors determining the access to subsidies.....	23
2.7. Access for the most vulnerable groups	24
2.8. The impact of management of agriculture inputs and supplies on food security	25
CHAPTER THREE: RESEARCH METHODOLOGY	26
3.1. Introduction.....	26
3.2. Study area.....	26
3.2 Research model.....	28
3.3. Research design	28
3.4. Population of the study	29
3.5. Sample size and techniques	29

3.6. Data collection method and source	31
3.7. Data Analysis	32
3.8. Validity and Reliability of Research Instrument	32
3.9. Research ethics.....	32
CHAPTER FOUR: RESULTS AND DISCUSSION.....	33
4.1. Introduction.....	33
4.2. Comparison between yield of production before and after agriculture subsidies provision	34
4.3. The people’s attitudes regarding the use of agriculture subsidies in Nyabihu district	35
4.4. Type of subsidies provided and used by respondents.....	41
4.5. Analysis of relationship between factors and improvement of food security in Rwanda/ Nyabihu district	42
4.5.1. Relationship between gender of people and the yield production after using agriculture subsidies.....	42
4.5.2. Relationship between education level of people and yield production after using subsidies.....	43
4.5.3. Relationship between age and yield production after using agriculture subsidies .	45
4.5.4. Relationship between marital status and yield production after using agriculture subsidies.....	47
4.5.5. Relationship between number of family members and yield production after using agriculture subsidies.....	48
4.5.6. Relationship between received subsidies and yield production after using agriculture subsidies.....	49

4.5.7. Relationship between employment status and Yield production after using agriculture subsidies.....	51
CHAPTER FIVE: CONCLUSION AND RECOMMENDATIONS	59
5.1. Conclusion	59
5.2. Recommendations.....	60
BIBLIOGRAPHY	61
APPENDICES	70

LIST OF TABLES

Table 1: Sampling procedure	30
Table 2: Comparison between yield of production before and after agriculture subsidies provision	34
Table 3: People with different demographic socioeconomic characteristics using the agriculture subsidies in Nyabihu district.....	36
Table 4: Attitudes regarding subsidies distribution policy	38
Table 5: Attitudes of people regarding factors affecting the food security	40
Table 6: Type of subsidies provided and received by respondents	42
Table 7: Relationship between gender of people and the yield production after using agriculture subsidies.....	43
Table 8: Relationship between education level of people and yield production after using subsidies	44
Table 9: Relationship between age and yield production after using agriculture subsidies	46
Table 10: Relationship between marital status and yield production after using agriculture subsidies	47
Table 11: Relationship between number of family members and yield production after using agriculture subsidies	48
Table 12: Relationship between received subsidies and yield production after using agriculture subsidies.....	50
Table 13: Relationship between employment status and Yield production after using agriculture subsidies.....	52
Table 14: Logistic regression for food security improvement.....	56

LIST OF FIGURES

Figure 1: Conceptual Framework	28
--------------------------------------	----

ABSTRACT

The food insecurity is the most powerful source of many different problems and conflict in the greater part of the world and Africa especially the sub-Saharan region is where these problems are based nowadays. Also, in Rwanda the traces of food insecurity are remarkable like there is a number of people who are still under poverty conditions, there are still malnutrition cases, stunted growth in children and the like. The Rwandan government is constantly striving to find programs and strategies to deal with and mitigate all of these problems, and the most important program is to upgrade Rwandan agricultural production through various strategies, one of which is the provision of agriculture subsidies to people. This is due to the fact that agriculture employs more than 70% of Rwanda's population. And it is at this point that this research (an evaluation of the effectiveness of agricultural subsidies in improving food security in Rwanda) was carried out in Nyabihu District, one of Rwanda's agricultural regions. This research was carried out in Nyabihu district one of seven district of western province, using a questionnaire and interview, the sample was composed of 100 respondents that are beneficiaries of agricultural subsidies in the said district. The data analysis was done using excel spread sheet and SPSS version 23.

The findings revealed that in Nyabihu District, people use subsidies at various levels based on demographic socioeconomic characteristics (age, gender, marital status, employment status, education level, and household size) as well as their attitudes toward the provision and use of subsidies. In the findings of this research, the people involved in the use of subsidies 63% were males, 90% were above 30 years, 88% were married, 53% had primary level, 85% were farmers and 69% had above 3 family members. But surprisingly by using the Chi square analysis only marital status, employment status and the kind of used subsidies showed a statistical relation to the improvement of food security. Not only from this aspect but also people involved in using subsidies in Nyabihu District strongly agree with the programs, distribution policy of subsidies in the line of improvement their food security and also they are being aware of other factors affecting their agriculture production later on their food security. This research after using logistic

regression showed that marital status, employment status, and the attitudes upon the subsidies presented a positive statistical influence to the improvement of agriculture production and the improvement of food security in Nyabihu District which can be inferred the whole country, Rwanda.

Key words:

Rwanda agriculture subsidies, Food security.

CHAPTER ONE: GENERAL INTRODUCTION

1.1. Introduction

Globally, achieving food security remains a difficult task, not only in developing countries but also in developed countries. The severity of the vision problem varies, as do the demographics of the affected population. In developed countries, this problem is addressed through targeted measures to ensure food safety, such as food aid in the form of food assistance, direct or indirect subsidies for food production. This is due, in large part, to the region's lack of food security. Self-sufficiency has long been a major goal for agricultural and rural development in developing countries (Agboola, P. B., 2004; Fan, S., Gulati, A., and S. Thorat, 2007; FAO, 2006, 2008a, 2015,2017; the World Food Programme, 2020). Food security is defined as "a situation in which all people have physical, social, and economic access to sufficient, safe, and nutritious food to meet their dietary needs and preferences for an active and healthy lifestyle at all times." The combination of food, nutrition, availability, and bio-assisted nutrition, as well as the stability of all of it, is defined in this definition. Please keep in mind that food security is generally defined in terms of food, and thus is subject to the majority of definitions and causes. Food can be used to analyze units of various conceptual levels, such as regions, states, households, and individuals, and much of the research on this subject has focused on the macro-level.

It is well known that the major concern of food security in the absence of a common supply, attention deficit, food safety, the site has grown from a global and national perspective, the perspective of households and individuals, despite the fact that the food security of individuals, is often the focus is on the safety of food, but it is an event in the state, the family, and not in every single household. So, to all the people, the families of the lack of food or the experience of hunger, lack of food. All over the world, with 108 million people in 2016 were reported to have been experiencing a food crisis, or the poor state of health (FAO, 2017; World Food Programme, 2018). In 2017, there were almost 124 million people in 51 countries, and are living in a time of crisis, nature, or of the poor, the provision of food (world food PROGRAMME, 2006, 2009, 2018). In the five African countries each year, and nearly 32 million people off of food

insecurity, and the urgent action that is needed. In addition, Omotesho *et al.*, 2006; GOM and World Bank, 2007; Jacobs, P., 2009), it is indicated that the many of people from around the world, especially in developing countries, it does not have enough nutrients to meet their basic nutritional needs. Despite the fact that food prices have risen significantly as a result of limited access to food, a lack of household income and income to feed, volatility in supply and demand, and natural and man-made disasters caused by humans, it prevents the satisfaction of basic food needs. The challenges of hunger and food insecurity are global in scope, and are likely to worsen in some regions unless urgent, determined, and concerted action is taken in response to the world's expected population growth and the strain on natural resources. Save the developing world from hunger, which means providing enough food for the population, will continue to be a major challenge for policymakers in many developing countries in the coming years (T. Jayne, F. C. Yeboah, and J. Henry, 2018). According to Maxwell and Wiebe (1998), food security is a state that provides safe and sustainable access to adequate food for an active and healthy lifestyle. At the moment, the synthesis of these terms draws attention to what is available and is being used in the context of international organization projects. As a result, developing strategies, policies, and actions to improve food security necessitates an understanding of each of these factors, their interactions, and the significance of the outcomes.

Makwarela, M., Magolela, Japhata.E., (2009); Osundare, F. (1999) argued that the emphasis on food security ensures that the basic needs of the poorest and most vulnerable groups are ignored in policymaking. This is because one of the most important requirements for a population to be healthy and well-fed is food security. The ability of people to feed is one of the most important aspects of a nation's well-being. Food safety, in this context, is an important factor in the context of the processing to preserve the wealth of nations. Because it is a well-known fact that in much of tropical Africa, are suffering from malnutrition and food, as every year, the increase in food production will fail to cope with the increasing needs, which is associated with higher rates of population growth, enough food to eat in order to alleviate the famine, and the creation and maintenance of a healthy body is a necessary requirement in order to achieve a better standard of living and increasing expectations in an environment of economic growth and political independence (Olayide S.O., 1982; Ofgren, H., and Richards, A., 2003). The main reason is a lack of food security in the developing world; as a result of poverty, it is impossible for people to

obtain food. While the rest of the world has made significant progress in combating poverty, particularly in Sub-Saharan Africa, it remains. Forecasts indicate that if preventive measures are not implemented, this trend will deteriorate many of the factors contributing to these trends, including the civil war, instability, and poor management, recurring drought and famine, and of the agricultural, depending on the climate and the environment. Food security on the continent has deteriorated since the 1970s, and the proportion of the undernourished population in Sub-Saharan Africa has hovered between 33 and 35 percent. More than 77 percent of Africa's rural poor population lives in rural areas. Surprisingly, the majority (50%) of the population is made up of small-scale farmers who produce more than 90% of the food. The rest of the population is not fed; it is made up of poor, landless people in rural areas (30 percent) and poor people in urban areas. Agriculture accounts for approximately 9% of GDP and more than half of total employment in the developing world.

In countries where more than 34% of the population is malnourished and agriculture accounts for 30% of GDP, it is possible to say that nearly 70% of the population is dependent on agriculture for a living. This is a historical fact that can be used to support the argument that developing countries must deal with the production of technological investment. Given that 70% of the poor already live in rural areas, which have the highest proportion of people suffering from food scarcity, it is clear that we have significantly low levels of food security, even without changing the living conditions in these areas (Rosegrant et al., 2005; Yawson, D. On-Armah, F. A, and Afrifa, E. K., 2010). The most important aspect of this is a lie is that it will improve the efficiency of small-scale farmers, the environment, agriculture, and open up employment opportunities in rural areas. The goal of this study is to shed light on the challenges of achieving food security in Africa while also providing an alternative solution to this problem that would allow it not only to reduce poverty but also to create wealth. And the purpose of this document is to demonstrate that efforts are being made to reduce the problem of food insecurity in rural areas, and that efforts are being made to resolve the problem to be with a crying out of the city for the poor (Pinstrup-Adereesen, P. 2002).

In Africa, the Abuja Declaration by the African Union, the food security summit in 2006, which is considered to be "in the efforts and the progress that has been made in many African countries, the growth rate of the agriculture sector, and the reduction of food and food security, and the adoption of the 15 commitments of aid in the agricultural sector, including:-as part of agriculture, which is making good progress within and across Africa," is to encourage investment in the public sector, in agriculture, and the creation of programmatic and technical assistance to the agriculture and food security (AU, 2006). At the sub-regional level, the Southern African Development Community (SADC) emphasizes rural areas in the development of their food security agenda. The Regional Indicative Strategic Development Plan (RISRD) of the SADC is required to build the capacity of food security and early-warning systems. RISDP to realize that poverty is widespread and grows in many of the countries in the region, with 26% of children under five years of age, that go to bed hungry. The losses that have occurred over the last decade, the Human Development Index (HDI) is included as a reduction of the average life expectancy of adults under 50 years of age, in which to a large extent, reflects the rise in the death rate from AIDS. In addition, this is much less than the differences between the sexes, it is also to be taken into account in the course of human evolution, with the assistance of the Gender Development Index (GDI). This RISDP is a gender-sensitive index was 0.536 at the beginning of the 1990s, and in the end reduced by 0.87% compared with the beginning of the 1990s. It is also to be noted that an estimated 14 million people live without food for their households (SADC, 2003).

In Rwanda the majority of food consumption comes from agriculture. Food sustainability is envisioned as an ongoing process of identifying and striking a balance between agriculture's social, economic and environmental objectives, and between agriculture and other sectors of the economy (FAO, 2014). The Government of Rwanda envisions that this will be possible if small scale farmers are supported with crucial tools and seeds, while expanding irrigation and supporting environmentally sustainable production methods to tackle the endemic problems of soil erosion in the country. Food and nutrition security improved in Rwanda and most parts of Rwanda are witnessing the improvement. Rwanda has committed at least 10% of its national budget to agriculture and this almost doubled agriculture production between 2000 and 2012 (CFSVA, 2015). The food insecure households in Rwanda, are typically in rural areas and they are dependent on daily agricultural labor, agriculture or external support for their livelihoods

(CFSVA, 2015). By comparison with food secure households, food insecure households working in agriculture have less livestock, less agricultural land, grow fewer crops, are less likely to have a vegetable garden, have lower food stocks and consume more of their own production at home (CFSVA, 2015). High percentages of households with unacceptable food consumption are especially located in the rural areas of Western Province bordering Lake Kivu (42%) and alongside the Congo Nile Crest and in several other districts of Southern Rwanda.

As for Rwanda, which, since 2000, the implementation of the "Vision 2020" has started, and the government, in opposition to the policies and reforms aimed at transforming agriculture to the level of the subsistence minimum and up to date, and is for a more industrial and market-oriented agriculture. The changes in agricultural policy and the implementation of reforms in the country, of work, decreased productivity, and non-crop production, improved distribution of food products, investments, new product, which is able to generate more income, and to facilitate households ' access to food at affordable prices. In spite of this, the statistics on the food security shows that 70 per cent of all households in Rwanda are still dependent on agriculture, with 41 per cent and 87 per cent of the households living in urban and rural areas, respectively, is dependent on the agricultural sector. Roughly speaking, this is the degree of the government's commitment to playing its role as an incentive to improve efficiency in the non-oil sector, agriculture, and subsidies, because there is strong evidence that successful agricultural transformation requires a strong partnership between public and private sector stakeholders (MINAGRI, 2019).

In the context of Nyabihu, is densely populated which makes their soil more fragmented and therefore impeding the agricultural production and their food and nutrition security in general. The rate of malnutrition of children under 5years is also high (51%) with high rate of stunting children (Ibid, 2015). However, the asymmetries in acquiring and impeding factors to accessing to agricultural subsidies and their impacts (Size land, education, age of farmer, economic activity) are not well known. The reason for this is that in this study, an attempt was made to assess the effectiveness of these programs, grants, subsidies, and agricultural provision to improve food security.

1.2. Background

Some of the countries have increased the use of agricultural expenditure, the contribution of the programme, as part of their policy. It would seem that, for their contributions, and to give a successful "green revolution" in Asia, in agriculture, the contribution has had a significant impact on food security and the eradication of poverty, to the billions of people in Asia, and, through them, to the impact of the global supply of food, and to the products and prices from all over the world (World Bank, 2009; Dorward, A. and Morrison, J.,2015).

According to Garrone *et al.* (2019), subsidies increase labor productivity in the agricultural sector, but this is a cumulative effect that masks a significant degree of heterogeneity, the effects of different types of subsidies. Referring to Spittler *et al.* (2011), a massive infusion of dollar contributions has changed the face of America's food industry, to the point where fast food, red meat, soft drinks, and saturated fat as foods have become significantly cheaper, while healthier options such as fruits and vegetables have become significantly more expensive.

Schmitz (2006) argues that the agricultural subsidies in the United States and the European Union were in the midst of WTO negotiations at the end of 2005. The WTO provides a forum for demonstrating how subsidies affect production rates and trade patterns. The subsidies in the United States, low-cost corn brings the benefits to the consumer, each and every one of these products, which are derived from the corn (for example, the cow, or calf). In addition, in Canada, the newly-dumping measures against the United States of America, in order to provide low-cost Canadian corn, highlighting the difficulty of the effect.

In 2014, African leaders identified targets in the Malaba Agreement to improve agricultural productivity, reduce food security, development, and trade. In Africa, fertilizer subsidies are important tools for increasing agricultural productivity in the long run (Grow Africa, 2012). Smale and Jayne (2009), in Zimbabwe, Zambia, Kenya, Malawi, Arene, C. J.& Anyaeji, J., (2010) in Nigeria; Abo, T., and Kuma, B. (2015) in Ethiopia, and the inclusion of the contribution of the system in order to provide the agricultural industry is one of initial success, increasing productivity, but for a variety of political and economic factors, including ineffective programs and the refusal of aid from donors) were not able to retain what is fiscal policy,

investment, and the market system is necessary in order to achieve a sustainable competitive advantage. Agriculture is the main economic activity of Rwanda, where about 70% of the population is directly employed in this sector, and about 72 per cent of the working population is engaged in agriculture (WHO, 2020).

In Rwanda, the national agricultural policy recognizes agriculture as a shared opportunity and responsibility, which requires the concerted action of a variety of state and non-state actors. As part of this policy, the time and the true model, the family-oriented farms, to encourage the expansion of the farmer's co-operatives and the development of the agri-food economy led by the private sector (MINAGRI, 2017). According to the Ministry of Agriculture (MINAGRI), as Rwanda's population grows (2.6 percent in 2018), so does the demand for more food, better nutrition, and increased resilience. Since 2007, Crop Intensification Program (CIP) activities included bulk buying of inputs by the Government of Rwanda (GOR), training of district and sector extension agents who provide farmer interface as a result of decentralization policy in improved production practices and the use of improved inputs, and the subsidized provision of inputs (with subsidy rates reduced in a stair step manner each year) and credit for input purchase. (MINAGRI, 2018).

The agricultural subsidies is defined as 'payments by the government to individual people or organizations (or reduce the payment from them) in order to compensate for agricultural costs, or to increase or decrease the prices of agricultural products, it is said to be in the public interest. In Rwanda, the agriculture inputs subsidy program known as Nkuganire has been reinforced in 2018 by a digitalized tool/Database known as Smart Nkunganire System that link and empowers stakeholders involved in the subsidy program. It was initiated in order to provide better management of government subsidy to farmers in fertilizers and seeds based on its key impact on agriculture productivity in line with the attainment of the vision of the National Agriculture Policy. This new system will make it possible for the farmers to seek advice from experts on best practices, as well as to a warning or a general notice to a variety of stakeholders. It was also intended to greatly increase the efficiency, productivity, transparency, and take away the message of the gaps in the agricultural subsidy program, as well as contributing to a significant increase in the financial assets of the non-cash transactions in the agriculture and the reduction of the gap between men and women (Fisher,M.,Kandiwa,V.,2014; RATIN, 2018). Nyabihu

District, the area of this research, is one of the beneficiaries of this program with 60,329 farmers registered in Nkunganire Smart System (Smart Nkunganire Scoring System, 2021). This District is one of the country's top producers of irish potatoes, maize, wheat, fruit and vegetables, for more voluminous and others crop.

Rwanda's National Agricultural revealed a country with a food supply, healthy eating, sustainable agriculture, and growth in a productive, green, and market-oriented agricultural sector (MINAGRI, 2018). Food safety is a state of affairs in which all people have physical, social, and economic access to adequate and safe food preparation that meets the needs of the food as well as the benefits of an active and healthy lifestyle at all times (World Food Summit, 1996, WHO, 2020). In the latter, an estimated 9.7 percent of the world's population (less than 750 million) is at risk of food insecurity by the start of 2019, while 16 percent of the world's population, or more than 1.25 billion people, and were experienced food insecurity on a regular basis. Despite the fact that it has the greatest overall food supply. In 2019, more than nine out of ten stunted children lived in Africa, accounting for 40% of all children in need worldwide (FAO et al.,2020).

National Institute of Statistics of Rwanda (NISR, 2015) quantified that while stunting and undernourishment have been reducing at a steady pace, overall stunting rates remained high by international comparison 38%, and 17.8 per cent of 6-23 month-olds do not meet the Minimum Acceptable Diet. Nyabihu is one among Districts with the highest stunting rate considering children under 5 years of age. Rwanda's Strategic Plan for Agriculture Transformation 2018-2024 (PSTA 4) envisioning a transformation of agriculture from a subsistence sector to a knowledge-based value creating sector, that contributes to the national economy and ensures food and nutrition security. It adopted a food schemes approach for enhancing nutrition and household food security and proposes approaches and interventions to ensure the nutrient quality of commodities is preserved or enhanced throughout the entire value chain. In addition, resilience and risk mitigation strategies continue to be developed, particularly at the household level and PSTA4 puts private sector development at the forefront of this process (MINAGRI, 2019).

1.3. Statement of the problem

The availability of agricultural subsidies is a serious problem for farmers during the planting season (they need them, as well as other agricultural resources, as well as off-farm income, as the previous season's food comes to an end), and a limited ability to borrow at a very high cost. To address these challenges the Government of Rwanda has adopted the agricultural subsidies policy known as Nkunganire which facilitates farmers' accessibility to acquired fertilizers, improved seeds and other agriculture inputs. Later, for better management, Smart Nkunganire (SNS), which is a supply chain management system to digitalize the end to end value chain of the Agro-Input Subsidy program to enhance access to agriculture inputs, has been putted in place. From this new system, built by Rwanda Agriculture Board (RAB) in collaboration with BK TecHouse, the farmers are able to receive advisory messages from experts on best practice, as well as warnings or general notification from different stakeholders. The platform is accessible to farmers and other stakeholders via a Mobile App, Unstructured Supplementary Standard Data (USSD) Short Code, and Web-Based App. To access the system the farmers can register on Smart Nkunganire System by dialing *774# and follow instructions. Web users can also register or get more information by visiting www.smartnkunganire.rw. The technicians, field staff, district & sector agronomists and farmer promoters countrywide have been trained on the use of the new system. It was expected that to have a significantly increase efficiency, productivity, transparency, productivity and bridges communication gaps within the Agro-Input subsidy program to ensuring food security for Rwandans. Also, it may plays a remarkably raise financial inclusion, cashless transactions and green economy in the agriculture sector (FAO, 2015; Ndakaza et al.,2016; MINAGRI, 2018). During the policy execution some issues were identified such as many farmers who do not know how to register in smart Nkunganire (to request for agriculture inputs by phone) to receive agricultural inputs; farmers with no land titles who therefore cannot benefit from requesting agricultural inputs; maize disease, few pumps and phytosanitary products that are not available at agro dealers' shops.

Since 2007 the Government of Rwanda invests heavily in the provision of agricultural subsidies as a way of making the citizens more food secure, however, the effectiveness of this initiative on food security is not very much known, while also frauds has been detected during its implementation. Food security and nutrition continue to be issues, particularly when considering

household vulnerability to shocks (PSTA 4). For example, in Nyabihu District there was noticed a high rate of stunting, particularly among children under the age of five, despite the fact that this District is one of the potential implementers of Smart Nkunganire in collaboration with its development stakeholders. Without much knowing the effectiveness of this initiative, policymakers may develop rash policies that impede the goal of resolving food security issues. Therefore, a research on the effectiveness of agricultural subsidies particularly Nkunganire program in the improvement of food security is vital for better forthcoming household food security planning toward the improving the status of food security in Rwanda.

1.4. Objectives

1.4.1. General objective

The main objective of this research is to evaluate the effectiveness of agriculture subsidies in the improvement of food security in Rwanda, study of Nyabihu District.

1.4.2. Specific objectives

- i. To evaluate how access to acquired fertilizers and improved seeds help in improving food security for Nyabihu District.
- ii. To assess how management of agriculture inputs and supplies affects food security in Nyabihu District.

1.4.3. Research questions

To achieve the above objectives, study sought answers to the following specific questions:

- i. How do access to acquired fertilizers and improved seeds improve food security in Nyabihu District?
- ii. How has management of agriculture inputs and supplies improved food security in Nyabihu District?

1.4.4. Significance of the study

It is expected that the findings of this study will contribute in policy and program design that addresses food insecurity in Rwanda.

Additionally, this study is significant because it will be suggested ways that need to be implemented and changes that need to be made if there is any in order to mitigate food insecurity in Rwanda. Furthermore, this study will contribute to the existing body of knowledge regarding the impact of agriculture subsidies on food security. Other researchers could draw inspiration from the results of this research to conduct other research in this area.

1.4.5. Research delimitation

This research has been conducted in Nyabihu District, Western Province of Rwanda. Nyabihu District is chosen to be the area of this research because countrywide the big number of farmers are located there, it is one of the country's top producers of Irish potatoes, maize, wheat, voluminous, vegetables, fruits and other crops; it is also known as one of the districts with the highest rate of malnutrition. In terms of content, the research focus on the effectiveness of agriculture subsidies on food security.

CHAPTER TWO: LITERATURE REVIEW

2.1. Introduction

This chapter examines relevant literature on the subject under consideration. Unambiguously, this chapter covers definition and overview of agriculture subsidies in Rwanda, definition and overview of food security, theoretical framework, nexus between agriculture subsidies and food security, the impact of management of agriculture inputs and supplies on food security and finally chapter concluding explanations.

2.2. Definition and overview of agriculture subsidies

According to McCulloch *et al.* (2001); Meyer (2011); Goodwin, Barry, K., Mishra & Ortalo, F., (2005) and World Bank (2007), agricultural subsidies are "payments made by governments to (or reductions in payments made by private) individuals or organizations to offset agricultural costs or raise or lower agricultural prices in the stated favor of the public interest." (For example, overcoming a market failure, increasing productivity, and/or allocating resources to a specific economic, social, or political group). However, they argue that the input of agriculture has been one of the dark side of the page. This stems from developed-economy subsidies that reduce the earnings and welfare of poor producers and societies in low-income countries (cotton subsidies have been perhaps the clearest example). The globalists and opportunists in underdeveloped countries can exploit subsidies to steal government resources through rents and other forms of diversion (Morris, M., Kelly, V.A., Kopicki, R., Bayerlee, D., 2007; Chirwa, T. G. 2010).

They emphasized that even well-intended programs can be counter-productive if implemented, but they are necessary for the initial and additional investment and thus inefficient, ineffective, and wasteful of means. This could also happen if successful subsidies are kept, and even enhanced, after their usefulness has ended. However, as a result of this, both the refusal to pay the subsidies and the failure to comply with them may take time. In the next 50 years, this could become a more pressing issue, as present poverty and food insecurity issues are aggravated by rapidly rising food consumption and increasing dangers to food supply. Food production and the

increased use of subsidies, both in rich and developing nations, may be crucial to guaranteeing food security and poverty reduction in the long run (Gregory, I.,2006; Kelly, V.,&Crawford, E.,2010; Morrison, A., 2015). The new use of subventions, production of food, both It could be crucial in both developed and underdeveloped countries to ensuring the sustainability of food security and poverty reduction (Gregory,I.,2006; Kelly,V.,&Crawford,E.,2010; Dorward, A, Morrison, 2015). Rwibasira (2018) also stated that farmers received subsidies to purchase imported fertilizers. The fertilizer, which can be imported with the Rwandan government appointing a representative, will be transferred to distributors at district base, traders at the sector level, thereafter to the producers. According to the agreement, the government will contribute for both macro and micronutrients at different rate: 15%, 30% and 35% for NPK, Urea and DAP respectively whereas other inputs (micro-nutrients and seeds), the government support is ranged from 18% to 85% in "Smart Nkunganire System".

Conferring to the International Alert – Rwanda and Pro-Femmes/Twese Hamwe (2018). The farmers participating in the planning of agricultural production objectives of the Imihigo is limited to the planning, which includes the choice of crops to be planted, area, priority species of plants, seeds and fertilizers) under the nkunganire programs, there are other limited involvement of different sectors, such as erosion control, irrigation, mechanization, and agroforestry. This study did not take into consideration the new system ‘Smart Nkunganire’.

2.3. Definition and overview of food security

According to Argus (2017), food security is defined as the extent to which food is available and accessible to individuals. It specifies how simple it is to obtain food. According to Argus (2017), there are three components of food security: food accessibility, food availability, and food use and utilization. Food availability is determined by crop production, efficient use of resources such as water and land, physical stocks of food, and trade. People use various means to obtain food for a nutritious diet, which is referred to as food accessibility. People's levels of income, market prices for food, infrastructure, food distribution within households, and gender all influence food accessibility. Food use and utilization are socioeconomic aspects of household food and nutrition security that are primarily influenced by knowledge and habits (Pasquale De

Mura&Burchi,F.,2007;Kelly,V.A.,Boughton,D.,Lenski,N.,2010;Akinloye,O.,Putuma,M.,&Adey efa,S.A.,2016).

Food and nutrition knowledge, food preparation and food habits, cultural traditions, health, hygiene, and treatment options available are all factors that influence food consumption and utilization. As a result, based on the Argus (2017) exposure to, and definition of food security, it is possible that all of the food that is available, but if people don't have access to it, and don't know how to use it, food insecurity exists. As per World Food Programme (WFP), food security is a situation in which all people have physical, social, and economic access to adequate, safe, and nutritious food that meets their dietary needs and food preferences for an active and healthy life at all times. In the line of FAO definition, the food Security is that people will always have enough to eat, and to maintain an active and healthy lifestyle. This requires a constant supply of food, with no adverse fluctuations in the prices of food products. If food prices for example rise, then peoples' access to food becomes limited, hence, compromising on food security. FAO, IFAD, & WFP (2013) also define food security that is, at all times, in adequate nutrition, diverse, balanced and moderate eating from food in order to maintain a sustainable food consumption and to offset fluctuations in production and prices of food.

Based on the above three definitions for the purposes of food safety, we can say that the food is so, is it enough to eat, which is easily accessible, as are all of the people in the community, or the country will always have a chance to have access to food, and the people who have the knowledge of how to efficiently use the available food to meet their dietary needs, leading an active lifestyle and healthy lifestyle. Among scientists, however, the general consensus is that a lack of food security is one of the most important indicators of economic growth and development. Food availability and accessibility are related to the country's crime rate. As per Bazezew (2012), food security is linked to a country's national security, and he contends that countries with limited access to food will inevitably face high crime rates because people who engage in criminal activities will use them to meet their nutritional needs. Assefa,A.A. and Singh,K.N.,(2018); Fall (2018) brought up the issue of a lack of food security and economic growth are interlinked in all countries, as governments are forced to spend more money on food that would otherwise be used, in order to ensure the economic growth and development in the

country delay. FAO, International Fund for Agricultural Development (IFAD) & WFP, (2013) postulates that, for nations to successfully cut down the poverty and starvation among their citizens, there is need to address the problem of food shortages. According to FAO, IFAD, and WFP (2013), 815 million people are chronically hungry. This reduces productivity, raises mortality rates, and makes people more susceptible to disease. Food scarcity, according to FAO, IFAD, and WFP (2013), affects the rate at which countries experience growth, thereby affecting sustainable growth in such countries.

Although FAO, IFAD, and WFP (2013) agreed that food insecurity is a problem that affects both developed and developing countries, different authors estimate that the measures taken by the developed world to deal with the problem of food security are inadequate. However, food insecurity is not being addressed adequately in developing countries, particularly in Africa. Food security is to be regarded as a basic indicator, and it is the most important measure of poverty and community well-being. Because food is the most basic of human needs, the government, as well as households and individuals, must make an effort to provide enough food to feed the people, families, and community.

2.3.1. Household food security in Rwanda

As per the Comprehensive Food Security and Vulnerability Analysis (CFSVA) (2018), 81.3 percent of all households (nearly 2,034,942 households) are food secure (i.e., they can meet essential food and non-food needs without resorting to atypical coping strategies), eat a healthy diet, and spend a small portion of their budget on food. In this group, 38.6% (966,160 households) were classified as marginally food secure, meaning they were at high risk of becoming food insecure, 18.7% (468,062 households) were food insecure, and 1.7 percent (42,551 families) were severely food insecure.

2.3.2. Geographical location of food insecure households in Rwanda

According to the CFSVA (2015), food insecurity affected 16.8% of Rwandan families, with 2.6 percent experiencing extreme food insecurity. The Western Province was found to be the most food insecure, with 35.2 percent of all households experiencing food insecurity and 5.6

percent experiencing severe food insecurity, followed by the Southern Province (24 percent), Northern Province (17 percent), and Eastern Province (5.6 percent severely food insecure) (14 percent). The City of Kigali had the lowest prevalence of food insecurity, with only 3% of households experiencing moderate food uncertainty. The livelihood zones most hit by food insecurity were the Western Congo-Nile Crest Tea Zone (49 percent), Lake Kivu Coffee Zone (37 percent), and Northern Highland Beans and Wheat Zone (32 percent). Rutsiro had the largest rate of food insecure families (57%) followed by Nyamagabe (42%), Nyabihu (39%), Nyaruguru (37%), Rusizi (36%), Karongi (35%), and Nyamasheke (35%).

2.3.3. Food availability in Rwanda

During the study period, the most important staple foods (maize, beans, potatoes, and sweet potatoes) were readily available in market. According to an agricultural survey, the pulses, roots, and tubers are grown in the country, but cereals, flours, and seeds are imported at a larger rate, particularly from neighboring nations. Food output increased in season 2018A compared to season 2017A. The food stockpiles from the 2018A season lasted three months for beans, tubers, and roots but just two months for maize, according to households. The majority of farmers sell their agricultural goods to raise funds for additional food, non-food commodities, and services. Outside of Kigali, one out of every two households raised cattle, with over 60% of them producing animals for their own consumption (NISR, 2018).

2.4. Theory of behavioral model

Professor Andersen has developed a unique behavioral model of health, service use, (hereinafter referred to as the behavior of the model, which is a part of his PhD dissertation (1968) (Andersen,1968), which are classified in the availability of factors, according to a three-stage model: predisposing features, enabling factors, and finally the perceived and evaluated need.

Predisposing factors: This set includes individual age and sex as "biological imperatives," social characteristics along with education, occupation, and social relationships (e.g., family status), and mental factors such as attitudes, willingness to make decisions, values, and

knowledge, as well as other related factors such as community demographic and social composition, cultural norms, political perceptions, collective and organizational values.

Enabling factors: This is made up of characteristics that allowed the household members to take action to use services like agricultural input accessible. That part was split into family incomes and community resources. Whereas the family resources variables included "their financial resources" (Andersen, 1968), revealed that the family's income and savings. Andersen associated the accessibility of services with "geographic convenience to services" (Andersen, 1968). This was the only indication of access in the 1968 behavioral model. That model was intended to explore the use, the placement of access proposes that at least at this point in time Andersen saw utilization as an effect of services.

Need factors: Andersen and Davidson (1968), distinguished between the recognized need for services and evaluated the need like proficient assessments and objective measurements of service seeker's status which leads to need for services.

2.5. Empirical studies of agriculture subsidies in the improvement of food security

A wide variety of data in the literature are analyzed, based on the experience gained from a variety of countries have shown that the high levels of continuing the predisposing characteristics, such as age, gender, education, occupation, family size, marital status, peer pressure related to decision-making, and the beliefs of others, and, on the other hand, is the most important stimulating factors are included in household income.

2.5.1. Gender, food security and use of subsidized input

The idea is that agricultural subsidies are fully capitalized in the price of the land, into the ground, claiming that a grant of rights, and to remove them would be to dramatically reduce the carrying value of the land. Not surprisingly, there is little evidence to support this claim.

In addition, the gender dimension is taken into account, and addresses the criteria to be taken into account when the home is classified as a part of the most vulnerable groups that require particular attention, where they are heavily subsidized agricultural resources. However, how

gender relations effect or may affect the use of social resources at the family level is also crucial to address. The investigation on gender matters, with a focus primarily on a difference of effect between the households are headed by women and for women. Correspondingly, R. Wendy Karamba, Paul C. Winters (2014) was emphasized that closing the gap between men and women in agricultural output is critical for poverty reduction. Meanwhile many research imply that gender variations in agricultural production are due to female farmers' lower access to resources, few research look at the effect of agricultural interventions in reducing input restrictions and, as a result, the productivity gap between men and women. The verdicts from their research suggested that even though participation in the program increases agricultural productivity for both male and female farmers, it does not provide disproportionate assistance to female farmers in order to close the gap in agricultural output. Other scientists argued that while participation in the program increases agricultural productivity for both male and female farmers, it does not provide disproportionate assistance to female farmers in bridging the gender gap in agricultural output. That would suggest that women farmers are faced with the additional productivity of the constraints, the lack of the extra costs and labor costs.

Though, in 2008/9 School of Oriental and African Studies *et al.*(2008) discovered that male-headed recipient households received more fertilizer coupons than female-headed recipient households, with male-headed households receiving 1.55 coupons on average compared to 1.45 coupons for female-headed households. Food shortage occurs if a family has supply available and means to get adequate food security. The assessment of the food security basing on gender is considered as significant due to the fact that males and females are involved in agriculture sector at different levels and it is well evidenced that 80% males whereas 20% females are involved in producing horticultural food crops Mugalavai, (2012); Belinda Dodson, Asiyati Chiweza & Liam Riley (2012).

CFSVA (2018) found that a home that is run by men stay more vulnerable to foodstuff insecurity (23 out of a hundred), than in a home directed by women (17 per cent), because it is the proportionate number of households headed by women have been enough to consume the food, and spent a greater proportion of their budget on food, and are more actively engaged in

strategies to life. Households headed by women are poor: about 31 per cent are classified as Ubudehe 1, compared with 11 per cent, led by a male.

Women who are head of the household, are often widows or to be pointed out, and their households are made up of a huge number of active families. More than 80% of male home heads are male, compared to around a female head of a strong school. Female heads of households engaged in small-scale agriculture production or agricultural day-to-day work in the lowest types of employment, while male heads of households with a diverse livelihood activity, such as labor, business, or skilled labor.

2.5.2. Age and food security

Age is regarded as a predisposing factor for service use by many authors who have studied the factors influencing the willingness to seek help. Previous studies yielded a variety of results; for example, some researchers discovered that young females (those under 30 years old) were more likely to use services (Neupane and Doku, 2012; Troubat,N.,Faalooa,E.,&Aliyeva,R.,2020) meanwhile others researchers identified that old aged females have great influence in decision making in their households (Navaneetham and Dharmalingam, 2002; Wendy,R.,Winters,P.,2014). As a result, the age of people may have an impact on agricultural production; agricultural activities require muscular force, implying that young people are more likely to participate in them. However, this is not the case because adult people are involved in the agriculture sector, whereas young people prefer other activities such as mechanics, driving, trading, and other professions other than agriculture. And this revealed that when it comes to food security, young people are less concerned (Guancheng Guo *et al.*, 2015).

In the same line, Godwin Anjeinu Abu and Aondonenge Soom (2016) showed up the household food security was negatively related to the age of the household's head ($p < 0.05$) and the size of the household. Lack of finance, shortage of farmland, poverty, soil infertility, a lack of non-farm income-generating activities, and storage and processing challenges were highlighted as some of the barriers to achieving food security in the study area. There was suggested that the government provide credit to farming households to alleviate the people not being able to access credit, that agricultural policies aimed at promoting farmers' access to land

and improving farm household productivity be encouraged, and that farmers be provided with informal nutritional education and non-agricultural sources of income through extension services.

Food security in a community is demonstrated by high food production, and this production is heavily influenced by personal social characteristics, particularly marital status. According to previous research, married people are more involved than single people (Kiriti and Tisdell, 2003). Alisha Coleman-Jensen, Matthew P. Rabbitt, Christian A. Gregory, and Anita Singh (2019) found that 7.1 percent of children in 2.7 million American homes were food insecure in 2018, which was not significantly different from 7.7 percent in 2017. Food insecurity among children meant that these families were sometimes unable to feed their children with appropriate, healthy food. These families with food insecure children claimed that their children were hungry, skipped meals, or went a day without eating, and that the major cause was a lack of money for food (Jill Lambden, Olivier Receveur & Harriet V. Kuhnlein 2007). Again Weatherspoon, D.D., Miller, S., Ngabitsinze, J.C. *et al.* (2019) identified an increase of 10 years in the age of the household head reduces household dietary diversity score by about forth percent.

2.5.3. Marital status and food security

In Ethiopia, Haliu *et al.* (2007) and Kaloi *et al.* (2005) in Uganda, found that married people were more likely to be food secure by the factor 0.0549962. Those results were contrary to those stressed by (Aidoo *et al.*, 2013) whereby they emphasized the importance of marital status, stating that families led by unmarried individuals were more likely to be food secure than those headed by married people, referring to the fact that homes headed by married people may have bigger household sizes and hence many mouths to nourish.

Karla L .Hanson, Jeffery, Frongillo,E.(2007), except for those living with a partner, Males in all other marital status categories were more likely to be overweight than married men. Divorced men were more likely than never-married males to live in a household with very low food security. Males with medium food security were heavier than males with full food security, whereas men with low food security were lighter. For other hand, when compared to fully food-secure women, somewhat food-secure women had a higher likelihood of being overweight (P ¼

0.05), but women with low food security were more likely to be obese. While it comes to consider the comparison, those who were never married women, food insecurity was linked to a higher chance of obesity among married women, those living with partners, and widows. According to the sensitivity analyses, the effect was emphasized among women who were only minimally food secure.

The findings revealed that food insecurity affects body weight differently in men and women, and that partnering plays a significant role in this relationship for women.

2.5.4. Education and food security for peace resilient

Oluwatosin (2013) highlighted that the level of educational attainment shows a great role in the agriculture sector where the people of low education level are more involved for instance in his research he found that 61 percent of the respondents had no formal education, 33% had a primary school education, 4% had a secondary school education, and 2% had a Higher National Diploma or a university education. To meet the dietary requirements of its members (Neff, 2008). Food security is one of the seven aspects of human security that underpins and leads to long-term prosperity and peace. The role of education on food security is frequently seen solely from an economic standpoint. According to the FAO, a lack of education reduces productivity, employability, and earning potential, resulting in poverty and hunger. Hunger has been linked to a lack of education in many of the studies that have been conducted.

Furthermore, the relationships are strongest at the primary level and weaken with higher levels of education. These findings suggest that, in order to combat food insecurity, governments, international organizations, and civil society should invest much more in education, particularly primary education for rural people, in line with the capacity approach, which emphasizes education's active role in developing people's capabilities. Greater investment in high-quality elementary education is anticipated to result in significant progress toward achieving the global agenda. Furthermore, the scholars propose that in a low-income country like Rwanda, for example, among those with the lowest levels of education, could double access to primary education by rural people, it could substantially reduce rural food insecurity by around 25%. Given the concentration of population and poverty in rural areas in most low income countries,

education for rural people could be seen as a key factor for promoting overall national food security.

Increasing the education participation will require substantially greater invest of resources and a mobilization of political will at international, national and local levels (Dean T.Jamison, Peter R.Moock, 2002; Pasquale De Muro and Francesco Burchi ,2007; Acker, D. ; Gasperini, L.,2009; Ngware, M. W., Oketch, M., Ezech, A. C., Mutisya, M., & Ejakait, C. E. 2012; NDAKAZA J. et al,2016). Kennedy and Peter (1992) stressed that the proportion of income controlled by women has a positive influence on household caloric intake. Household food security in rural areas of Ethiopia has been demonstrated (Feleke et al. 2005; Kidane *et al.* 2005), and other research have linked food security to technology adoption (adoption of high yield varieties of maize and fertilizer application). The same research found that adopting technology improves household food security, but there are other elements to consider, such as farm land area, animal ownership, the head of household's education, the size of the family, and the household's per capita production. A part from household size other factors influence positively the food security.

2.5.5. Household size and food security

The family size is defined as the number in the household (Ndayisaba,F.2019). The previous study exposed by (Oluwatosin, 2013) revealed that 40% of those polled live in households with five or less individuals, while 60% live in households with more than five. Four people lived in the average family. This indicates that many of the respondents do not have enough hands on their farms to sustain or assist them in the event of severe labor demands. Farmers were forced to lower the size of their farms in order to meet labor needs. Also, according to the researcher, the larger a person's household becomes, the harder he or she strives to produce. Adebayo, O. (2012) indicated that in Nigeria, 60.9 percent of families had between 5 and 8 individuals, while just 24.5 percent were food secure. Borrowing money and relying on less liked and less expensive food are some of the coping mechanisms used. Poor financial access (84.5%) and a lack of feedback are among the challenges faced (81.8 percent).

2.6. Factors determining the access to subsidies

The targeting criteria's ambiguity suggests that they could be interpreted and applied differently at the local level. Multivariate regression analysis used in several studies to separate parameters that are major drivers of access to subsidized farm inputs (Chirwa et al., 2011c; Reincke, K., Vilvert, E., Fasse, F., Graef, F., Sieber, S., & Lana, M. A., 2018), whether coupon recipients were more likely to be food insecure (Chirwa *et al.*, 2011c; Reincke, K. (Holden and Lunduka, 2012a) and (Holden and Lunduka, 2012b) the factors that determined the amount of subsidized fertilizer received by the household (Ricker-Gilbert, 2011).

The receipt of fertilizer coupons and the quantity of subsidized fertilizers purchased by households are used to calculate the amount of subsidized fertilizers purchased by households. Characteristics of the household (composition, headship, and assets), the agricultural traits, as well as access to subsidized farm inputs, are utilized to explain the procedures by considering (land size, degree of commercialization, cash crop cultivation, and quantity of commercial fertilizers purchased the previous season), other control variables include: food scarcity and exposure indicators (own poverty assessment, adequacy in food consumption, participation in safety nets, receipt of subsidy in previous season); and poverty and vulnerability indicators (own poverty assessment, adequacy in food consumption, participation in safety nets, receipt of subsidy in previous season) (labour market participation, remittances, business enterprise, open forum allocation of coupons, and regional fixed effects). Several new insights into the factors that influence access to subsidized fertilizers have emerged. First, the data reveal that age counts when it comes to the age of the household. Coupons are more likely to be received by households with older heads of household, with a 0.3 percent increase in the likelihood of receiving a coupon. However, senior households (those aged 64 and over) are less likely to receive fertilizer coupons, with their chances reducing by 13%.

Similarly, there is a favorable relationship between age and the quantity of fertilizers gained, but the old are at a disadvantage (Senusi, R. A., C. A. Badejo and B. O. Yussuf, 2006; Chirwa, E., Matita, M., Dorward, A., 2011). This is in stark contrast to the recent emphasis on certain vulnerable groups in the subsidy program's targeted criteria. It's also plausible that elderly-headed households are labor-strapped in agriculture, making coupons less likely to be used.

Secondly, households with larger agricultural plots are more likely to receive subsidized fertilizer coupons and to buy more fertilizer and agricultural subsidies. Poulton (2012) argued that agricultural subsidies are the result of a confluence of technical and political objectives, but that efficacy might diminish over time if interests divide. Such divergence is likely unless governments face significant dangers that can only be mitigated by strong government support from rural voters. Finally, we analyze the input subsidy programs' agro-ecological sustainability. Such initiatives are politically appealing because they provide quick and visible solutions to food security issues, as well as the potential for channeling patronage to gain political support.

There are difficulties in balancing typically short-term political interests with longer-term technical requirements of effective targeting and cost control in order to maximize the developmental value of invested resources (Pernechele, V., Balié, J., & Ghins, L., 2018).

Continuous farming without fertilization leads soils to lose their structure and become prone to erosion in many African countries, while dropping yields and expanding populations urge farmers to expand or transfer cultivation to forests and steeper slopes, resulting in erosion and tree loss.

2.7. Access for the most vulnerable groups

Due to the processes and obstacles encountered during the program's implementation, these vulnerable populations may face greater difficulties in obtaining coupons and subsidized fertilizers. Von Braun, J., (2008) and Mvula *et al.* (2011) outline some of the obstacles that the most vulnerable households face in obtaining subsidized agriculture supplies, and we highlight some of the most pressing difficulties in this section. The issues such as coupons and subsidized fertilizers complicate accessibility inputs. Several issues were identified with regard to coupon sharing, unproven coupon sales by government agents and traditional leaders, and the process of beneficiary identification and coupon distribution.

Farmers Union of Malawi (2011) found that these findings are consistent with their judgment among the 30% of respondents; the main issues reported by those who had problems with coupon distribution were: not enough coupons (34 percent of respondents, 10 percent of all respondents); not receiving coupons despite eligibility (23 percent of respondents, 7% of all respondents); and being forced to share a coupon with those who did not register (23 percent of

respondents, 7% of all respondents); (17 percent of respondents reporting problems, 5 percent of all respondents). Despite the fact that these issues affect all beneficiaries, they are exacerbated for vulnerable groups. Because of the low amount of coupons available for villages compared to the number of resource poor and vulnerable households, the most vulnerable households are often left out.

2.8. The impact of management of agriculture inputs and supplies on food security

Failures to adopt agricultural subsidies, as well as failures to apply them when they are needed, are the dark side of agricultural subsidies. SNS is a digital tool/database that was launched in 2018 to connect and empower participants in the Nkunganire subsidy program. It allows farmers to receive best-practices advice from specialists and collaborates with the Agro-Processing Trust Corporation (APTC), which is in charge of input demand and distribution, the Agro-Dealership Management IKOFI (a financial e-wallet that supports SNS), and MOPA (Mobile Ordering Process Application). On SNS, 1,503,944 farmers have registered 2,299,894 plots (RAB, 2020). More farmers are registering, more fertilizer users are increasing, and seed quality is improving, all of which could lead to increased harvest quantity and quality.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1. Introduction

This part covers study design and methodology. This section explains the research philosophy that was adopted, the methodology and study design that was adopted, it explains the study population, sample size and techniques, and it explains data collection method and source. This chapter also covers data analysis and ethical considerations that were observed during the collection of data from the research participants.

3.2. Study area

The current study took place in Nyabihu District, which is located in Rwanda's Western Province. Mukamira is the District's capital. The 12 sectors of Nyabihu district are Bigogwe, Jenda, Jomba, Kabatwa, Karago, Kintobo, Mukamira, Muringa, Rambura, Rugera, Rurembo, and Shyira. These sectors are organized into 73 cells and 474 "imidugudu" villages (Nyabihu, 2013). Nyabihu District shares borders with Ngororero District in the south, Rubavu District in the west, Gakenke District in the east, and Musanze District and the Democratic Republic of Congo in the north. Despite high rains, the area is severely hampered by a shortage of water supplies due to a poor hydrographic network. The water is supplied by ephemeral torrential streams such as the Susa and its subsidiary tributaries. The fact that they are torrential is due to the steep slope upstream. Over 2200 m, the volcano's sloping slopes have an average slope of more than 60%. (Nyabihu, 2013).

As it rains, the water rushes down the slopes at breakneck speed, trying to pull everything in its path along with it: animals, people, lava rocks, and so on. The countless torrents of water rushing down the hillsides do a great deal of harm (flooding, sanding and sapping of banks). The water bodies are said to be many and plentiful, however they are located at a depth of about 100 meters. We believe they are in an old basement depression (synclines and pockmarks) that has been buried by lava. According to the 2012 Census on Population and Housing, the population of Nyabihu district is predicted to be 295,580 people, with a population growth rate of 1%, the

lowest in the country. Nonetheless, the Nyabihu District, according to the same source, has a population density of 558 people per square kilometer.

In terms of total fertility, Nyabihu district has a rate of 4.9, which is higher than the national average of 4.6. For female, the average age at first marriage is 21.5 years, while for boys it is 23 years. 62.5 percent of homes have children under the age of seven, while men lead 53.2 percent of homes. This situation necessitates substantial investments in the education sector as well as particular programs to assist women. The economy of Nyabihu District is mainly reliant on subsistence agriculture, with the majority of households being smallholders. The exploitation of the soil provides income to around 74 percent of the district's population, or 105,672 persons out of a total of 143 000 people. However, land is scarce since, according to EICV3, half of the population lives on less than 0.3 hectares. Due to a lack of land, farmers are forced to work an average of 5 hours a day rather than the recommended 8 hours. This demonstrates that unemployment exists among economically productive people, particularly among youths.

Agricultural food crops, industrial crops, and ornamental crops are all widely grown. Irish potatoes, corn, beans, wheat, bananas, and vegetables are among the foods available. Potatoes, maize, and beans are grown by 76.6 percent of Irish families, or 51,000 homes on average. Irish potatoes are the most often planted, accounting for 83.7 percent, followed by maize (74.3 percent) and beans (74.3 percent) (71.9 percent). Maize accounts for 47.3 percent of the district's agricultural output, while wheat accounts for 8.9%. Irrigation is required throughout the hot season. Agriculture should not be the only main source of revenue for the District's economy; other services should also be utilized. In recent years, Rwanda's government has adopted a number of ambitious programs aimed at increasing the agricultural sector's productivity.

In summary, the District has significant agricultural potential, particularly in the production of potatoes, corn, and wheat, as well as a wide range of vegetables. These crops, however, do not have a potential processing factory. The district is planning to open a potato processing plant as well as honey and milk collection centers. For food security and price stability, crop storage facilities are also required. The crops such as maize, Irish potatoes, ordinary beans, bananas, and climbing beans appear to be of great importance in Nyabihu District in terms of crop proportion of harvested area in the 2013 season.

3.2 Research model

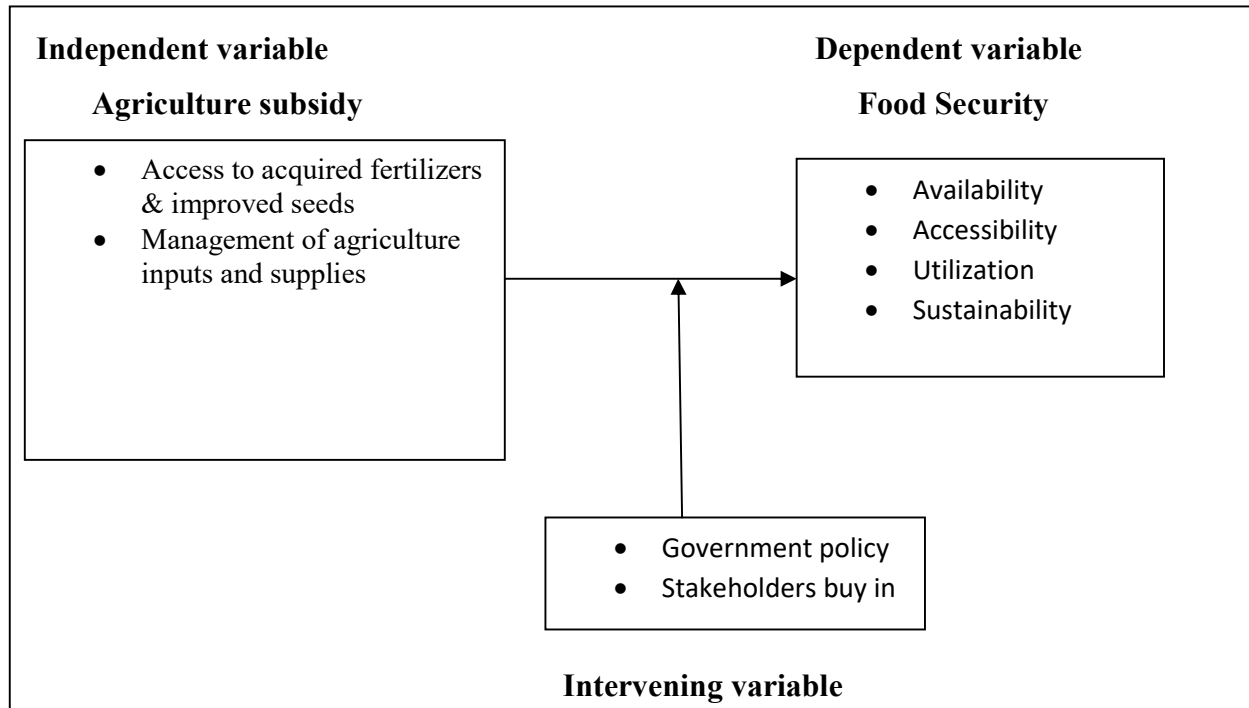


Figure 1: Conceptual Framework

The conceptual framework describes the predicted relationship between the independent variables (access to acquired fertilizers and improved seeds, Management of agriculture inputs and supplies) and the dependent variable (food security: availability, accessibility, utilisation, sustainability).

3.3. Research design

Research design, according to Leedy and Ormrod (2014), is the overarching strategy utilized by the research to integrate the many aspects of the study. Qualitative and quantitative research designs are the two most common types of study. Qualitative research entails the examination of a set of data in order to derive meaning from it (Creswell, 2014).

Qualitative research is mostly exploratory research that seeks to understand the fundamental causes of events or phenomena. Qualitative research allows a researcher to gain a better insight

of the problem at hand and to obtain information that would otherwise be unavailable if questionnaires were employed as data collection methods while the study of numerical and quantifiable data is central to quantitative research (Creswell, 2014).

According to Leedy and Ormrod (2012), quantitative research is done to see if there are any correlations between variables. A questionnaire is the most common tool used in quantitative research. In this study, the research strategy was exploratory, and both quantitative and qualitative methods were used. With this combined strategy, the strength of one method compensates for the weakness of another, resulting in better research results.

3.4. Population of the study

According to Maree (2011), the study population is made up of all elements with similar qualities that the researcher is interested in. As a result, the population of this study includes the residents of Nyabihu, which is estimated to number sixty thousand three hundred twenty nine (60,329).

3.5. Sample size and techniques

The sample size used in this study was one hundred (100) residents of Nyabihu District sampled using Dempsey's formula. They were selected using random probability sampling and purposive sampling techniques. Among Participants there were farmers, agro- dealers and staff of Nyabihu District and Rwanda Agriculture Board (RAB) selected using stratified or quota sampling techniques. To achieve this, the present study was applying convenience sampling technique to select those households from each sub-location. The sub-locations (sectors) constitute the strata. The proper representation for this study was then determined using proportional sampling. To use proportional sampling, the researcher must be able to calculate the percentage of the population that each stratum contains.

For stratified sampling technique, A. P. Dempsey and Dempsey(2000) stated that the researcher samples the population proportionally based on the percentage of population in each strata. This was determined using the following formula:

$$\frac{\text{Number of households in each stratum}}{\text{Total number of households}} \times \text{Sample size (100)}$$

According to the data of Rwanda national population census (2012), the population from those 3 sub-regions(sectors) of Nyabihu District under study were 30,016 in general. So, to constitute the sample size, A,P. Dempsey and Dempsey(2000)'s formula was applied as it has highlighted in the table 1 below.

Table 1: Sampling procedure

District	Sector	Households in the Sector	Sample
Nyabihu	Kintobo	3,930	$3,930 \div 20,308 \times 100 = 19$
	Jenda	8,861	$8,861 \div 20,308 \times 100 = 44$
	Mukamira	7,517	$7,517 \div 20,308 \times 100 = 37$
	Total	20,308	100

Finally, non-probability (purposive sampling) was utilized to choose the workers and heads of institutions at the local government level (key informants) who would be sampled and questioned using a semi-structured questionnaire in that study. Following that, primary data was collected in the form of built questionnaires, which were then analyzed using the Statistical Package for the Social Sciences (SPSS) software version 23 has been used to generate descriptive statistics, logistics regression analysis, and Pearson Chi-square correlation.

3.6. Data collection method and source

The research was based on both primary and secondary data sources. Interviews for qualitative data are included in the primary data. Structured questionnaires and interviews were used to collect quantitative data. The questionnaire was chosen because it increases the likelihood of receiving honest responses by ensuring the respondent's privacy (Canals.L, 2017).

A questionnaire is a set of questions written by a researcher on a particular topic of interest in order to collect responses from a sample of people (Leedy and Ormrod, 2014). The quantity of respondents and the sort of study in question influenced the decision to use questionnaires. The researcher was able to collect a great amount of data in a short amount of time because to the use of questionnaires. The questionnaires were self-administered by the researcher.

The questions were self-administered to avoid losing any questionnaires and to confirm that the respondents who were chosen personally completed the questionnaires. The questionnaire was designed in this way to make it as simple as feasible for research participants to complete the questions in the lowest amount of time possible (Masats D., 2017). And also consisting this questionnaire method of data collecting having the advantage of low cost, it was also demonstrated to be free from interviewer bias, it offered the respondent adequate time to offer carefully thought out answers, and because large samples could be used, the results were more dependable and reliable (Kothari, 2008). There were the study included both structured and semi-structured questions (Sloven *et al.*, 2004). The respondents is a conversation amongst the two or more people (both the interviewer and the interviewee are involved in the interview session) in which one party asks the other questions in order to obtain information (Leedy & Ormrod, 2010). Documents (reports, statistics, etc.) and literature connected to the topic will be used as secondary data (Canals. L, 2017). The documentary method was made it easier to study the existing literature without having to go out into the field to collect data. It is useful for data triangulation, which will assist my investigation into the collecting of various pertinent data. This strategy is useful in this study because it saves time (Masats, D., 2017).

3.7. Data Analysis

The primary figures has been examined in this study using the SPSS computer package on Software package 23. The study results were generated using chi-square analysis and logistic regression analysis of the surveyed data. For food security, Chi-square analysis has been applied to determine the level of significance between independent variables and the dependent variable, while logistic regression was used to determine the association between socio-demographic characteristics and the dependent variable. Furthermore, the findings from the logistic model were investigated using probabilities (odds) ratios in this study.

3.8. Validity and Reliability of Research Instrument

Validity refers to how much a research instrument measures what it's supposed to measure, whereas reliability relates to how well the measuring instrument works consistently (Leedy and Ormrod, 2014). The researcher used a sample of 10 inhabitants from Nyabihu District to test the questionnaire's validity and reliability. Following the testing of the research instrument, While gathering all of the essential data for this study, certain modifications were made to make it intelligible and straightforward for all respondents to answer, for example, questions that added no value to the study were not considered.

3.9. Research ethics

Permission from the university was obtained in order to conduct this research, respondents have been informed for the persistence of the study and anonymity was guaranteed. The information collected was treated with confidentiality, Respondents were encouraged to talk freely and give their options in win-win situation. Selected study subjects respondents who refused to participate in the study were considered as non-respondent and the number was adjusted.

CHAPTER FOUR: RESULTS AND DISCUSSION

4.1. Introduction

In this regard, and as mentioned in the previous chapter, the data for the research was gathered through structured questionnaires and interviews on the effectiveness of agriculture subsidies in improving food security in Rwanda, particularly in the Nyabihu district.

To assess the effectiveness of farming subventions toward improvement of food security in Rwanda, Nyabihu District as a case study, the yield of production (Kg/ha) after receiving and using the agriculture subsidies (Nkunganire) was used as a dependent variable while different demographic socioeconomic characteristics of respondents (gender, age, employment status, number of family members, education, marital status), types of provided subsidies, subsidies distribution policy in Rwanda and factors currently affect the food security in Rwanda characteristics were used as dependent variables for food security in Nyabihu District. Then after, different measurement parameters under the independent variable on a structured questionnaire were used to assess the relationship. Statistical Package for the Social Sciences (SPSS) software version 23 was used to compute frequencies, chi square, and logistic regression.

To finally start, the paired-sample t-Test has been utilized to assess the average and evaluate the similarity of yields before and after the provision of agricultural subsidies. Moreover, Chi-square inquiry has played in great role to evaluate the association between the independent and dependent variables. Finally, the logistic regression test was used in this study to make a broad prediction, roughly whatever it takes to boost food security should be done in the Nyabihu District and, later, the Rwandan population.

4.2. Comparison between yield of production before and after agriculture subsidies provision

These two types of yields produced by the people in Nyabihu district before and after agriculture subsidies provision had to be compared in order to see if there was a significant difference between them which indicates the improvement of yield thanks to those subsidies. And at this juncture, the paired t-test (similarity test) analysis carried out in this research.

In the Table 2 below, there is a similarity test between the yield produced before and after the agriculture subsidies provision to the respondents. With 95% confidence interval of the difference, the mean difference is -7.531×10^3 , this is because the yield obtained after the agriculture subsidies is very greater than that obtained before applying the subsidies and the probability of this test p value $= .000 < 0.05$ which means that there is similarity between these two yields and also we assume that the relationship between them can be pointed out by chance.

Now, in the other analyses, the second yield was taken into consideration only.

Table 2: Comparison between yield of production before and after agriculture subsidies provision

	Paired Differences					t	Df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error	95% Confidence Interval of the Difference				
				Lower	Upper			
Pair 1 what was the yield before receiving the subsidy (Kg/ha) - What is the yield after receiving the subsidy (Kg/ha)	-7.531E3	6337.00	633.700	-8788.809	6274.011	-11.885	99	.000

4.3. The people's attitudes regarding the use of agriculture subsidies in Nyabihu district

In Nyabihu district, people were using agriculture subsidies in different levels basing upon their personal characteristics such as gender, age, and educational attainment, employment status, marital status and numbers of family members. And the people in Nyabihu district they had different attitudes regarding subsidies distribution policy and factors affecting food security in their location. The table 3 below shows the personal characteristics of respondents in this study, and the results were as following:

Gender aspect in receiving the subsidies in Nyabihu District, the males presented 63% while females were of 37% which is similar to what has been found by Mugalavai Violet Kadenyeka (2012), Chirwa *et al.* (2011) and Oluwatosin(2013) in their previous researches. The males participated in receiving subsidies at higher level than females due to the fact that in Nyabihu District, the man-headed families are more than woman-headed families. The association of gender at this point is that due to cultural biases and a lack of resources, farming operations are gender sensitive. They may do so through inheritance from their parents or late husbands, or they may acquire land in rare situations. Furthermore, the majority of participants are married, which may indicate that couples collaborate on agricultural activities . As a result, even in their old age, their wives are a source of support for them.

The age was another characteristic for how people were participating in receiving the agriculture subsidies and the people of 21-30 presented 10, 31-40 years presented 31%, 41-50 years presented 29%, and above 50 years presented 30%. These year categories show that in Nyabihu District, young people especially unmarried ones are engaged slowly in agriculture programs whereas old people are participating highly in agricultural production. And this can be related to the marital status of Nyabihu population where most people are getting married at 30 years and also married people are engaged in agricultural activities and programs than unmarried ones as they presented 88% and 12% respectively. This explain also the fact that subsidies use increases with the increase in years. These results are not different from that have been found by Oluwatosin(2013).

In this Table 3 below demonstrates the respondents' level of educational accomplishment. According to the table, the majority of respondents (53%) took primary schooling, 30% had secondary school education, 10% had university level education, 1% had vocational training, and 6% had other form of education. These results are the same as those have been found by Oluwatosin(2013) and Olayide *et al.* (1980) in their findings. As it is been revealed that above 70% of Rwandan population rely on agriculture (MINAGRI, 2019 and FAO 2021), this table 3 below shows how the people in Nyabihu District are engaged in agricultural program in which subsidy program is concerned even though some have other employments. It is in this regards, the results of this research are the same to those found previously as, 85% of respondents were farmers, 10% were agro-dealer, and 4% were government employees while only 1% were of other forms of employments in Nyabihu District.

The table 3 below also shows that the number of family members influenced the use of agriculture subsidies in Nyabihu district due to the fact that 3% of respondents were from family with only 1 person, 23% were from family of 1-3 persons, 34% were from family of 3-5 persons while 38% were form above 5 persons in a family. These results revealed that once in a family has a huge number of persons, it is involved in agriculture to find the food and other requirements to its households as it has been demonstrated by Oluwatosin (2013).

Table 3: People with different demographic socioeconomic characteristics using the agriculture subsidies in Nyabihu district

		Frequency	Percentage
Gender	Male	63	63.0%
	Female	37	37.0%
Range of Years	21-30	10	10.0%
	31-40	31	31.0%
	41-50	29	29.0%
	Above 50	30	30.0%
Marital status	Married	88	88.0%
	Single	12	12.0%

Education	Primary	53	53.0%
	Secondary	30	30.0%
	Vocation training	1	1.0%
	University	10	10.0%
	Others	6	6.0%
Employment status	Farmer	85	85.0%
	Agro dealer	10	10.0%
	Government employee	4	4.0%
	Others	1	1.0%
Number of family members	None	2	2.0%
	One person	3	3.0%
	Between one and three	23	23.0%
	between three and five	34	34.0%
	Above 5	38	38.0%

Not only according to the personal perspectives but also people had different consents regarding subsidies distribution policy and factors affecting food security where, the percentages of the people strongly agreed and agreed were very high comparing to the percentages of the people strongly disagreed, disagreed and did not know (neutral).

In the table 4 and table 5 below show how the people in Nyabihu district feel upon the different program and strategies concerning provision and use of agriculture subsidies. And these tables revealed that people are satisfied with how they are being done as the high percentage of people strongly agree and agree with the stated attitudes predisposed in this research.

Table 4: Attitudes regarding subsidies distribution policy

	Strongly agree		Agree		I don't know		Disagree		Strongly disagree	
	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %
Agricultural subsidy accessibility in Nyabihu district is fast and free from any form of bureaucracy.	73	73.0 %	23	23.0 %	1	1.0%	2	2.0 %	1	1.0%
The process of agricultural subsidies accessibility is fair to the people.	89	89.0 %	9	9.0%	1	1.0%	1	1.0 %	0	0.0%
Everyone who needs agricultural subsidy is allocated subsidy.	90	90.0 %	9	9.0%	1	1.0%	0	0.0 %	0	0.0%
Agriculture subsidy is allocated to people who really need it without any form of influence.	88	88.0 %	6	6.0%	6	6.0%	0	0.0 %	0	0.0%

Agriculture subsidy is assigned to people who can use it productively to produce food for their families and to commercial farmers.	57	57.0 %	36	36.0 %	3	3.0%	4	4.0 %	0	0.0%
The government provides infrastructures such as agro processing factories, communication network to people in Nyabihu District to facilitate ease farming.	44	44.0 %	48	48.0 %	5	5.0%	3	3.0 %	0	0.0%
The government provides necessary tools and facilities to ensure that farmers are in position to engage in agricultural production.	44	44.0 %	42	42.0 %	11	11.0%	2	2.0 %	1	1.0%

Agricultural subsidies availability determines food availability.	67	67.0 %	33	33.0 %	0	0.0%	0	0.0 %	0	0.0%
The rate at which the Rwandan Government is addressing the management of agriculture subsidy distribution helps to improve food supply.	62	62.0 %	36	36.0 %	2	2.0%	0	0.0 %	0	0.0%

Table 5: Attitudes of people regarding factors affecting the food security

	Strongly agree		Agree		I don't know		Disagree		Strongly disagree	
	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %
The access to agriculture subsidies from the government affects food production in Nyabihu	84	84.0 %	16	16.0 %	0	0.0 %	0	0.0 %	0	0.0%
The better management of agriculture inputs and supplies affects food security in Nyabihu	61	61.0 %	31	31.0 %	8	8.0 %	0	0.0 %	0	0.0%

The access to financial and technical support for best practices to farmers from the government and private sector affect agricultural production in Nyabihu District	65	65.0 %	21	21.0 %	11	11.0 %	2	2.0 %	1	1.0%
Farmers in Nyabihu use good farming agricultural tools and inputs like seeds and fertilizers which affects crop yield	85	85.0 %	13	13.0 %	1	1.0 %	0	0.0 %	1	1.0%
Farmers in Nyabihu are well trained which makes them able to produce more	52	52.0 %	36	36.0 %	9	9.0 %	3	3.0 %	0	0.0%
The willingness of people to engage in agricultural work leads to more food production in Nyabihu District	86	86.0 %	12	12.0 %	1	1.0 %	0	0.0 %	1	1.0%

4.4. Type of subsidies provided and used by respondents

In this research, the one hundred respondents were asked on kind of subsidies used and among them, 55% used fertilizers, 5% received improved seeds while 40% received all two kinds as shown in the table 6 below. And 55% preferred receiving fertilizers, 40% received both fertilizers and seed while only 5% preferred receiving improved seeds. The fertilizers were more preferred because are expensive compared to seed on the markets (IFDC, 2014).

Table 6: Type of subsidies provided and received by respondents

	Frequency	Percent 9%)
Valid Fertilizers	55	55.0
Fertilizers and seeds	40	40.0
Seeds	5	5.0
Total	100	100.0

**4.5. Analysis of relationship between factors and improvement of food security in Rwanda/
Nyabihu district**

The following tables describe the results of Chi-square analysis to identify the relationship between the independent variables which are generally personal characteristics mainly gender, age, employment status, number of family members, education, marital status and the type of subsidies received and used and the dependent variable which is the yield of production after agriculture subsidies provision. The Pearson Chi-square correlation has been applied and the results are presented in tables.

**4.5.1. Relationship between gender of people and the yield production after using
agriculture subsidies**

Starting with the gender aspect which is the first someone's differentiation way from another one and there are some people think that they are different in terms of working, thinking, engagement and the like. For instance someone can say that if 63% of respondents were male against 37% were females, it would be the same in productivity which is true according to Mugalavai Violet Kadenyeka (2012). But there was no statistical significance relation (dependence) between being male or female towards the improvement of food security in Nyabihu according to the outcomes of this study. May be this was thanks to the fact that how people are equal basing upon gender or when someone using the subsidies is aware of it

regardless to his or her gender. This was statistically approved by Pearson Chi-Square analysis results which were Pearson Chi-square (χ^2) = .001 and p value = 0.980 > 0.05.

Table 7: Relationship between gender of people and the yield production after using agriculture subsidies

			production yield range after using subsidies		Total
			under 10000kg/ha	or equal above 10000kg/ha	
Gender	Male	Count	24	39	63
		% of Total	24.0%	39.0%	63.0%
	Female	Count	14	23	37
		% of Total	14.0%	23.0%	37.0%
Total		Count	38	62	100
		% of Total	38.0%	62.0%	100.0%
Pearson Chi-square (χ^2) = .001 ^a Asymptotic Significance (2-sided) = .980					
a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 14.06					

4.5.2. Relationship between education level of people and yield production after using subsidies

In the improvement of food security by using agriculture subsidies, people of different education level be it so primary, secondary, university, vocation training, be it so other form of education respondents received which is the same what found by Oluwatosin (2013) saying that

lower educated people are most likely involved in agriculture. Taking example of Irish potatoes, the respondents of primary level are more productive than other with 35% produced above 10000kg/ha and vocational training respondents acted at low level with 1% in the productivity scale and most important all these later respondents produced no more than 10000kg/ha. However, there was no significant relation statistically between education level and improvement of food security considering production yield after agriculture subsidies. This is illustrated by the fact that Pearson Chi-square (χ^2) = 2.433 and p value = 0.657 which is more than 0.05(5%) implied that the relation between them would be by chance. This is due to the fact that this program is for all interested people regardless to their educational level and they were trained and followed up at same level.

Table 8: Relationship between education level of people and yield production after using subsidies

			production yield range after using subsidies		Total
			under or equal 10000kg/ha	above 10000/ha	
Education	Primary	Count % of Total	18 18.0%	35 35.0%	53 53.0%
	Secondary	Count % of Total	12 12.0%	18 18.0%	30 30.0%
	Vocation training	Count % of Total	1 1.0%	0 0.0%	1 1.0%
	University	Count	4	6	10

		% of Total	4.0%	6.0%	10.0%
	Others	Count	3	3	6
		% of Total	3.0%	3.0%	6.0%
Total		Count	38	62	100
		% of Total	38.0%	62.0%	100.0%
Pearson Chi-square (χ^2) = 2.433 ^a Asymptotic Significance (2-sided) = .657 cells (50.0%) have expected count less than 5. The minimum expected count is .38					

4.5.3. Relationship between age and yield production after using agriculture subsidies

Regarding age, there was not statistically significant relationship as Pearson Chi-square (χ^2)= 9.924 and p value = 0.19 >0.05 with someone of 21-30 years was in 10% of respondents with 8% and 2% produced no more than 10000kg/ha and above 10000kg/ha respectively after using the agriculture subsidies. Then 31% of respondents were aged between 31-40 years with 13% and 18% produced no more than 10000kg/ha and above 10000kg/ha respectively after using the agriculture subsidies. Moreover 29% were in the range of 41-50 years with 9% and 20% of respondent produced no more than 10000kg/ha and above 10000kg/ha respectively after using the agriculture subsidies. Ultimately, 30% were in the range of above 50 years with 8% and 22% of respondent produced no more than 10000kg/ha and above 10000kg/ha respectively after using the agriculture subsidies. These findings may reflect the real status of the Nyabihu population as the personal age cannot influence the yield obtained with using the agriculture subsidies or in simply, the relationship between those two variable occur by chance. These results are different from those have been presented by Oluwatosin, (2013) stated that the productivity decreases with the increase of age (from old farmer to young farmers). This can be explained by the fact that those old farmers have experiences and sufficient fund to invest in agriculture (Ugwoke *et al* ,

2005). And this insignificance in statistical relationship is explained by the fact that people regardless to their age received and use subsidies according to their field size and capacity.

Table 9: Relationship between age and yield production after using agriculture subsidies

			production yield range after using subsidies		Total
			under or equal 10000kg/ha	above 10000kg/ha	
Range of Years	21-30	Count	8	2	10
		% of Total	8.0%	2.0%	10.0%
	31-40	Count	13	18	31
		% of Total	13.0%	18.0%	31.0%
	41-50	Count	9	20	29
		% of Total	9.0%	20.0%	29.0%
	Above 50	Count	8	22	30
		% of Total	8.0%	22.0%	30.0%
Total		Count	38	62	100
		% of Total	38.0%	62.0%	100.0%
Pearson Chi-square (χ^2) = 9.924 ^a Asymptotic Significance (2-sided) = 0.19					
a. 1 cells (12.5%) have expected count less than 5. The minimum expected count is 3.80					

4.5.4. Relationship between marital status and yield production after using agriculture subsidies

When we were considering the relationship between marital status and yield gained after using those subsidies, 88% are married with 54% produced above 10000 kg/ha and 34% produced no more than 10000kg/ha while 12% are single consisting of 4% and 8% produced no more than 10000kg/ha and above 10000kg/ha respectively. And 54% of married produced above 10000kg/ha. Surprisingly there was statistical significance due to the fact that the Pearson Chi square (χ^2) = .0126 and p value = 0.023 < 0.05 between marital status and improvement food security. These results are not different from those have been found by Oluwatosin (2013) stating that the males were contributing more than females in the agricultural programs and production.

Table 10: Relationship between marital status and yield production after using agriculture subsidies

			production yield range after using subsidies		Total
			under or equal 10000kg/ha	above 10000kg/ha	
Marital status	Married	Count	34	54	88
		% of Total	34.0%	54.0%	88.0%
	Single	Count	4	8	12
		% of Total	4.0%	8.0%	12.0%
Total	Count		38	62	100
	% of Total		38.0%	62.0%	100.0%
Pearson Chi-square (χ^2) = .0126 ^a Asymptotic Significance (2-sided) = .023					
a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 4.56					

4.5.5. Relationship between number of family members and yield production after using agriculture subsidies

The responded were different in the number of family members, and hence they produced in the different scale but this difference of yield production was not statistical significant due to the result of Chi-square analysis which was Pearson Chi-square (χ^2) = 6.581 and p value = 0.16 > 0.05 meaning that the relation between having a certain number of family members and yield production after using agriculture subsidies may occur by chance.

Table 11: Relationship between number of family members and yield production after using agriculture subsidies

		production yield range after using subsidies			Total
		under or equal 10000kg/ha	above 10000/ha	1	
Number of family members	None	Count	1	1	2
		% of Total	1.0%	1.0%	2.0%
	One person	Count	2	1	3
		% of Total	2.0%	1.0%	3.0%
	Between one and three	Count	12	11	23
		% of Total	12.0%	11.0%	23.0%
	between three and five	Count	14	20	34
		% of Total	14.0%	20.0%	34.0%

	Above 5	Count	9	29	38
		% of Total	9.0%	29.0%	38.0%
Total		Count	38	62	100
		% of Total	38.0%	62.0%	100.0%
Pearson Chi-square (χ^2) = 6.581 ^a Asymptotic Significance (2-sided) = .160					
a. 1 cells (40.0%) have expected count less than 5. The minimum expected count is 0.76					

4.5.6. Relationship between received subsidies and yield production after using agriculture subsidies.

In this research, the respondents were asked about the type of subsidies received and it was found that they received fertilizers, improved seeds and combination of two as it has been shown in the table 12. And 55% were using fertilizers as the subsidies with 38% produced above 10000kg/ha. And the assessment of effect on the yield, it was evidently that the yield was related to the subsidies received and it was statistically significant as Pearson Chi-square (χ^2) = 5.336 and p value = 0.048 < 0.05. This finding is the same as that found by Mwesigye (2017) stating that the use of fertilizers improves the yield and ensures the food security in farmers. This is because in the normal program, fertilizers are expensive and once there is a coupon or subsidy in fertilizers, the cost become reduced and yield increased.

Table 12: Relationship between received subsidies and yield production after using agriculture subsidies

			yield of production range		Total
			under or equal 10000kg/ha	above 10000kg/ha	
Which kind of subsidy have been given?	Fertilizer	Count % within Which kind of subsidy have been given?	17 30.9%	38 69.1%	55 100.0%
	fertilizers and seeds	Count % within Which kind of subsidy have been given?	21 52.5%	19 _b 47.5%	40 100.0%
	Seeds	Count % within Which kind of subsidy have been given?	1 20.0%	4 80.0%	5 100.0%
Total		Count	39	61	100

% within Which kind of subsidy have been given?	39.0%	61.0%	100.0%
Pearson Chi-square (χ^2) = 5.336 ^a Asymptotic significance (2-sided) = .048			
a. 1 cells (33.3.0%) have expected count less than 5. The minimum expected count is 1.95			

4.5.7. Relationship between employment status and Yield production after using agriculture subsidies

The table 13 below shows the relationship between employment status (being farmer, government employee, other) and the yield after receiving agriculture subsidies. And 85% were farmers with 56.5% of farmers produced above 10000kg/ha, agro-dealer were 10%, government employees were 4% while other employees were only 1%. These findings are not different from those have been found by FAO (2021) revealed that more than 70% of Rwandan population are farmers. And this result were statistically significant because it presented Pearson Chi-square (χ^2) = 8.390 and p value = .039 < 0.05 in the chi square analysis.

Table 13: Relationship between employment status and Yield production after using agriculture subsidies

			yield of production range		Total
			under or equal 10000kg/ha	above 10000kg/ha	
Employment status	Farmer	Count % within Employment status	37 43.5%	48 56.5%	85 100.0%
	Agro dealer	Count % within Employment status	1 10.0%	9 90.0%	10 100.0%
	Government employee	Count % within Employment status	0 0.0%	4 100.0%	4 100.0%
	Others	Count % within Employment status	1 100.0%	0 0.0%	1 100.0%
Total		Count % within Employment status	39 39.0%	61 61.0%	100 100.0%

Pearson Chi-square (χ^2) = 8.390^a

Asymptotic significance (2-sided) = .039

a. 1 cells (62.5%) have expected count less than 5. The minimum expected count is .39

4.5.8. The prediction of improvement of food security

Logistic regression was another statistical tool used in this study to predict the possible influence of independent variables towards the improvement of food security has been applied to assess the factors affecting mostly food security. Many determinants under the research model herein (personal characteristics, types of subsidies received and used, Attitudes of people regarding different programs and strategies concerning provision and use of agriculture subsidies) were assessed and the results are presented and as it has been shown in the table 14 below.

Marital status, type of agriculture subsidies used, factors currently affect food security in Nyabihu District, and agriculture subsidies distribution policy in Nyabihu district, the training provided to the people and the availability of storage facilities to the farmers for storing their food and agro-processing plants were found to be statistically significant and influence improvement of food security in Nyabihu district and in Rwanda in general.

Starting with personal characteristics to predict which would be done to improve food security in Nyabihu district, gender, age, education level, family members, presented odds of regression (OR) and p values which are (OR = 1.702 and p value = .972), (OR = .453 and p value = .876), (OR = .329 and p value = .0621), (OR = .132 and p value = .572) respectively. And these result present the statistical insignificance effects or influence on the improvement of food security as their p values are greater than 5%.

These findings are contrary to that found by Oluwatosin (2013) who found in their related researches that agriculture productivity and food security are negatively affected and influenced

by the ages of farmers due to fact that as ages increases, strength decreases finally the production decreases as well.

Level of education of respondent in this research presented a non-significance statistically in influencing the food security after receiving and using the agriculture subsidies which different from the previous results of Oluwatosin (2013) stating that the agricultural production and food security in general depend upon the percentage of low level of education people involved in agricultural programs because agriculture is their principal occupation whereas others complementary to their employment.

Gender and the size of household of respondents in this conducted research were not statistical significant to the prediction of food security in Nyabihu District basing on using agriculture subsidies. And these findings are contrary to those found by Dorward *et al.*(2014) and Mugalavai (2012) in their studies where they came up with saying that the male-headed families influence food security positively and great number of family members (household size) affects food security negatively.

Whereas marital status ($OR = 5.394 > 1$ and $p \text{ value} = .034 < .05$) which means that marital status has a positive statistical significance in the prediction of improving the food security in Nyabihu District where being married is 5.394 times comparing to being single and using subsidies. And employment status ($OR = 3.210 > 1$ and $p \text{ value} = .027 < .05$) has a positive statistical significance in prediction of food security improvement where being a farmer and using subsidies is 3.210 times compared to other employment type like government employee or other. These results are the same as those found by Mugalavai (2012).

In the table14 below, the Attitudes of people regarding programs and strategies of distribution of subsidies; and factors affecting food security presented odds of regression (OR) and p values which are greater than one and less than .05, the meaning of positive statistical significance of those predictors to the improvement of food security in Nyabihu District and it was the majority of people strongly agreed with them. These results are the same as those have been found by (OAF, 2016 and RAB, 2020.) stating that there is no any form of discrimination or inequality in

distributing the agriculture subsidies to the people and by (MINAGRI, 2017) stating that the climate change reduces agricultural production tremendously.

The kind of agriculture subsidies provided and used in Nyabihu District, fertilizers and improved seed combined showed a positive statistical significance influence in the food security as $OR = 4.434 > 1$ and $p \text{ value} = .007 < .05$. This means that use of combination of fertilizers and improved seeds subsidies increases the yield and improve the food security 4.434 times compared to using only fertilizers or seeds subsidies. And this finding of this research is not different from the prescribed advice provided by OAF(2016 and RAB(2020.) stating that it is very important to use at the same time seeds and fertilizers provided by government or other entities because they provide also the related guidelines in using them.

And also in the table 14 below, the fact that government provided the regular training to the farmer showed a positive statistical significance in increasing the yield from agriculture later on in food security in Nyabihu District as $OR = 2.45 > 1$ and $p \text{ value} = .019$ which means that these trainings improves the yield 2.45 times more than yield in absence of trainings. And this finding is not different from that has been found by RAB (2020) and OAF (2016) stating that in order to have a sustainable food security in Rwanda, they have trained some people in every village in order to help others in the agricultural programs and activities.

Finally, the table 14 below showed the fact that the government did not provide adequate storage facilities to store the food and agro-processing plants to Nyabihu District presented a negative statistical significance in food security improvement as $OR = .998 < 1$ and $p \text{ value} = .011 < .05$.

Table 14: Logistic regression for food security improvement

Predictors	Pearson Chi- square (χ^2)	Sig	Odds or EXP(B)
Personal characteristics(demographic socioeconomic characteristic)			
Gender	1.008	.972	1.702
Marital status (married = 1)	2.553	.034	5.394
Age	.343	.876	.453
Education	.249	.0321	.329
Family members(above 5 = 5)	5.438	.572	.132
Employment status (Farmer = 1)	2.568	.027	3.210
Attitudes of people regarding programs and strategies of distribution of subsidies			
Agricultural subsidy accessibility in Nyabihu district is fast and free from any form of bureaucracy (strongly agree = 1)	1.345	.023	1.012
The process of agricultural subsidies accessibility is fair to the people (strongly agree = 1)	2.567	.0001	5.387
Everyone who needs agricultural subsidy is allocated subsidy (strongly agree = 1)	2.345	.0342	3.980
Agriculture subsidy is allocated to people who really need it without any form of influence (strongly agree = 1)	3.453	0.273	1.123
Agriculture subsidy is assigned to people who can use it productively to produce food for their families and to commercial farmers (strongly agree = 1)	2.345	0.500	4.938

The government provides infrastructures such as agro processing factories, communication network to people in Nyabihu District to facilitate ease farming.	3.473	0.023	3.432
The government provides necessary tools and facilities to ensure that farmers are in position to engage in agricultural production (strongly agree = 1)	1.345	.046	3.333
Agricultural subsidies availability determines food availability (strongly agree = 1)	2.232	.049	1.543
The rate at which the Rwandan Government is addressing the management of agriculture subsidy distribution helps to improve food supply (strongly agree = 1)	.098	0.008	1.234
Factors affecting food security			
The access to agriculture subsidies from the government affects food production in Nyabihu (strongly agree = 1)	1.899	.009	9.870
The better management of agriculture inputs and supplies affects food security in Nyabihu (strongly agree = 1)	2.212	.0347	1.322
The access to financial and technical support for best practices to farmers from the government and private sector affect agricultural production in Nyabihu District (strongly agree = 1)	12.344	.045	2.292
Farmers in Nyabihu use good farming agricultural tools and inputs like seeds and fertilizers which affects crop yield (strongly agree = 1)	17.595	.038	3.343
Farmers in Nyabihu are well trained which makes them able to produce more (strongly agree = 1)	2.435	.044	.5.847
The willingness of people to engage in agricultural work leads	4.384	.002	2.202

to more food production in Nyabihu District (strongly agree = 1)			
Others			
Which kind of subsidies has been used (fertilizers and improved seeds 2)	20.987	.007	4.434
Does the government offer regular training to farmers on how to improve agricultural productivity? (yes=1)	2.233	0.019	2.45
Does the government provide farmers of Nyabihu District with storage facilities to store their food and agro-processing plants? (not=2)	0.895	0.011	.998

CHAPTER FIVE: CONCLUSION AND RECOMMENDATIONS

5.1. Conclusion

To conclude this work which had then main objective was to evaluate the effectiveness of agriculture subsidies in the improvement of food security in Rwanda, in Nyabihu District. And with specific objectives were to evaluate how access to acquired fertilizers and improved seeds help in improving food security in Nyabihu District. Then after to assess how management of agriculture inputs and supplies affects food security in Nyabihu District. To conduct this research, the people who are already using agriculture subsidies were asked different questions aiming to get the related results to my study.

As the matter of finding in this research conducted in western province, Nyabihu district, I found that males, primary level of education, farmers, married and old people are more likely to engage in agricultural programs and activities to upgrade their production and also food security. But the marital status, employment status and type of used subsidies have a statistical significance in relationship to the high production compared to other variables comprising the demographic socioeconomic characteristic of my respondents. And the majority of people in Nyabihu District strongly agree with the distribution policy of agriculture subsidies and the factors affecting their food security in their district.

It was from these different variables used as predictors in this research, the marital status, employment status, types of used subsidies, the Attitudes of people regarding programs and strategies of distribution of subsidies; and factors affecting food security, availability of trainings, stores and agro food processing plants were considered as positive statistical significant predictors in my research basing on their significance level and odds of regression which were greater than 1 and less than .05 respectively.

5.2. Recommendations

5.2.1. Recommendations for policymakers

To ameliorate the life and food security status of the household, the following measure ought to be taking place. The regime and non-governmental organization must operate with pro farmers who cannot afford the contribution of famers to “Smart Nkunganire” scheme. In addition, since food security/insecurity status is different from area to area, the government must implement research based strategies. Again, depending to the findings of that study some households especially those which have many family members were unable to find the money to buy/ pay the remaining amount apart from government agricultural input support therefore there is a need to sensitize the family planning. Policymakers should also put into place programmes that would help the less advantaged groups to establish other means of making money, for example, entrepreneurship skills to help find for their families by giving these groups monetary capital to establish businesses instead of relying on subsidies from the government.

Lastly, there is a need to make a cross checking to if the government partners in implementation of Smart Nkunganire scheme are in right way because recently some of them started to misuse the funds allocated to that initiative.

5.2.2. Recommendations for Future Research

This study focused on exploring the effectiveness of agriculture subsidy on food security in Rwanda. There is therefore need to conduct extensive study to explore the impact of agricultural input subsidies management on food security in all Districts in Rwanda. This will help to gain comprehensive understanding on the impact of input distribution on food security in the country.

BIBLIOGRAPHY

- Abo, T. and Kuma, B. (2015). ‘Determinants of Food Security Status of Female-headed Households: The case of Wolaita Sodo town, South Nations, Nationalities and Peoples Region, Ethiopia’, *In International Journal of Scientific Footprints*, 3(2): 8–24.
- Acker, D., Gasperini, L. (2009). Education for rural people: the role of education, training and food security, Rome.
- Adebayo Oyefunke Olayemi (2012). “Effects of Family Size on Household Food Security in Osun State, Nigeria”, *In Asian Journal of Agriculture and Rural Development*, Vol. 2, No. 2, pp. 136-141.
- Agboola, P.O (2004). Economic Analysis of Household food Insecurity and Coping Strategies in Osun state, Nigeria. Unpublished PhD thesis, Department of Agricultural Economics, University of Ibadan, Oyo State.
- Akinloye, O., Putuma, M., & Adeyefa, S. A. (2016). Determinants of Food Insecurity among the Urban Poor in the City of Tshwane, South Africa.
- Anderson, M and Cook, J. (1999). Community food security: Practice in need of theory?, Springer, Available at <https://link.springer.com/article/10.1023/A:1007580809588>.
- Arene, C.J & Anyaeji, J. (2010). Determinants of food security among Households in Nsukka metropolis of Enugu State, Nigeria.
- Assefa, A.A. and Singh, K.N. (2018). ‘Determinants of food insecurity in the rural farm households in South Wollo Zone of Ethiopia: the case of the Teleyayen sub-watershed’, Agidew and Singh Agricultural and Food Economics. *In Agricultural and Food Economics*, 6(10). doi: <https://doi.org/10.1186/s40100-018-0106-4>.
- Babu, S and Sanyal, P. (2009). Food Security, Poverty and Nutrition Policy, Washington DC.
- Baltzer, K and Hansen, H. (2012). Evaluation Study Agricultural input subsidies in Sub-Saharan Africa, Institute of Food and Resource Economics, University of Copenhagen, Denmark.
- Belinda Dodson, Asiyati Chiweza & Liam Riley. (2012). “Gender and Food Insecurity in

Southern African Cities. ” Urban Food Security Series No. 10. Queen’s University and AFSUN: Kingston and Cape Town.

Bosch, RA (1985). *The Economies of Agricultural Subsidies*, Wageningen.

Breckwich, V, Lanza, D, Hennessey, S, Facente, S, Halpin, H A, Minkler, M.(2007).

"Addressing food security through public policy action in a community-based participatory research partnership", *In health promotion practice. 8 (4): 342–349.*

doi:10.1177/1524839906298501.

Canals Laia (2017). Instruments for gathering data. In E. Moore & M. Dooly (Eds), *Qualitative approaches to research on plurilingual education* (pp. 390-401). Research-publishing.net. <https://doi.org/10.14705/rpnet.2017.emmd2016.637>.

Chirwa, T. G. (2010). Program evaluation of agricultural input subsidies in Malawi using treatment effects: Methods and practicability based on propensity scores.

Coleman-Jensen, Alisha, Matthew P. Rabbitt, Christian A. Gregory, and Anita Singh. (2019). Household Food Security in the United States in 2018, ERR-270, U.S. Department of Agriculture, Economic Research Service.

Dean T.JamisonPeter R.Moock (2002). Farmer education and farm efficiency in Nepal: The role of schooling, extension services, and cognitive skills, Washington, D.C.

Dorward, A,et al.2012).Towards ‘smart’ subsidies in agriculture? Lessons from recent experience in Malawi, in Overseas Development Institute, UK.

Dorward, A., & Chirwa, E. (2011). The Malawi agricultural input subsidy programme: 2005/06 to 2008/09. *In International journal of agricultural sustainability, 9(1), 232-247.*

Dorward, A,et al.(2014). Protocol: Agricultural input subsidies for improving productivity, farm income, consumer welfare and wider growth in low-and middle-income countries: A systematic review: Pennsylvania: The Campbell Collaboration.

Druilhe, Z., & Barreiro-Hurlé, J. (2012). Fertilizer subsidies in sub-Saharan Africa: ESA working paper.

Ephraim W. Chirwa, Mirriam Matita and Andrew Dorward (2011). Factors Influencing Access to Agricultural Input Subsidy Coupons in Malawi, available at www.future-

- agricultures.org and accessed on 30th May 2021.
- Fan, S., A. Gulati and S. Thorat (2007). Investment, Subsidies, and Pro-Poor Growth in Rural India. IFPRI Discussion Paper 716. Washington D.C., IFPRI.
- FAO (2016). Sustainable agricultural development for food security and nutrition: what roles for livestock? A Report by the High Level Panel of Experts on Food Security and Nutrition, Available at <http://www.fao.org>.
- FAO (2017). The Future of Food and Agriculture - Alternative pathways to 2050. Rome, FAO. (also available at www.fao.org/3/CA1553EN/ca1553en.pdf).
- FAO, IFAD & WFP. (2015). The State of Food Insecurity in the World 2015. Meeting the 2015 international hunger targets: taking stock of uneven progress. Rome, FAO.
- FAO, IFAD, UNICEF, WFP & WHO.(2017). The State of Food Security and Nutrition in the World 2017: Building resilience for peace and food security, Rome, Italy.
- FAO, IFAD, UNICEF, WFP, WHO (2020) The state of food security and nutrition in the World, Rome, Italy.
- FAO,(2006). The state of food and agriculture, Rome, Italy.
- Fisher, M., Kandiwa, V., (2014). Can agricultural input subsidies reduce the gender gap in modern maize adoption? Evidence from Malawi. *Food Pol.* 45, 101–111.
- Food and Agricultural Organization of the United Nations (FAO). 2008a. Food Security in Protracted Crises: What Can be Done? Food Security Information for Action. Policy Brief. Food and Agriculture Organization, Rome, Italy.
- Garrone,M, Emmers, D, Lee,H, Olper,A, Swinnen, J.(2019).Subsidies and agricultural productivity in the EU, available at <https://doi.org/10.1111/agec.12526>.
- Global Panel on Agriculture and Food Systems for Nutrition (GLOPAN). 2016. Food systems and diets: facing the challenges of the 21st century. London. (also available at <http://glopan.org/sites/default/files/ForesightReport.pdf>).
- Godwin Anjeinu Abu and Aondonenge Soom (2016). Analysis of factors affecting food security in rural and urban farming households of benue state, NIGERIA
- GOM and World Bank (2007).Malawi – Poverty and Vulnerability Assessment: Investing in Our Future, Washington, D.C., USA: The World Bank and Government of Malawi.
- Goodwin, Barry K., Ashok K. Mishra, and François Ortalo-Magné. (2005). “Landowners' Riches: The Distribution of Agricultural Subsidies.” Working paper, February 2005.

- Gregory, I. (2006). The Role of Input Vouchers in Pro-Poor Growth. Background Paper Prepared for the African Fertilizer Summit, June 9-13, 2006, Abuja, Nigeria.
- GROW AFRICA (2014). The agricultural transformation agenda: the plan to recover Nigeria's global market share in agriculture, available at www.growafrica.com.
- Guancheng Guo, Qiyu Wen, and Jingjuan Zhu (2015). The Impact of Aging Agricultural Labor Population on Farmland Output: From the Perspective of Farmer, *Hindawi Publishing Corporation Mathematical Problems in Engineering Volume 2015, Article ID 730618, 7 pages* <http://dx.doi.org/10.1155/2015/730618>.
- Hamm, M., Bellows, A. (2003). "Community food security and nutrition educators". *Journal of Nutrition Education and Behavior*. 35 (1): 37–43. doi:10.1016/s1499-4046(06)60325-4. PMID 12588679.
- IFDC (2014). Rwanda Fertilizer Assessment, Kigali, Rwanda.
- International Alert–Rwanda and Pro-Femmes/Twese Hamwe (2018). Towards sustainable agriculture - An analysis of farmers' participation in agriculture programmes in Rwanda, Kigali.
- Jacobs, P. (2009). Identifying Targets for Household Food Security in South Africa. Pretoria: Centre for Poverty, Employment and Growth, Human Science Research Council.
- Jayne, T., Yeboah, F.K. & Henry, C. (2018). The future of work in African agriculture: trends and drivers of change. ILO Research Department Working Paper 25. Geneva, Switzerland.
- Jill Lambden, Olivier Receveur & Harriet V. Kuhnlein (2007). Traditional food attributes must be included in studies of food security in the Canadian Arctic, *International Journal of Circumpolar Health*, 66:4, 308-319, DOI: 10.3402/ijch.v66i4.18272.
- Karla L. Hanson, Jeffery Sobal, Edward A. Frongillo, (2007). Gender and Marital Status Clarify Associations between Food Insecurity and Body Weight, *The Journal of Nutrition*, Volume 137, Issue 6, June 2007, Pages 1460–1465, <https://doi.org/10.1093/jn/137.6.1460>.
- Kelly, V. & Crawford E. (2010). Panacea or Pandora's Box Fertilizer subsidy impacts and recommendations for improving subsidy performance. Policy Synthesis for cooperating USAID offices and country missions. Presentation at USAID, Washington DC, USA.
- Kelly, V. A., Boughton, D., Lenski, N. (2010). Malawi Agricultural Inputs Subsidy Program:

- Evaluation of the 2007/08 and 2008/09 Input Supply Sector Unpublished paper, International Development, Department of Agricultural Food and Resource Economics, Michigan State University, East Lansing, USA.
- Kothari, D., Reddy, V. R., Sathe, V., Gupta, A., Banerjee, A., & Awasthi, A. (2008). Raman. Lawrence, G, Lyons, K, Walngton, T.(2009).Food security, nutrition and sustainability, Earthscan, London,UK.
- Makombe, T., Lewin, P., Fisher, M., (2010). The Determinants of Food insecurity in Rural Malawi: Implications for Agricultural Policy”. *Int. Food Policy Res. Inst.*
- Makwarela Murunwa and Magolela, Japhta.M (2009). Integrated Food Security Policy and Strategy for the City of Tshwane, Agriculture and Environmental Management Department, Mayoral Committee Cluster, Economic Development and Portfolio Committee on Agricultural Environmental Management,Pretoria, South Africa.
- Masats, D. (2017). Conversation analysis at the service of research in the field of second language acquisition (CA-for-SLA). *In E. Moore & M. Dooly (Eds), Qualitative approaches to research on plurilingual education (pp. 321-347)*. Research-publishing.net. <https://doi.org/10.14705/rpnet.2017.emmd2016.633>.
- MINAGRI (2017).Rwanda’s Strategic Plan for Agriculture Transformation 2018-2024(PSTA 4).
- MINAGRI (2017).National Agriculture Policy, Kigali.
- MINAGRI (2019). Leveraging Private Sector Strategy, Report, Kigali.
- Morris, M., Kelly, V. A., Kopicki, R., Byerlee, D. (2007).Fertilizer Use in African Agriculture, World Bank, Washington DC.
- Mugalavai Violet Kadenyeka ,Chepkoilel. The effect of gender on the food security of urban agriculture households: a case of eldoret, University College, Eldoret.
- Mwesigye A.(2017). The educing poverty through fertilizer subsidy programe “evidence from Rwanda”, Jomo Kenyatta University of Agriculture and technology, *In International Journal of Agricultural Extension and Rural Development Studies Vol.5, No.4, pp.18-37, September 2017*.
- Ndakaza J. et al.(2016). The household food security in Rwanda: probit regression approach, Kigali.

- Ndayisaba, F. (2019). Determinants of enrollment in community based health insurance among men in Rwanda, a case study of Musanze District, Wonju.
- Ngware, M. W., Oketch, M., Ezeh, A. C., Mutisya, M., & Ejakait, C. E. (2012). Assessing the impact of free primary education using retrospective and prospective data: lessons from the Nairobi case study. *International Journal of Research & Method in Education*, 35(1), 71–92. doi:10.1080/1743727X.2012.666717.
- NISR (2018). Comprehensive Food Security and Vulnerability Analysis, Kigali.
- Nyabihu District (2013). District potentialities assessment for the integrated and self-centered local economic development/ led potentialities, Nyabihu district, Rwanda.
- Ofgren, H. and Richards, A (2003). Food security, poverty and economic policy in the Middle East and North Africa. *In TMD Discussion Paper No 111, Trade and Macroeconomic Division*, IFPRI, Washington D.C.
- Olayide, S.O., Ewewa, J.A. & Bello-Osagie, V.E. (1980). Nigeria small farmers: problems and prospects in integrated rural development. Ibadan: Centre for Rural Development.
- Oluwatosin Oluwasegun F. (2003). Federal University of Technology, NIGERIA, farmers perception of the effect of aging on their agricultural activities in Ondo state, Nigeria, Venets: *In The Belogradchik Journal for Local History, Cultural Heritage and Folk Studies Volume 4, Number 3, 2013*.
- ONE ACRE FUND/ TUBURA, (2016). Comprehensive Impact report / Decade of measurement and impact , Kigali.
- Pasquale De Muro and Francesco Burchi (2007). Education for Rural People and Food Security a Cross Country Analysis, Rome.
- Pernechele, V., Balié, J. & Ghins, L. (2018). Agricultural policy incentives in sub-Saharan Africa in the last decade (2005-2016): Monitoring and Analysing Food and Agricultural Policies (MAFAP) synthesis study. FAO Agricultural Development Economics Technical Study 3, Rome.
- R. Wendy Karamba, Paul C. Winters (2014), Gender and agricultural productivity: implications of the Farm Input Subsidy Program in Malawi, Washington, D.C.
- Regional Agricultural Trade Intelligence Network (RATIN) (2018). Smart Nkunganire System to enhance access to Agriculture, Available at [Http://ratin.net](http://ratin.net).
- Reincke, K., Vilvert, E., Fasse, F., Graef, F., Sieber, S., & Lana, M.A. (2018). Key factors

- influencing food security of smallholder farmers in Tanzania and the role of cassava as a strategic crop. *Food Security*, 10, 911–924 doi: org/10.1007/s12571-018-0814-3.
- Rosegrant *et al.* (2005). Looking Ahead. Long-Term prospects for Africa’s Agricultural Development and Food Security. Washington D.C.
- Rwibasira, TM (2018). In-depth study on “analysis of value chain for intensified crops and market price in Rwanda; the case study: irish potatoes, maize and rice”, Kigali.
- Sandelowski, M.(2000). Focus on Research Methods Combining Qualitative and Quantitative Sampling, Data Collection, and Analysis Techniques in Mixed-Method Studies, University of North Carolina, available at <https://onlinelibrary.wiley.com>.
- Sanusi, R. A., C. A. Badejo and B. O. Yusuf (2006) .“Measuring household food insecurity in Selected Local Government Areas of Lagos and Ibadan, Nigeria. *In palc. J. Nutri, Vol. 5, pp.62-67.*
- Scanlan, S.(2003). Food Security and Comparative Sociology: Research, Theories, and Concepts, *In International Journal of Sociology*, Ohio University, Available at <https://www.researchgate.net>, Doi:10.1.80/15579336.2003.11770272.
- Schmitz, A, Troy G. Schmitz, TG, Rossi, F.(2006). Agricultural Subsidies in Developed Countries: Impact on Global Welfare. *Review of Agricultural Economics—Volume 28, Number 3*, DOI:10.1111/j.1467-9353.2006.00307.
- Smale, M. & Jayne, T. (2009). Breeding and 'amazing' crop: improved maize in Kenya, Malawi, Zambia and Zimbabwe.
- SPIELMAN, D. J. & PANDYA-LORCH, R. (eds.) Millions fed: proven successes in agricultural development, Washington D.C.
- Spittler, J, Ross, R, Block, W. (2011). The Economic Impact of Agricultural Subsidies in the United States , Loyola University, New Orleans.
- Tabitha, K. and Clem, T. (2003). Marital Status, Farm Size and other Influences on the Extent of Cash Cropping in Kenya: A Household Case Study, Nairobi.
- Togunu-Bickersteth, F. (1987). Chronological definitions and expectations of old age among young adults in Nigeria. *In J. Aging Studies, 1, 113-124.*
- Troubat, N., Faaloa, E. & Aliyeva, R. (2020). The State of Food Security and Nutrition in Samoa, based on the analysis of the 2018 Household Income and Expenditure Survey. Apia, Samoa, FAO.

- Ugwoke, F.O., Adesope, O.M. & Ibe, F.C. (2005). Youths participation in farming activities in rural areas of Imo State, Nigeria: implications for extension. *Journal Agricultural Extension*, 8, 136-141.
- USAID (2019). Improving the design and implementation of fertilizer subsidy programs in west Africa, proposed guidelines for smart subsidy programs.
- Von Braun, J. (2008). Food and Financial Crisis: Implications for Agriculture and the Poor. Food Policy Report. International Food Policy Research Institute. Washington, D.C.
- Walls, HL, Johnston, D, Tak, M, Dixon, J, Hanefeld, J, Hull, E, Smith, RD (2018). The impact of agricultural input subsidies on food and nutrition security: A systematic review, Springer.
- Weatherspoon, D.D., Miller, S., Ngabitsinze, J.C. et al. (2019). Stunting, food security, markets and food policy in Rwanda. *BMC Public Health* 19, 882 <https://doi.org/10.1186/s12889-019-7208-0>.
- Weatherspoon, D., et al. (2019). Stunting, food security, markets and food policy in Rwanda. *BMC Public Health* 19, 882.
- WFP (2018). Rwanda: Comprehensive Food Security and Vulnerability Analysis 2018, Kigali.
- WFP. (2020). Impact of COVID-19 outbreak on livelihoods, food security and nutrition in East Africa. Nairobi. Available at <https://reliefweb.int/sites/reliefweb.int/files/resources/WFP-0000114452.pdf>.
- WHO (2020). Food and nutrition during self-quarantine: what to choose and how to eat healthily. Available at: www.euro.who.int/en/health-topics/health-emergencies/coronavirus-covid-19/news/news/2020/3
- Winne, M. (2011). Community Food Security: Promoting Food Security and Building Healthy Food Systems. Available at <https://www.hungercenter.org>.
- World Bank (2009). Niger Food Security and Safety Nets; Report No. 44072-NE; World Bank, Washington, DC. Available at: http://reliefweb.int/sites/reliefweb.int/files/resources/fullreport_154.pdf (accessed on 19 May 2021).
- World Food Programme. (2006). World Hunger Series 2006: Hunger and Learning. World Food Programme and Stanford University Press.

- World Food Programme. (2009). Summary of Food Security and Vulnerability in Selected Urban Centers of Ethiopia. Addis Ababa. Available at:
<http://documents.wfp.org/stellent/groups/public/documents/ena/wfp221386.pdf>.
- World Food Summit (1996). Food And Agriculture Organization Of The United Nations, Rome,Italy.
- Wright, J. (2009). Sustainable Agriculture and Food Security in an Era of Oil Scarcity, Earthscan, London,UK.
- Yawson, D. O, Armah, F. A.& Afrifa, E. K. A. (2010) . Ghana’s fertilizer subsidy policy: Early field lessons from farmers in the central region. *Journal of Sustainable Development in Africa*, 12,191–203.

APPENDICES

Appendix A: Questionnaire



UNIVERSITY *of*
RWANDA

RESEARCH QUESTIONNAIRE

INTRODUCTORY PAGE

Dear respondent, I am Egide HARELIMANA, a student at the University of Rwanda in the College of the Arts and Social Sciences (CASS), Center for Conflict Management (CCM) pursuing a MA in Peace Studies and Conflicts Transformation. I am collecting data on the **evaluation of the effectiveness of agriculture subsidies in the improvement of food security in Rwanda, a study of Nyabihu District**. You have been selected to take part in this study. You are therefore kindly requested to complete this questionnaire to enable me collect the data needed for this study. Your participation in this study is voluntary. Please note that all the data collected from this study will be used for academic purposes only. The researcher undertakes to protect the identities of the participants and therefore, personal information of the research participants will not be shared with any third party without the express consent of the research participants. Should you have any questions, please feel free to contact me on 0786823867 or on email: harelimanegide@yahoo.fr.

Thanking you in advance for your assistance.

Signed.....

Egide HARELIMANA(Researcher)

INSTRUCTIONS

Mark with an **X** inside the appropriate box next to the answer that applies to you. No multiple answers are required unless it is expressly stated in the question.

SECTION A

1. Gender of respondents

Male

Female

2. Age bracket of respondents

Between 21 and 30 years

Between 31 and 40 years

Between 41 and 50 years

Above 50 years

3. Marital status

Married

Single

4. What is your highest education level?

Primary level

Secondary level

Vocational training

University level

Others (please specify

5. Origin

Sector.....

Cell.....

Village

6. Employment status

I am a farmer

I am an agro- dealer

I am a government employee

7. Number of people that you are currently taking care of

None

One person

Between one and three people

Between three and five people

Above five people

SECTION B

8. What is the main agricultural activity undertaken by residents of Nyabihu?

Cattle farming

Crop farming

Forestry

Poultry farming

Others (Please specify.....)

9. In reference to question 8 above, is the land allocated to you or the one that you are currently using adequate for your agricultural needs?

Yes

No

10. How many hectares do you currently using for agriculture?

I am usingha

11. Are you among the beneficiaries of the government agricultural subsidy known as Nkunganire?

Yes

No

12. If yes, how long have you been receiving this subsidy?

I have been given it sinceyears

13. Which kind of subsidy have been given ?

Fertilizers

Seeds

Others

14. What was the yield before receiving subsidy?

Tones..... or kilogram s.....by hectare

15. What is the yield after receiving subsidy?

Tones..... or kilogram s.....by hectare

16. Are you satisfied with your yield?

Yes

No

17. What is the main purpose for engaging in food production?

To meet subsistence needs

For commercial purposes

Both for subsistence and for commercial purposes

18. In reference to question 16 above, if the main purpose of engaging is for subsistence, are you able to grow enough food for your family to last you one year on the piece of land that you have ?

Yes

No

19. What is the main source of your food supplies?

I grow most of my own food

I buy most of the food which I consume with my family

Others (Please specify.....)

20. On a scale of 1 to 5, with 1 representing strongly agree and 5 representing strongly disagree, indicate how agriculture subsidies distribution policy in Rwanda affects food security in Nyabihu

District.

Key

1. Strongly agree
2. Agree
3. I don't know
4. Disagree
5. Strongly disagree

S/N		1	2	3	4	5
a	The process of agriculture subsidies accessibility in Nyabihu District is fast and free from any form of bureaucracy					
b	The process of agriculture subsidies accessibility is fair to all people					
c	Everyone who needs agriculture subsidy is allocated subsidy by the government					
d	Agriculture subsidy is allocated to people who really need it without any form of influence					
e	Agriculture subsidy is assigned to people who can use it productively to produce food for their families and to commercial farmers					
f	The government provides infrastructures such as agroprocessing factories, communication network, to people in Nyabihu to facilitate easy farming					
g	The government provides necessary tools and facilities to ensure that farmers are in position to engage in agricultural					

	production					
h	Agricultural subsidies availability determines food availability					
i	The rate at which the Rwandan government is addressing the management of agriculture subsidy distribution helps to improve food supply in Rwanda					

21. Does the government offer regular training to farmers on how to improve agricultural productivity?

Yes, the government provides training to farmers on regular basis

The government does not offer regular training sessions to farmers on how to improve agricultural productivity

I don't know

22. Do you think the present state of infrastructure supports agricultural production in Nyabihu?

Yes

No

I don't know

23. Do the residents of the Nyabihu District have a food bank?

Yes

No

I don't know

24. Do you sell most of the food which you grow?

Yes

No

25. What is the main limiting factors to food production in Nyabihu District?

The land is not fertile

Limited accessibility to improved seeds

Farmer's insufficient knowledge in agriculture

Lack of machinery

Unwillingness by people to do agricultural work

26. On a scale of 1 to 5, with 1 representing strongly agree and 5 representing strongly disagree, indicate whether or not each of the following factors currently affect food security in Nyabihu District.

Key

1. Strongly agree

2. Agree

3. I don't know

4. Disagree

5. Strongly disagree

S/N		1	2	3	4	5
a	The access to agriculture subsidies from the government affects food production in Nyabihu District					
b	The better management of agriculture inputs and supplies affects food security in Nyabihu District					

c	The access to financial and technical support for best practices to farmers from the government and private sector affect agricultural production in Nyabihu District					
d	Farmers in Nyabihu use good farming agricultural tools and inputs like seeds and fertilizers which affects crop yield					
e	Farmers in Nyabihu are well trained which makes them able to produce more					
f	The willingness of people to engage in agricultural work leads to more food production in Nyabihu District					
g	The favorable climatic conditions lead to better yields					

27. Does the government provide farmers of Nyabihu District with storage facilities to store their food and agroprocessing plants?

Yes

No

28. Are you aware of some people who have land in Nyabihu District but they are not utilizing the land for agricultural purposes?

Yes

No

29. What do you think should be done again that allows you to be more productive and continue to improve food security in Nyabihu District?

.....

The End:

Thank you so much for your time and for taking part in this study.

APPENDIX B: INTRODUCTORY LETTER



APPENDIX C: TURNITIN REPORT

THESIS SUBMISSION			
ORIGINALITY REPORT			
6% SIMILARITY INDEX	6% INTERNET SOURCES	2% PUBLICATIONS	1% STUDENT PAPERS
PRIMARY SOURCES			
1	en.wikipedia.org Internet Source		1%
2	eprints.soas.ac.uk Internet Source		1%
3	reliefweb.int Internet Source		1%
4	www.scribd.com Internet Source		1%
5	www.oxfordscholarship.com Internet Source		1%
6	docplayer.net Internet Source		1%
7	extwprlegs1.fao.org Internet Source		1%
8	Submitted to Dallas Baptist University Student Paper		1%