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Drought and Food Security in Gatumba Zone, Burundi

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Abstract: This study examined at addressing the pressing issue of food insecurity in Gatumba
Zone, Burundi, resulting from the adverse impacts of climate variability, particularly droughts.
This study was guided by Food Availability Decline theory and the Theory of Change and
anchored on case study research design. Both primary and secondary data were utilized in this
study. The data collected revealed that farm productivity is affected significantly by droughts. The
findings highlighted the significant influence of climate variability on farm productivity, with
droughts leading to crop damage reduced vields and food shortages Displacement of farmers
due to droughts further exacerbated food insecurity in the region Coning strategies such as early
maturing crop varieties and irrigation were identified along with governmental interventions
aimed at enhancing resilience. The study recommends the urgent need for comprehensive
aimed at enhancing residence. The study recommends the argent need for comprehensive
strategies to mitigate the impacts of climate variability on food security and promote sustainable
agricultural practices in Gatumba Zone and other similar regions. The study further
recommended to include farmer education initiatives, land allocation for displaced persons, and
short-term drought control measures.

Key Words: Food Insecurity, Climate Variability, Farm Productivity, Drought.

1.1 Background of the Study

The study aimed to investigate the effects of climate variability and food security in Gatumba zone, Burundi as potential threats that climate variability posed to Burundi's food security, particularly in terms of an uneven and destabilizing distribution of resources and changing patterns of conflict and migration. Food security has been a prevalent concern since the turn of the century, driven by alarming statistics on global hunger. According to the United Nations (UN), an estimated 800 million people were grappling with hunger in 2021, marking a significant increase of approximately 46 million from the previous year's figures (FAO, 2022). Projections indicate that these numbers will continue to rise, with Africa bearing the brunt as the most affected region, where around 140 million individuals are facing acute food insecurity, as reported in the Global Report on Food Crises 2022 (*World Bank, 2022*).

Climate variability has exacerbated food insecurity in numerous countries, contributing to the progressive decline in agricultural production observed over the past five decades in Africa. This term encompasses fluctuations in the earth's climate patterns over short and long timescales, including variations in temperature, wind patterns, and precipitation, among other natural climate parameters. According to Verschuur *et al.*, (2021), climate variability accounts for 30% of the change in global agricultural yields, leading households to allocate a larger share of their incomes to staple foods, thereby pushing many into poverty. Insufficient food intake also has adverse effects on the health and wellbeing of individuals.

At the global level, India is one of the countries whose agricultural sector has been greatly affected by climate variability. The food system in this country has been affected by change in the production levels of its agricultural sector (Ajay & Pritee, 2013). The heat waves experienced in this country have negatively affected agriculture and food security. The damage that climate variability causes on crops, especially wheat has affected food supply, which has prompted significant rise in the price of wheat and its products. In a report that was released by the Global Food Policy Report in 2022, it warned that the variability of climate in India is likely to push more Indians towards hunger by 2030 because of the declining production levels.

Regionally, millions of people in Angola do not have access to sufficient food. The drought spells in this country have gotten worse in recent years and have forced about 3.8 million people into food insecurity (UNICEF, 2023). Because of climate variability, the agricultural harvesting seasons record losses of up to 40%, which in turn has affected households' livelihoods and incomes. The low harvests have severely affected access to food especially in rural areas. According to the International Fund for Agriculture Development (IFAD), majority of Angolans live in rural areas, and largely depend on rainfed agriculture as their source of food and income (IFAD, 2023). Therefore, many households face hunger and poverty because of the erratic rains. Food insecurity in urban areas is also high because they depend on the farm produce supplied by the farmers. So, low production in the rural areas affects the quantity of food supplied in urban areas. Because of the severe drought conditions in Angola, UNICEF has been heavily engaged in the provision of humanitarian assistance to prevent malnutrition among children and save lives of those suffering severe malnourishment.

The impact of climate variability on food security in Kenya is quite noticeable in terms of rainfall irregularity and temperature increase. Climate variations have greatly undermined agricultural production in various agricultural regions in this country. Agriculture is the mainstay of the Kenyan economy, contributing approximately 25.6% of its Gross Domestic Product (GDP), an indication that it is a major source of food security and income for the rural folk (Ochieng et al., 2016). The dependency on rainfed agriculture has affected both crop and livestock yield. Downing (1992) established that in the semi-arid areas of the country, high temperatures favour production in highland but affects lowland areas negatively. Therefore, agricultural yield declines significantly in the lowlands when the temperature is high and precipitation low. According to Ochieng et al (2016), in response to the challenge of food insecurity posed by climate variability, the Kenyan government has implemented initiatives such as the National Climate Change Response Strategy (NCCRS) to strengthen nation-wide focused actions that can help mitigate the effects of unpredictable climatic conditions on food production. Addressing the threats of climate variability is also a priority in Kenya Vision 2030, a development foot print that is expected to raise the living standards of its people.

Climate variability has had notable effects on Burundi. The weather patterns shift from dry spells, high winds to heavy rains, and these conditions are becoming increasingly extreme and unpredictable. Some people died by the effect of droughts and thousands of people displaced. The consequences of climate shocks on food production in this country are enormous. Majority of the people are subsistence farmers and climate variability is a serious constraint that has affected production. The climate hazards include erratic rainfall, drought, floods and landslides. As a result, domestics demand for food has outpaced demand. Against this background, this research study conducted an in-depth analysis on the effects of climate variability on Burundi food security,

with a specific focus on Gatumba zone.

1.2 Statement of the Problem

In Africa, climate extremes, such as droughts, floods, landslides, and windstorms, have become increasingly prevalent. Achieving food security and ending hunger amidst the ongoing impacts of climate variability is a key priority within the Sustainable Development Goals (SDGs). SDG 2 aimed to eradicate world hunger by 2023. However, the 2023 SDG report highlighted that food insecurity remains a pervasive threat to the lives of millions across the globe. 9.2 percent of the global population, equivalent to 735 million people, face chronic hunger (United Nations, 2023). It is clear that climate variability has been a key contributor to exacerbating the world's population vulnerability to food insecurity. According to the United Nations World Food Program (WFP), Africa is greatly affected, and it identified Burundi among the nations facing widespread hunger. At least half of the population is suffering from chronic hunger. Another key indicator is the soaring food prices in Burundi. The food insecurity has led to its classification as one of the "red zone" countries by the WFP. It has also been determined that the total food production in Burundi is capable of covering only 55 days per person per year (WFP, 2021). These repercussions are experienced despite a greater proportion of Burundi's population identifying as farmers. Exploring the climate variability effects manifestation in Burundi is key to understanding the reason that the problem of food insecurity persists in this country. Normally, the ripple effects of food shortages can also extend beyond individual households to impact entire communities and the nation's development trajectory. Reduced agricultural productivity not only undermines food availability but also diminishes income opportunities for farmers, perpetuating cycles of poverty and inequality. Furthermore, food insecurity can fuel social unrest and migration, straining the already fragile systems of governance and exacerbating humanitarian crises. This study therefore sought to investigate drought as among the complex impacts of climate variability on food security in Burundi focusing on Gatumba Zone.

1.3 Study Objective

To analyse the extent that droughts affect food security in Gatumba zone.

1.4 Justification

Climate variability, characterized by fluctuations in precipitation, temperature, and general weather patterns, poses significant disruptions to agricultural systems. Hence, this study investigating the impact of droughts on food security in the Gatumba zone was justified. Without it, there would be limited research available regarding the state of food security in the selected study site, attributable to the unfavorable climatic conditions prevalent in this region. Given the vulnerability of the agricultural sector, it was imperative to explore if droughts in the Gatumba zone have impacted agricultural practices and crop harvests. Projections indicate that extreme weather conditions will become more severe in the future, underscoring the necessity to comprehend the impact of this conditions on the welfare of the people. Ignoring this area of study would deprive individuals and states of the knowledge required to mitigate the effects of droughts on food security.

1.5 Theoretical Framework

Food Availability Decline (FAD) Theory

The FAD approach is credited to the scholarly works of the economist, Amartya Sen (Bowbrick, 2022). One of the core assumptions of this theory is that a sudden reduction of food supply causes famines. It describes that the major causes of this decline are wars, epidemics and natural disasters, such as floods, drought, and pest infestation to mention a few. According to Atubiga and Donkor (2022), the FAD approach explains further that, due to the constraints on food availability caused by climatic hazards, the prices of food commodities rise, posing challenges for vulnerable households in meeting their basic needs. This is an approach that underscores that natural phenomena like floods and dry spells have the potential to reduce food production, which is a

critical factor leading to food insecurity (Milà-Villarroel *et al.*, 2016). Additionally, it also recognizes that a combination of factors, including deforestation, overgrazing, environmental degradation, and decreased rainfall in arid regions such as Africa, could contribute to a decline in food production. It is a relevant theory in this study because it predicts what the objective of this research seeks to establish. The objective is concerned with the effects of drought on farm productivity. As earlier explained, FAD theory emphasizes that droughts and floods can cause a decline in production, which means that farm productivity is affected and the agricultural activities are also hampered.

1.6 Literature Review

Effect of Drought on Food Security

According to the UN report, *Drought in Numbers 2022*, droughts cause the largest number of climate-related deaths in developing countries (UN, 2022). Other economic losses as a result of drought have also increased multifold over the last decades. Its effect on farm productivity is significant. Across the globe, the devastating effects of droughts are felt in various countries. Ray *et al.*, (2018) explains that drought causes water deficit which affects plants growth negatively and the end result is reduced crop yield. They describe Texas as a country that has shown great vulnerability to droughts, which is further compounded by the rapidly growing population.

The frequency and magnitude of droughts in Texas keep changing, and its impact on cropping systems and crop production is significant. The extremely high temperature where there is a drought spells, affect the yield of major crops in Texas including soybean, wheat, sorghum, cotton and corn. Ray *et al.*, (2018) express that the water needs of various crops differ. For instance, corn requires more water than sorghum and cotton. Since major drought reduces the soil moisture, the crop yield ends up reducing. Although planting drought-tolerant crops is recommended, Zipper *et al.*, (2016) explains that the variability of drought affects the farmer's ability to plan adequately to mitigate the potential adverse impact it has on agriculture. Ray *et al.*, (2018) conducted a study to evaluate drought impact on corn, sorghum, cotton and wheat in Texas from 2008-2016. It was established that when the drought periods increased, the yield from the farms would reduce.

The impact of climate variability on the food systems in the US Caribbean is also significant. The devastating effects of droughts on farm productivity are observed in Puerto Rico and U.S Virgin Islands (Holupchinski, 2017). Crop losses attributed to drought spells that occurred between 2014-2016 is in millions of dollars. During the 2014 drought, the most affected group was coffee farmers. In 2015, drought adversely impacted plantains, fodder, and grass, with the total losses for the year amounting to about USD\$ 14 million (Holupchinski, 2017). When the staple crops are affected, food availability in the households becomes a challenge. Even if food is imported to supplement low local supply, often, such foods may contain preservatives or may be of lower quality, which affects human health. The author goes ahead to say that it is not only long-term droughts that affects productivity in the US Caribbean, but the effects of short-term droughts are equally detrimental to farm productivity, especially when it occurs during key crop development stages such as planting or flowering. It ends up stunting the crops growth resulting in low quantity and quality of produce.

Summer *et al.*, (2023) took on a different perspective from Ray *et al.*, (2018) and Holupchinski (2017) in determining how droughts affect farm productivity. They focused their study on how farmers' decisions are affected by drought and how it affects the quantity of the harvest. He established that when drought occurs during the pre-planting season, farmers tend to decrease the acres they had planned to plant. Booth *et al.*, (2020) agree that pre-planting conditions form the farmers' risk perceptions and expectations. When drought begins during the pre-planting season and the farmers expect it to get more severe, they end up reducing the number of acres they were planning to plant, especially in the drought-sensitive and less productive lands. This kind of selective planning ends up affecting yield.

Mali, a country in West Africa, has also been grappling with the effects of droughts on farm productivity. This is a country characterized by climate variability and therefore highly vulnerable to extreme climatic conditions.

According to the World Bank, Mali experiences recurrent droughts that have altered the composition and characteristics of its vegetation (World Bank, 2023). It experiences crop losses of up to USD\$9.5 million annually because of droughts. The growing number of droughts in this country vary in the degree of severity. As a nation heavily dependent of agriculture as the major source of food and livelihood, droughts present a major threat to the food security in Mali and Malian farmers are finding it increasingly difficult to meet the food demand in the country. The situation is further exacerbated by the fact that arable lands in this country are limited and there is also poor diversification of crops (Montaud, 2019). The major cash crops include rice and cotton, while subsistence crop production has concentrated on sorghum, rice, millet and maize. Farmers in this sector have been producing low yields, which has contributed greatly to the widespread poverty in this region. Caritas (2022) explains that because of low yields as a result of recurrent droughts, about 4.8 million of the population in Mali is food insecure.

In East Africa, several countries are prone to climate variability, especially droughts. In recent years, this region has experienced increasing trend of extreme temperatures. According to Gebrechorkos (2020), this explains why it is among the most food insecure regions around the globe, Drought is a major challenge because majority of the people are farmers. Ahmed *et al.*, (2023) study focused on Somalia as one of the countries in this region that has endured progression in dry seasons since 2000, sometimes extending even up to a period of three years. During such periods, crop yields, which are highly dependent on precipitation, are unfavourably affected, and the effect is observed in the form of diminished harvest yield. The author further mentions that declining farm yields in Somalia is a cause of food deficiency, declining incomes, rural-urban migration. The further expressed that agriculture is key to the economy not only because it assures it of food security, but because it interacts with other industries. Also, a nation with a steady agricultural sector tends to be viewed as a socially and politically stable country.

Drought however is a persistent problem in Somalia that has caused major reduction in agricultural production. In their study, Ahmed *et al.*, (2023) tried to identify the relationship between drought and farming, and they established that when drought increases, farming reduces. When there are fewer people willing to farm, the overall farm productivity reduces. Rowhani *et al.*, (2011) carried out a study to determine how extreme temperatures affect maize, rice and sorghum yields. After the analysis of the data, they found out that when temperature increases by 21°C, production of maize decreases by 5.2%, rice by 6% and sorghum by 5.3%.

Nshuti (2018) also carried out a study to establish the impact of drought on agricultural development in Burundi, Kenya, Rwanda, and Uganda. In this study, the researcher hypothesized that extreme temperatures affect maize production. The results of this study showed that increase in temperature from 1991-2015 affected the quantity of maize produced. These results show that in Burundi and other East African countries, droughts result in declining maize yield.

1.7 Methodology

This study adopted a case study research design. This design facilitated comprehensive and nuanced investigations into this complex real-world phenomenon of climate variability. Widely recognized across various disciplines, the case study design proves particularly valuable when seeking an in-depth understanding of real-life events, phenomena, or issues. Semi-structured questionnaires comprising both open-ended and closed-ended questions were employed. Another tool for collecting data that the researcher used was interview guide. Lastly, books, scholarly journals, reports, reputable websites were used in data collection. This study was conducted in Gatumba zone, Burundi. Burundi is a landlocked country located in East Africa. It is bordered by Rwanda to the north, Tanzania to the east and south, the Democratic Republic of the Congo (DRC) and Lake Tanganyika to the west. Burundi is a relatively small country in the African continent, known for its hilly terrain and beautiful landscape. Its capital city is Bujumbura. Gatumba zone is situated in the peri-urban area of the city of Bujumbura. It is bordered by Lake Tanganyika to the south, the rural commune of Gihanga to the north, Bujumbura to the west, and the DRC to the east. The main economic activities of the households in this

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Gatumba Zone are agriculture, pastoralism, and fishing. The targeted population comprised of the heads of households in Gatumba Zone, community leaders in Gatumba Zone, along with government officials working in the Ministry of Environment, Agriculture, and Livestock in the Republic of Burundi. For the heads of households participating in the study, a simple random sampling technique was employed. Through this method, each head of household within Gatumba zone was afforded an equal opportunity for inclusion. The same approach was applied in identifying the community leaders who participated in this study. In contrast, for respondents affiliated with the Ministry of Environment, Agriculture, and Livestock in Burundi, a purposive sampling strategy was utilized. This deliberate selection process involved identifying individuals possessing the requisite expertise to contribute meaningfully to the study's objectives. Specifically, individuals knowledgeable about climate variability and its impact on food security within Gatumba zone were targeted for inclusion. The sample size was calculated using Taro Yamane's (1967) formula. The mathematical representation of this method is as follows:

 $n = N/(1+N(e)^2)$

N signifies the populations getting studied. The total population for this study is 3365 as illustrated by Table 1 e is the margin of error. This study used a margin of error of 0.1.

n= 3365/ (1+3365(0.1)²) n= 3365/ (1+3365(0.01) n=3365/ (1+33.65) n=3365/34.65 n=97

Table 1: Target Population and Sample Population

	Target Population (N)	Sample population (e)
Households in Gatumba Zone	3210	75
Community Chiefs	55	12
Representatives Ministry of Environment,	100	10
Agriculture and Livestock		
Total	3365	97
Source: Field data, 2024		

This research study relied mainly on primary data from a self-administered semi-structured questionnaire. Secondary data was derived from scholarly articles, newspapers, books, and web links. Data collected from the field was filtered, sorted and cleaned in line with research objectives. The data was then coded, and entered into and analyzed using statistics software (SPSS, Version 27.0). Quantitative data was analyzed using descriptive statistics. It involved calculation of percentages, and frequencies. Thematic analysis entailed the creation of themes related to the study variables. This was performed on the qualitative data provided by the open-ended parts in the questionnaire. The results were presented using tables, graphs and in prose.

1.8 Data Analysis and Interpretation

Response Rate

The table below presents information on the number of respondents who participated in this study. **Table 2: Response Rate**

	Frequency
Farming households	62
Community Chiefs	4
Representatives Ministry of Environment, Agriculture and Livestock	6
Total	72

Source: Field Data, 2024

Table 2 shows that a total of 72 respondents participated in this study. The study's sample size was 97

respondents; thus, this was 74% representation. A 74% response rate was satisfactory and gives credence to the study to provide accurate and credible information about climate variability and food security in Gatumba Zone.

Effect of Drought on Food Security in Gatumba Zone

Gebrechorkos *et al.*, (2020) explain that climate variability is a major issue in East African countries and a cause of extreme climatic events such droughts. In their study, they reported that one key indicator of this issue is the increasing trend in maximum temperatures, and because of this, droughts have become a recurring event in several countries in East Africa over the past two decades.

Frequency of Drought in Gatumba Zone

In order to determine how extended drought spells have affected farm productivity and consequently food security in Gatumba Zone, the study sought to establish the frequency of droughts in the region. The study participants were asked to describe the frequency of the drought in Gatumba Zone using one of the following options: Very frequent, frequent. occasional, rare, very rare. The responses were as presented in Figure 1.



Figure 1 Frequency of Droughts in Gatumba Zone Source: Field Data, 2024

The chart above shows that 43% of the respondents felt that drought spells in this area are very frequent, 51% responded that the spells are frequent, and only 6% expressed that the drought spells are occasional. None of the respondents responded as to whether they were rare or very rare. The key respondents also expressed that droughts have been a major challenge in Gatumba Zone that has been occurring yearly in the recent past. In a similar study conducted by Nkunzimana *et al.*, on drought events and trends in Burundi between 1993 and 2010, it was established that severe droughts began in Burundi in 1993 and reccurred in 2000, 2003, 2005, 2007, and 2010 (Nkunzimana *et al.*, 2021). This suggests that this hazard has gotten worse by the years. It never used to occur every year, but now it has become an annual problem for the people of Gatumba Zone.

Drought Impact on Farm Productivity

The study posed the following question to the respondents: Do you believe that drought is a major problem in Gatumba zone that is affecting farm productivity? Their responses were as illustrated in Figure 2.



Figure 2: Drought Impact on Farm productivity Source: Field Data, 2024

Figure 2 illustrates the participants' responses. It appears that the majority of the respondents agreed on this matter. As shown, 88% expressed that droughts are major problem affecting farm productivity in Gatumba Zone, while 12% a contrary view on this. This suggests that farmers produce less that their farm potential because of drought spells. It is also an indication that the productivity of the farms in Gatumba zone would go higher if this challenge is addressed. Some of the participants explained that in addition to the low production, the quality of harvest is also low as a result of the droughts. During the interviews a community leader opined as follows:

"The recurrence of drought affects the overall quality of yields and causes many people to face hunger because what was produced cannot sustain the daily food needs in the household for an extended period" (KII 4, 2024).

It is instructive to note that at least 90% of people in Gatumba zone are subsistence farmers, and so many lives are put at risk of hanger and starvation when their farm yields decline as a result of droughts, their livelihood is threatened. This finding was consistent with that of Gebrechorkos *et al.*, (2020) who reported that agriculture in East Africa is largely rain-fed, which makes it highly vulnerable to adverse weather conditions. This means that droughts induce significant impact on agriculture sector in this region because farmers are overly dependent on rain for their farming activities.

Selective planting was also been found to be another reason for declining farm productivity during the dry spells. Asked on how drought affected the planned planting decisions, the findings were as presented in Figure 3



Figure 3 Effect of Drought on Planned Planting Source: Field Data

Figure 3 illustrates the farmers' decisions upon the onset of a drought during the pre-planting stage. The results show that more than half (57%) expressed that abandoning planting plans is one of the actions that farmers take. 40% expressed that there is usually no change observed in the farmers' planting plans, and an equal number expressed that farmers end up reducing the acreage they had planned to plant. It is apparent that farmers in Gatumba Zone have differing risk perception and expectation, and those that abandon planting have the highest risk perception, followed by those who decide to reduce the planned planting acreage. The outcome is consistent with Booth *et al.*, (2020) findings who established that farmers' decisions were influenced by their risk perception and expectation. In their research they found that when farmers expect the drought to grow more severe, their planting decisions are affected, which in turn affects the overall yield. In this study, the farmers who expect the drought to grow severe reported that they abandoned the planting plans entirely to avoid losses while others chose to reduce the acreage, to control or minimize the level of losses they were likely to suffer because of the projected looming drought. The study argues that these decisions informed by climate variability and especially the phenomenon of drought contribute significantly to the low level of food production in Gatumba Zone. During the interviews, one of the interviewees explained thus:

"The onset of drought disrupts many farmers' planting plans majorly because of past experiences. If they suffered losses before, then they are likely to refrain from planting or they could reduce the acreage they had prepared for planting" (KII 2, 2024).

The consequence of low production arising from the decision to reduce acreage or not plant is widespread food insecurity. In 2016, Voice of America (VOA) reported that at least 600,000 people were short of food in Burundi, and they predicted that the number would be rising in the years that followed (VOA, 2016). The VOA report also mentioned that this food security problem has led to many people fleeing the villages to the urban centres in search for alternative sources of sustenance. This finding further lends credence to the argument made by the FAD theory that droughts affect availability of food, posing challenges for vulnerable households in meeting their basic needs. The migration also reduces the number of farmers in the rural areas, and as a result, Gatumba Zone and the wider Burundi becomes more food insecure.

Droughts have grown more frequent in Gatumba Zone in recent years. In a country where majority of farmers practice rain-fed agriculture, droughts affect farm productivity. Water deficit affects crop productivity, which results are lower crop yield and also low-quality produce. It was determined in this analysis that droughts also influence selective planning among farmers, in that farmers with high threat perception refrain from planting if they believe that a drought spell will grow more severe in the future. Others, reduce the acreage they had

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planned for planting. A combination of these factors makes the region even more food insecure.

Majority of East African countries rely on rain-fed agriculture. Today, this sector has been greatly affected because of the extended drought spells that have grown more frequent in recent years. Burundi being one of the East African states, in order to establish how climate variability has affected food security, there was a need for a comprehensive study on the impact of drought on farm productivity. It was clearly established that drought is one of the climate hazards that Gatumba Zone is facing. Using responses from the study participants and information from other credible secondary sources, the study proved that drought is no longer a sporadic event in this country as it were one decade ago, but have become frequent. In Gatumba Zone, drought occurs yearly. The study then focused on determining how farm productivity in Gatumba Zone has been affected by drought. It was established that, because of water deficit in plants during a drought spell, the crop yield reduces and also poor-quality produce is harvested. Another way by which the impact of droughts on farm productivity was explored was through the lens of farmer's risk perception and expectation which can be influenced by the preplanting conditions. In this case, farmers who believe that an ongoing drought spell would grow worse is considered as one with a high-risk perception and because of this, they can abandon the planting plans entirely for that season or they reduce the planned planting acreage. Those with low-risk perception do not change their planting plans. By choosing not to plant or to reduce the acreage, it affects the quantity of food produced, and this makes Gatumba Zone more food insecure. It was also noted that farmers past experiences with unfavorable pre-planting conditions also into play when making planting decision. The resultant food shortage that occurs because of reduced crop productivity and declined farming activities during droughts ends up affecting many vulnerable households. It was established that some of the affected persons end up freeing the villages in search for other sources of sustenance, which reduces farming activities in this region further.

1.9 Conclusion

The study used both primary and secondary data to investigate the influence of drought on food security in Burundi, using Gatumba Zone as the location of focus. Findings indicate that Burundi has experienced frequent and severe drought over the last three decades which have negatively impacted farm productivity and consequently food security. Apart from the high temperature affecting crop performance because of water deficit, it was also apparent farmers' decision about planting were also affected by the adverse pre-planting conditions, which in turn contributes to declining farm productivity, hence food insecurity. This is because, at the onset of drought, some farmers' abandon their planting plans altogether for that season, or reducing the acreage they had planned to plant. Such actions contribute to higher food insecurity.

1.10 Recommendations

In light of the findings, the study makes the following recommendations:

Academic Recommendation

There ought to be an exhaustive investigation on the effect of droughts on food security in Gatumba Zone. An exhaustive analysis of the destruction it has caused farmlands is needed in order to inform the mitigation measures that can be proposed to combat the phenomenon. Moreover, the research should aim at recommending the policy options that the government can take to reverse the adverse effects of climate variability on food security.

Policy Recommendations

To prevent farmers from making drastic decisions such as abandoning planned planting or reducing the farming acreage, which ends up hurting the food security in the region, the government through the Ministry of Agriculture should reinvigorate the agricultural extension services to educate farmers on methods of drought and floods tolerance. This information will help them better prepare and adjust to the attendant climate shocks. The study also proposes the establishment of an agricultural insurance mechanism that can compensate the

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farmers the losses that they incur in the course of food production, and especially vagaries relating to climate variability. This will make farming attractive and farmers will no longer have to count their losses whenever there are floods or droughts. It could also be an incentive to encourage more people into farming, thus boosting food security. Finally, the Ministry of Agriculture should collaborate with financial institutions to address the funding constraints by availing credit to farmers at low costs, provide farms inputs, such as drought resistant seeds at subsidized prices and also collaborate with the media houses to ensure regular dissemination of weather forecasts, and agronomic and climate information that can enhance the farmers' levels of preparedness.

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