

# Drought and Food Security in Kassebwera Parish, Butenga Sub County, Bukomansimbi District, Uganda

Henry Stanley Mbowa<sup>1\*</sup>, Specioza Asiimwe<sup>2</sup>, Beatrice Birungi<sup>3</sup>

<sup>1,3</sup>Kampala University, Uganda

<sup>2</sup>Kampala International University, Uganda

\* Corresponding Author

**Abstract:** - Over 800 million people in the world are food insecure where 180 (23%) million are found in the Sub Saharan Africa. The paper establishes the association between drought and food security in Kassebwera parish, Butenga Sub County, Bukomansimbi district, Uganda. The paper uses both cross-sectional and descriptive survey designs which included mixed methods data collection approaches. 1996 people were targeted and a sample of 322 respondents was determined using Krejcie and Morgan sample size formula. Data was collected through questionnaire which was validated through validity and reliability tests. Reliability was ensured through a pilot study and administered two times at different intervals. Thereafter, responses were calculated using Cronbach Alpha and the reliability was found at 0.778. Validity was ensured through content value index based on the number valid items in the questionnaire, hence a CVI of 0.735 was obtained. Data collected was organized, edited, coded and entered into the SPSS for analysis from which descriptive and inferential statistics were generated that is, regression and correlation. Results indicated that, drought contributes 38.6% while the other factors 61.4% to the variation of food security. The study recommends that, sensitization, awareness and capacity building in SMART agriculture should be enhanced among the households to adapt to the effects of drought on food security.

**Keywords:** Drought, food security, precipitation, temperature, smart agriculture, wind

## I. BACKGROUND OF THE STUDY

Drought has had significant adverse effects on food security across the globe through its effects on plants, animals and fisheries' productivity (FAO, 2016). The vulnerable and the poor are exposed to the risks of malnutrition, low immunity and eventually leading to death (Ibidi). For that note, drought has had adverse effects on agricultural production, hence food insecurity.

Food and Agriculture Organization (FAO, 2011) indicates that, drought has been ranked as the most important cause of insufficient food on the African Continent resulting into famine and malnutrition. This has food security dimensions too including; food stability, food access, food utilization and food availability. The detrimental effects of drought were observed in low crop, animals and fisheries' productivity, pest and disease outbreak, and forest and range fires in Africa

(FAO, 2011). Such consequences have continued to worry Africa's food security (Kabasa and Sage, 2009). It is also reported that, the region's poorest families, the evicted and female-headed families are hardest hit by the significant adverse effects of drought. In addition, the high food prices reduced real incomes and increased the prevalence of food insufficiencies and malnutrition amongst the poor (Ibidi).

It is asserted that, drought has widespread impacts on typical agricultural and pastoral livelihood activities in East Africa (www.reliefweb.int). Food insecurity has been rampant in Kenya especially Turkana, Marsabit, Mandera and Wajir due to poor rainy season in 2017, thus, increased rate of food insecurity (Fews.net, 2017). It is further reported that, millions of East Africans experience chronic hunger and threats of famine (Reid, 2018) which are due to conflict, recurring severe droughts and high food prices hence starvation, malnutrition and death. World Vision (2018) further states that, hunger and malnutrition continue to worsen in East Africa through the peak of the lean season in July of 2017.

In Uganda, from March to August 2016, the El Niño event, resulted into a prolonged dry spell and insufficient rain, thus, crop failure and inhibited harvests various locations (IPCTWG, 2017: Republic of Uganda, 2017; Bindhi, 2016). The reports add that, forecasted El Niño event was followed by La Niña, potentially exacerbating the already fragile food security situation of millions of Ugandans (Republic of Uganda, 2017). IPCTWG (2017) clarifies that, analyses from remote sensing data showed that, several areas in Uganda experiencing deterioration in crop and pasture conditions that could have a bearing on crop performance and eventual harvests (Bindhi, 2013; Bindhi, 2016). Furthermore, Uganda had recorded an increase in occurrence and magnitude of weather extremes like increased temperatures which led to prolonged drought and erratic rainfall patterns (Bindhi, 2016). He further adds that, the changing weather patterns have made it difficult for farmers to plan for farming seasons using the traditional knowledge about the two planting seasons.

Over 5.3 million people are experiencing acute food insecurity of whom 0.44 million are in crisis situation (IPCTWG, 2017). The report adds that majority of the regions in the country

have a stressed population, the highest being Karamoja (35%), East Central (17%), Acholi (16%), and Central 2 (16%). This implies that, these regions have suffered the effects of prolonged dry spells that stressed most of the crops and reduced agricultural yields from both seasons. Thus, the prolonged dry spell also enhanced Fall Army Worms (FAW) and other pests which affected cereals like maize, sorghum and rice hence inducing food shortages in the country (Bindhi, 2013, 2014, 2016; Sekweyama, 2014).

Bukomansimbi district experienced disease outbreak especially the Farry Army work (*Akasaanyi*) which seriously attacked the maize and caused food insecurity. These have resulted into food crisis which has induced malnutrition, stunted growth, low immunity and death (Nakitende, 2016). It was also highlighted that, there were high rates of food shortages in the area exacerbated by delayed and short-lived rains (Nakitende, 2016) as a result of prolonged dry spell, thus leading to further deterioration of people health status, i.e. malnutrition and death (Republic of Uganda, 2017). This is explained further that, drought has had adverse effects on food security which in the long run impacts on human and animal health hence, increasing their mortality.

Drought has been persistent and continuing to expose its adverse impacts to Kassebwera parish (Nabunya, 2017; Maseruka, 2015; Kisekka, 2016). Despite its adverse consequences, little effort has been done in areas of research on drought management, capacity building and sensitization to address the effects of drought on food security (da Silva, 2016). In this perspective, education plays an important role for adaption to drought, its parameters and their effect on food security. Therefore, increased awareness/sensitization helps the people to improve their understanding on the mitigation and management of drought and its consequences on food security, people's health and livelihoods.

## II. LITERATURE REVIEW

### 2.1 Drought and food security

Drought is a naturally reoccurring climatic variability (Lolemum *et al.*, 2017) and with changing climate, droughts are to become more severe and occur more often. Drought has become more frequent and severe in recent years and its scope is projected to increase in extent and severity ((Ibidi). Interestingly, drought has become an issue of concern due to its detrimental effects on humans' lives and livelihoods (Akudugu, Dittoh & Mahama, 2012). It is asserted that, drought ranks as a single most common cause of severe food shortage and represents one of the natural triggers of malnutrition and famine (Lolemum *et al.*, 2017; Akudugu, Dittoh & Mahama, 2012).

Khalafallah (2006) notes that drought is a major determinant of food security and leads to crop loss, with immediate effect on smallholder agricultural production. This implies that, the effects of drought are indirectly felt, for example when the market price of food increases, food becomes scarcer. He adds

that, people whose income depends upon farm work, food processing or food transport and marketing, they lose it when food production is affected by drought (Lolemum *et al.*, 2017; Akudugu, Dittoh & Mahama, 2012; Khalafallah, 2006). Devereux (2007) adds that, droughts' impact heavily and negatively on rural economy as weather shocks undermine both agricultural production and incomes. Shocks like droughts reduce harvests and lead to decline of food availability (Ibidi). Consequently, the demand for food is highly inelastic implying that, a relatively small shortfall in marketed supplies can cause a significant increase in food prices. This means that, as people who come to the markets to exchange their assets for cash or food, find excess supply which cause their prices to collapse (Devereux, 2007). Thus, people who neither produce enough food nor raise incomes through employment are forced into the market to buy food. For that note, buyers' access to food is determined by the price of food and the value of assets that they can exchange with or sell for food ((Ibidi). Therefore, food security improves with income in the same way as the ability to cope with drought (Khalafallah, 2006).

Previous studies indicate that drought sends people and their families into eating a single meal a day, or even no food which affects the nutritional status especially the young ones (Akudugu & Alhassan, 2013; MAF, 2016). As a consequence, the family will incur more money to treat the malnourished, which money is not available, but also limited supply of labour for productive work as a saying goes ...*an empty sack cannot stand....* This implies that, in the long term, the no more production in the community.

Drought and food insecurity go hand in hand, and much chronic and acute hunger in the world is associated with highly variable rainfall, with hunger peaking in times of drought (Khalafallah, 2006). He adds that the common interpretation that drought causes food shortage is simplistic and ignores most of the important dynamics of rural economies associated with hunger. Devereux (2007) explains that, weather shocks like droughts trigger not only harvest failure but a sequence of knock-on-shock to local economies and societies. Moreover, drought undermines farm yields harvests, reducing household and national food security availability and agriculture incomes derived from crop sales (Devereux, 2007). He further asserts that, these poor harvests threaten food security and livelihoods from household to national level, as families and government depend on agricultural harvests for food and incomes.

Food and Agriculture Organization (FAO, 2008) reports that, prolonged and repeated droughts cause loss of productive assets, which undermines the sustainability of livelihood systems based on rain fed agriculture. For example, drought and deforestation can increase fire danger with consequent loss of the vegetation cover needed for grazing and firewood (Lawrence & William, as cited in FAO, 2008). Interestingly, a drought-resilient society will also be a hunger-resilient society, as the same social and physical determinants are

associated both with food security and drought resilience (Lolemum *et al.*, 2017; Akudugu, Dittoh & Mahama, 2012; Khalafallah, 2006). The fact that hunger is a function of people's inability to cope with external shocks, including drought, has been recognized by the major relief agencies. Both food security and drought resilience result from a complex set of interacting physical and societal traits and food security policy needs to be informed by knowledge of these interactions, not by linear models that imply an absolute certainty of drought leading to food insecurity (Lolemum *et al.*, 2017; Khalafallah, 2006).

Regrettably, drought has not only contributed low productivity of the land but also contributed to food insecurity hence resulting into severe malnutrition among the population especially the children less than five years (Sanyu, 2014). It can be noted that this is common in dry areas especially in pastoral communities where the pastoralists are affected by the effects of droughts due to erratic rainfall. For example, pastoralists sell off or exchange their animals for grain or food. The exchange or sell are worth only a fraction of their pre-crisis value after weather shock disrupts demand and supply patterns on local community markets (Deveruex, 2007).

An assessment on food security by Government of Uganda (GOU, 2017) indicates that on average, a small percentage of Uganda's agricultural land is under some kinds of irrigation. The report adds that households engage in subsistence agriculture as well as small producers heavily rely on formerly well-defined seasonal patterns. There are increasingly longer dry spells, including drought which have been as a result of the 2015/2016 El Nino and most recently the La Nina phases of ENSO. In addition, the La Nina had exacerbated its effects on food security situation in Uganda, for example, in the northern region and the cattle corridor, drought has had devastating effects on livestock sector (GOU, 2017). Moreover, during the frequent drought episodes, men and the youths migrate to Uganda from the affected regions of East Africa like Kenya, Djibouti, Ethiopia and Somalia with their animals living elderly people, women and girls in the prone areas with no sources of food, hence a reliance on food aid (NDMA, as cited in Lolemum *et al.*, 2017).

KTN News (2019) reported that the advanced drought in Marsabit County left a number of goats, cows and camels died. She further reported that the surviving goats delivered their kids but unable to stand and walk due lack of water and grass to the mothers. Furthermore, boys and men had to move long distances to take animals for drinking water and they had to drink the water on the basis of first come first serve. It was also reported that, up to 7:00PM animals which arrived in late had not yet drunk the water and they had to be taken back home. This implies that, this had more adverse effects to the lives of the animals as well as those of the people. Women and girls also had to move longer distance in search of water for domestic uses. According to the correspondent, the lady she talked to had could not even estimate the distance they

had covered and they asserted that they had walked for two hour to reach the source of water. Unfortunately, the animals were drinking from the same water the community had to collect for their domestic activities (KTN News, 2019).

Still, in Kenya, in Baringo it was reported that a million of people was at risk of starvation due to drought. It was reported that, the County had spent almost 2-3 months without any rains for supporting agriculture activities like animal rearing, crop growing among other. It was reported that, rivers had dried up, animals died, soil erosion emerged and hunger and starvation emerged. Evidences from the TV showed that people could not speak; others were emaciated, and were just fed of bottled water given by a relief agency (Angina, 2019).

In Kabongo, Turkana South County, (KTN News, 2019) reported that, households were feeding on dry roasted animal skins for their survival. It was noticed that, the children aged 3-8 could not afford to chew and swallow the skins because of being too hard and dry. It was also reported that, a number of animals died and the carcasses were skinned to provide food. The correspondent in Kabongo village adds that, the household requested for food relief from both the national and county governments to save the situation.

Despite people migrating to Uganda, Uganda is also seriously hit by the drought and this has been eminent in Isingiro, Masaka, Bukomansimbi, Sembabule, Rakai, Kalungu and Lwengo making people to gripe with food shortage threatening the entire country (Lule, 2016). Worse still, districts are found in the cattle corridor which receive little or no rainfall. This means that, such drought conditions have led to the people in those districts to sell off their animals at a cheaper price to cater for their families thus increasing the vicious cycle of poverty. In addition, Fahimand Haidary (2018) reported that, tens of thousands of sheep and goats had died and many farmers had eaten the seeds for the next planting season, as rivers and wells dried up and pastures turn to dust.

In Nakasongola, a number of animals have died due to the intense heat because drought. It was also revealed that, an animal could as low as 50,000/= Uganda shillings and a kilogram of meat was sold at 1,000/= Uganda shillings but difficult to sell as each had his or her own meat. It was also reported that, many learners missed school because of their parents' failure to raise money for school fees (CBS News, 2019; Bukedde TV, Agawiiki, 2019). This implies that, in Nakasongola, since most of the people are cattle keepers, the emergency of drought cost their well-being and livelihoods as well their health status. It was also reported that, drought is continuing to be a threat in the country. This is reflected in terms of no rains, drying valley dams, dead animals especially in Ankole – Masaka Dry Corridor (CBS FM News, 2019). It was further reported that, the agencies which were supposed to provide seeds and seedlings and other farm inputs to farmers in those areas did not do so because of drought. It was also revealed that, those who had managed to plant their crops

have suffered seriously because they had dried up. This implies that, food insecurity is to worsen in Uganda and her neighboring countries.

In 1877, the El Nino event caused death of 6 – 10 million people as a result of drought in Central and Southern regions of India (Akudugu & Alhassan, 2013). Additionally, the cold waves struck in the Northern and North Eastern part of India in 2002 – 2003 and affected the production of perennial and season crops. An assessment by MAF (2016) in the Democratic Republic De Jimor-Leste indicated that 78% (est.122345) households were impacted by the drought. Results indicate that households’ experienced delayed planting of crops and those planted got stunted, and also animals got sick and others died due to difficulty in increasing water and fodder scarcity. The report further showed that there was a decreasing participation of the vulnerable households to drought into staple food crop production such as maize and rice and those participated never planted more than a hectare. It was also noted that who managed to plant, their crops were observed partially growing with some totally failing due to drought (MAF, 2016). The literature reviewed also revealed that 61% of households reported that they had poor maize yield conditions due to water stress, and expected to have lowered yield compared to the five years average to 2.3 tonne per acre. Khalafallah (2006) adds that almost one tenth of the world’s hungry live in India, which maintains a large wheat surplus from year to year.

Drought does not only affect crop production but it also affects animals and birds and when these die, people’s incomes (revenues) from the farm drastically lowers consequently (GOU, 2017; MAF, 2016; Akudugu & Alhassan, 2013; FAO, 2008). Evidences from Republica Democratica De Timor-Leste indicate that, 48% of the households reported sickness and death of animals due to drought. For example, 70,017 animals died while 69,921 animals were sick which resulted into an estimated loss of USD 13,101,373 and USD 13,083,412 respectively in 2016 (MAF, 2016).

### III. METHODOLOGY

#### 3.1. Study Area

This presents the villages in Kassebwera parish which the researchers visited while in the field for data from the respondents. These villages were considered for the study because they make Kassebwera parish to which the study was undertaken. The parish was considered for the study because it was of the parishes seriously hit by food insecurity as a results of drought and its parameters (temperature, precipitation and wind) in Kassebwera parish. The villages researchers visited include; Buyovu, Gayaza, Kakukuulu, Kanyogoga, Kassebwera, Katoma, Kawaala, Kikondeere, Kiryamenvu and Nkalwe as indicated in 3.1:

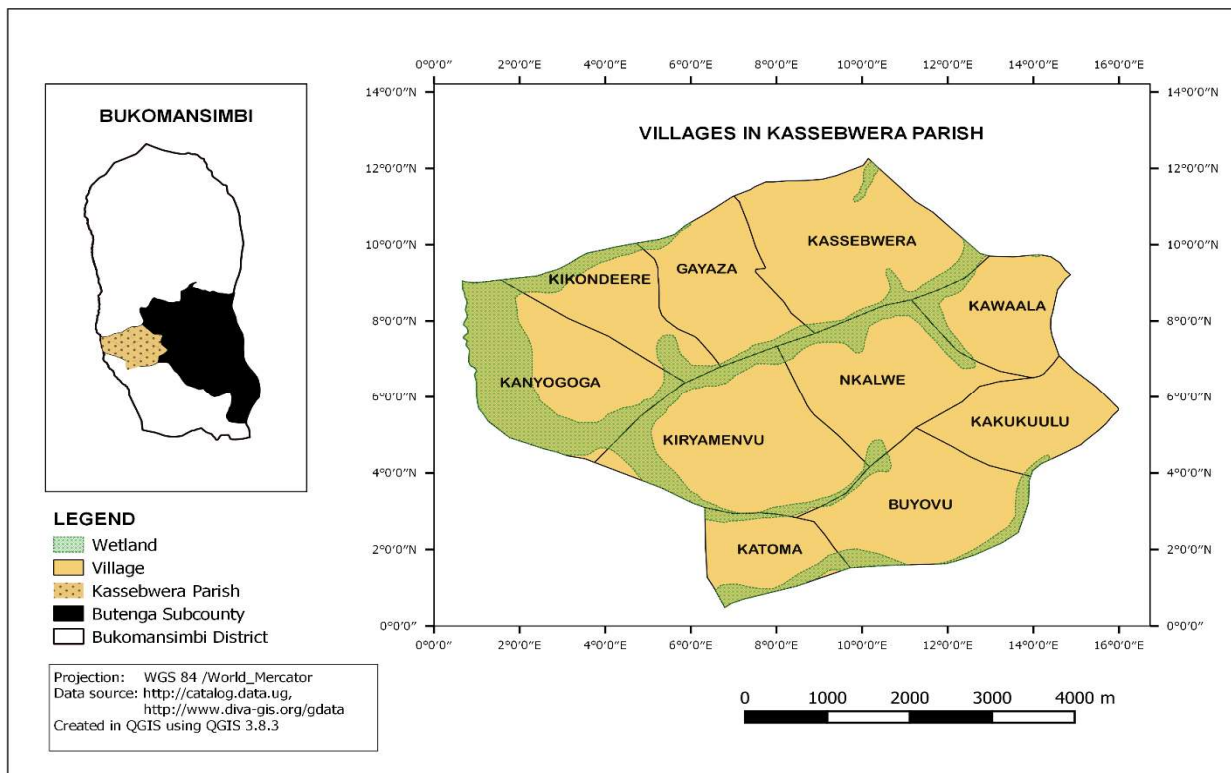


Fig. 3.1: Location of Kassebwera parish in Butenga Sub County, Bukomansimbi district

Source: <http://catalog.data.ug>, <http://www.diva-gis.org/data>. Created in QGIS 2.18, 2019

### 3.2. Research design

The paper employed cross-sectional and descriptive survey designs to assess the association between drought and food security in Bukomansibi district of Uganda. In the study cross-sectional and descriptive survey designs were used to assess the adjustments to the farmers and community members in the area. The cross-sectional and descriptive survey designs were employed to yields a large amount of data at one point in time from a sizeable population in an economic way. This enables the researcher to generalize results for entire population. The cross-sectional design allowed the collection of quantitative data which is analyzed quantitatively using descriptive and inferential statistics (Amin, 2005).

### 3.3. Study Population

This is a total number of objects of interest to the researcher (Oso & Onen, 2005; Bailey, 2012). The study targeted a total of 1996 people who included farmers (crops & animals) (1881), administrators (17), Financial manager (17), Office of the Chief Administrative Office (4), District planners (5), Natural resources officers (15), Health Services Officer (12), Community based services officers (8), Religious leaders (10), NGOs officers (15), LCIII Chairperson (1), Parish officer (1) and LCI Chairpersons (10). Therefore, the study targeted various people (stakeholders) due to sensitivity of the problem under investigation and the relevancy of the study findings not excluding the gender factor.

### 3.4. Sample Size

The paper determined a sample of 322 respondents to participate in the study. The sample size was calculated using Krejcie and Morgan 1970 sample size calculation formulae as indicated below:

$$s = \frac{X^2 NP (1 - P)}{d^2 (N - 1) + X^2 P (1 - P)}, \text{ where;}$$

s = Sample size

$X^2$  = Chi-square value for 1 degree of freedom at the desired confidence level, (3.841)

N = Population size

P = Population proportion (assumed to be .50, as it provides the maximum sample size)

d = Degree of accuracy expressed as a proportion (.05)

$$\begin{aligned} \text{Therefore, } & \frac{X^2 NP (1 - P)}{d^2 (N - 1) + X^2 P (1 - P)} \\ & = \frac{3.841 \times 1996 \times 0.5}{(0.05)^2 (1996 - 1) + 3.841 \times 0.5 (1 - 0.5)} \\ & = 1916.659 \div 5.94775 = 322.249 \end{aligned}$$

Therefore, the sample size for the study was 322 respondents

### 3.5. Sampling procedures

The paper employed both purposive and simple random sampling techniques to select the respondents basing on their

knowledge, competences and experiences to provide crucial information presumed vital to the study. Purposive sampling techniques help to collect firsthand from the specific respondents on the effect of temperature, food security and costs of food products (Ahuja, 2005; Creswell & Plano, 2011). In addition, the technique is economical in nature, minimizes time wastage and provides reliable information to the study (Kothari, 2004). It is important to obtain specific information when purposive sampling is employed. Therefore, the technique was used to collect data from the key informants that is; CAO, Administrators, Local Councils officers, NGOs, District Planning Unit, Health services officers, Community based services providers and Finance controllers.

On the other hand, simple random sampling technique was also used to select respondents to participate in the study. In the study, simple random sampling technique was employed as a qualitative approach to eliminate bias through giving each respondent a chance of being selected to participate in the study. Simple random sampling technique is a strategy that, adds credibility to a sample when the potential purposeful sample is large than one can handle.

### 3.6. Data collection methods/ instruments

#### 3.6.1. Questionnaire

The researchers used a questionnaire as a tool for data collection from the sampled respondents. A questionnaire is a data collection tool where the person answering the questions actually records his or her own responses (Kevin, cited in Saunders, Lewis & Thornhill, 2007). The questionnaire was used as an efficient tool to collect responses from a larger sample. The researchers designed and self-administered the questionnaire to the respondents as per agreed time. The questionnaire was filled by the respondents according to their convenience. The questionnaire included both close-ended and open-ended; the close-ended questions were ranked on a five (5) likert scale that is 1-Strongly Disagree, 2-Disagree, 3-Neutral, 4-Agree and 5- Strongly Agree and the opinions from the respondents were gathered as specified. In addition, open-ended questions captured information from both independent and dependent variables of the study.

### 3.7. Reliability and validity

#### 3.7.1. Reliability

Reliability refers to the consistence of research instruments (Arya *et al.*, 2002; Kothari, 2004; Amin, 2005). Before administering the questionnaire and other tools, sampling procedures will be tested by the experts more than two times (tests) for a two-day period to establish the problems with specific questions, test household selection procedures and receive constructive criticisms. The researchers conducted a pilot study to ensure reliability through administering the questionnaire to the respondents two times at different intervals. The researchers made sure that the respondents answered the questions like in the main study. Later, the responses were calculated with a statistical test of Cronbach

Alpha test reliability. Thus, variables with at least Cronbach Alpha of 0.7 from the two sets of data were considered reliable.

Table 3.1: Reliability Statistics

S/N	Variable	Number of items	Cronbach Alpha( $\alpha$ )
1	Drought	24	0.798
2	Food Security	20	0.757

Source: Pretest field data (2019) as extracted from SPSS

### 3.7.2. Validity

Validity refers to the extent to which an instrument measures what it claims to measure (Arya *et al.*, 2002; McQueen & Krussen, 2002) or concern to whether the variable is the underlying cause of item co variation (Devillis, 2003). This implies that, respondents are less likely to complete and return questionnaires perceived to be inappropriate. Consequently, to ensure validity, the researcher discussed the questions with the supervisor before forwarding them to two independent experts of Climate Change and Food Security at Makerere University for verification. This cleared ambiguities caused by the instrument and the experts assisted to refine the instruments focusing on study objectives and content validity index was computed through;

CVI = No. of items rated relevant ÷ Total No. of items in the instrument

Thus CVI = 50/68 = 0.735

### 3.8. Data analysis

Data was collected through the questionnaire, organized, coded and entered into SPSS Software for cleaning and analysis to generate descriptive and inferential statistics. Data analyzed helped to establish the relationship between drought and food security using the parameters of drought including; temperature wind and precipitation. Thus, all these were achieved through the use of Pearson product correlation coefficient and regressions analysis.

## IV. RESULTS AND DISCUSSION

The researchers conducted regression statistics for the study aimed at establishing the extent at which drought affects food security. On the overall, results of the regression model summary contained in Table 4.1 indicated that, the examined measures of drought was explained by 38.6% (R – Square = 0.386) of the variation in food security in Kassebwera parish. Other factors which were not part of the study explain 61.4 % of the variation in food security at Kassebwera parish as summarized in Table 4.1 below:

Table 4.1: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.621 <sup>a</sup>	.386	.375	.46585
<b>a. Predictors: (Constant), Wind, Temperature, Precipitation</b>				

Relatedly, Table 4.2 shows the regression coefficients from a model employed to measure the degree of relationship among study variables.

Table 4.2: Coefficients<sup>a</sup>

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.217	.095		2.277	.024
	Temperature	.118	.039	.176	3.012	.003
	Precipitation	-.337	.034	-.572	-9.794	.000
	Wind	.070	.049	.085	1.443	.151
<b>a. Dependent Variable: Food Security</b>						

Results of the regression model revealed that, temperature had the highest contribution to food security with a beta value of 0.176, followed by wind contributing 8.5% ( $\beta = 0.085$ ). On the other hand, Precipitation was found to have a negative contribution to food security in Kassebwera parish with beta values of -0.572. This implied that, a unit improvement in temperature results into 0.176 improvement in food security while a unit improvement in wind results into a 0.085 improvement in food security. Thus, a unit adjustment in precipitation retards food security by -0.572.

The researchers further conducted regression statistics for the study aimed at establishing the extent to which drought affects food security. On the overall, the results of the regression model summary contained in Table 4.1 indicated that, the examined measures of drought explained 38.6% (R – Square = 0.386) of the variation in food security in Kassebwera parish. Therefore, other factors that, were not part of this study explain 61.4 % of the variation in food security at the parish. This means that, even if the community receives sustainable precipitation levels, without other factors put into use, food insecurity will emanate and exist among the households. The results are supported by Khalafallah (2006) who observes that, drought is a major determinant of food security and leads to crop loss, which has an immediate effect on smallholder agricultural farms. Akudugu & Alhassan (2013) & MAF (2016) further emphasized that, drought sends people and their families into eating a single meal a day, or even no food which affects the nutritional status especially the

young ones. Thus, drought and food insecurity go hand in hand, and much chronic and acute hunger in the world is associated with highly variable rainfall, with hunger peaking in times of drought (Khalafallah, 2006).

The results agree with Krishnamurthy *et al.* (2014) who suggest that, increase in temperature have had impacts on crop production, which leads to limited food availability, access and utilization. Results are also supported by FAO (2006, 2008) who confirm that, changes in the global temperatures will have significant impacts on food security in the world, and the changes will impact more all the facets of food security such as food availability, food accessibility, food utilization and food system stability. Thus, the more the catastrophic temperatures the more, it impacts more on food security in any area where the events occur. This means that, the catastrophic events result into loss of foodstuffs and lowering household's income hence their effects of food security.

Results also concur with Akudugu and Alhassan (2013) who explain that, climate change may increase frequency and severity of wind storms which impact negatively on transit air at a sea port terminal as well as damaging infrastructure which may also create delays in food transport thereby creating food accessibility problems. This is further cemented by FAO (2016) who asserts that, any change in the wind circulation flows would allow dangerous pests like locusts swarm and reach previously they have not or have unaffected, when such insects reach in new locations their effects are observed on the food crops and other plants which eventually results into food insecurity in the new locations.

Interestingly, a clear example in Uganda, is in Greater Masaka where dry winds occurred in Sembabule, Mawogola and Nakaseke causing serious damages to crops and animals as well as the people. Thus, from the local understanding, strong dry winds are referred to "*Omuzimu*" literally means the "spirit of the deceased" and whenever it happens, it impacts on crops and animals including property hence lowering food security. This is supported by Krishnamurthy *et al.* (2015) who assert that, winds had effect on wheat production in Pakistan as it improved wheat production in Punjab and Sindh, but resulted into losses in Khyber, Pakhtunkhwa and Balochistan.

Results are in agreement with Nakitende (2016) who submit that, high rates of food shortages exacerbated by delayed and short-lived rains. Bindhi (2013) adds that, drought as indicated by hot/cold/low temperatures; dry/moist winds and their speed, and insufficient rains, drizzle and hailstorms exacerbating into food security.

## V. CONCLUSION

The researchers conducted regression statistics for the study to establish the extent to which drought affects food security. On the overall, the results of the regression model summary indicated that, the examined measures of drought explained

38.6% (R – Square = 0.386) of the variation in food security in Kassebwera Sub Country. Therefore, other factors that were not part of this study explained 61.4 % of the variation in food security at Kassebwera parish. Relatedly, the regression coefficients from a model employed to measure the degree of relationship among study variables.

## VI. RECOMMENDATIONS

1. Sensitization, awareness and capacity building should be enhanced among the households by the district to be adapt to drought effects on food security in the area. This should involve tree planting, drought resistant plants/crops, SMART agriculture, food utilization, and runoff water harvesting technologies.
2. The paper also recommended that, soil and water conservation practices such as: irrigation, tree planting, mulching, manure application and runoff water harvesting and storage should be enhanced to the households by the help of the NGOS, Local and Central governments.
3. Farmers and households should be encouraged by agricultural extension officers on drought resilience and support through planting drought resistant food crops, planting faster growing crops, control bush burning, construction of Maize cribs, and those who are food insecure supported with food aid.
4. The District and Sub County should liaise with the Meteorological Department of Uganda should ensure proper weather focus particularly on drought and its effects for the community to take precautionary measures.
5. Households should be encouraged to plant more trees which would act as wind breakers and protect the community plantations against the effects of winds.

## REFERENCES

- [1]. Ahuja, R., (2005). *Research Methods*, New Delhi, Rawat Publications
- [2]. Akudugu, A.M & Alhassan, A.R. (2013). The Climate Change Menace, Food Security, Livelihoods and Social Safety in Northern Ghana. *International Journal of Sustainable Development & World Policy* 1(3):80-95. Research Gate
- [3]. Akudugu, A.M., Dittoh, S & Mahama, S.E. (2012). The implication of climate change of food security and rural livelihoods: Experiences from Northern Ghana. *A paper in the journal of environment and earth science*, SSN 2224-3216, Vol.2, No.3, 2012.
- [4]. Amin, M. A., (2005). *Social Science Research, Conception, methodology and analysis*. Kampala, Makerere University Press
- [5]. Angina, R. (KBC/CGTN, Focus on Africa Live News at 11:00pm, 24/3/2019). A million of people at risk of starvation in Baringo County, Kenya: A correspondent for *CGTN New* at 11:00pm, Sunday from Baringo.
- [6]. Arya, D., Jacobs, L.C., Razavieh, A., (20002). *Introduction of Research in Education*. Belmont, CA, Wordsworth
- [7]. Bailey, K. (2012). *Methods of Social Research*. 4<sup>th</sup> Edition. New York.
- [8]. Bindhi, E. (2013, October 11). *Seven injured as hailstorms devastate Bukomansimbi and Lwengo districts*. Report on

- Environment Analysis. Retrieved from <https://ugandaradionnetwork.com/story> on 11 April, 2018
- [9]. Bindhi, E. (2014, October 11). Bacterial Banana Wilt (BBW): Bukomansimbi farmers resort to growing sweet potatoes. Report on diseases. Retrieved from <https://ugandaradionnetwork.com/story> on 09 April, 2018
- [10]. Bindhi, E. (2016, September 2). Bukomansimbi wetlands vanish as dry spell hits farmers. Report on environment. *Uganda Radio Network*.
- [11]. Correspondent for KTN Prime News at 9:00pm, 25/3/2019). Turkana Hunger pangs. Kabongo, Turkana South County, Kenya: A correspondent for *KTN New* at 11:00pm from Kabongo village.
- [12]. Correspondent for Bukedde TV, Agawiiki at 1.00PM (24<sup>th</sup>, March, 2019). Deforestation has increased high rates of drought in Kyankwanzi and Kiboga districts.
- [13]. Correspondent for CBS FM New at 09.00am, (23<sup>rd</sup>, March, 2019). Drought has resulted into death of animals and lowered their cost.
- [14]. Creswell & Plano, Clark (2011). *Best Practices for Mixed Methods Research in the Health Sciences*. [https://www2.jabsom.hawaii.edu/native/docs/tsu/docs/Best Practices for Mixed Methods Research](https://www2.jabsom.hawaii.edu/native/docs/tsu/docs/Best%20Practices%20for%20Mixed%20Methods%20Research)
- [15]. da Silva, J.G. (2016). *Agriculture has big role to play in curbing Greenhouse Gas Emissions: The State of Food and Agriculture 2016 report*. Food and Agriculture Organization Press
- [16]. Devereux, S. (2007). *The impact of droughts and floods on food security and policy options to alleviate negative effects*. AGECC blue book, Aptara. Pp 12 (47-57).
- [17]. Devillis, R. F., (2003). *Scale development, Theory and applications* (2<sup>nd</sup> Ed.). Thousand Oaks, CA, Sage
- [18]. Fahim, H & Haidary, E. (2018). *Farmers in War-torn Afghanistan hit by worst drought in decades*. Retrieved from [www.phys.org](http://www.phys.org) on 28<sup>th</sup> Oct, 2018.
- [19]. Food and Agriculture Organization. (2006). 'Food security'. FAO Policy brief Number 2, June. Rome.
- [20]. FAO. (2008). *Climate change and food security. A framework document*. Rome-Italy. FAO Inter Departmental Working Group on Climate Change, Viale Dell'Inferno di Carucalla, Rome Italy.
- [21]. FAO (2011). *Drought-related food insecurity: A focus on the Horn of Africa*. Drought emergency ministerial-level meeting in Rome on 25<sup>th</sup> July, 2011
- [22]. FAO (2016). *The state of food and agriculture: climate change, agriculture and food security*. Food and Agriculture Organization of the United Nations, Rome. 2016 ISBN 978-92-5-109374-0.
- [23]. GOU. (2017). *National food security assessment report* for January, 2017.
- [24]. <http://catalog.data.gov>, <http://www.diva-gis.org/data>. Created in *QGIS 2.18*, 2019
- [25]. Kabasa, J.B and Sage, I. (2009). *Climate change and food security and livelihoods in Africa*. In Besada, H and Sewankambo, N.K (Eds), *Climate change in Africa: Adaptation, Mitigation and Governance challenges*. CIGI special report. Ontario, Canada.
- [26]. Khalafallah, M.R. (2006). *Impact of drought on food security: Comparative study of sorghum production in Gezira, vs North Kordofan and North Darfur*. Unpublished MSc. thesis, University of Khartoum.
- [27]. Kinina, R. (KTN News at 1:00pm, 24/3/2019). A Thirsty Marsabit: Drought has advanced in many parts. A correspondent for *KTN News* at 1:00pm, Sunday from Marsabit.
- [28]. Kisekka, C. (2016, November 6). Uganda: Residents cry as Rugunda fails to deliver food relief. *The Monitor*, Kampala. Retrieved from <http://africa.com/stories> on 11 April, 2018
- [29]. Kisekka, C. (2016, November 11). Uganda: Prime minister's visit leaves residents frustrated. *The Daily Monitor*. Retrieved from [www.monitor.com](http://www.monitor.com) on 10 April, 2018
- [30]. Kothari, C. R., (2004). *Research Methodology. Methods and techniques* (2nd Ed.), WishwaPrakashan.
- [31]. Krejcie, R. V. and Morgan, D. W. (1970). *Determining sample size for research activities*, Educational and psychological measurement, 30, 608, Sage Publications.
- [32]. Krishnamurthy, P.K., Lewis, K., & Choutlart, R.J. (2014). *Climate impacts on food security and nutrition: A review of existing knowledge on food security, livelihoods and nutrition in Karamoja*, Metoffice and WFP, Bangkok, Thailand.
- [33]. Lolemtum, T.J., Mugalavai, M.E & Obiri, A.J. (2017). Impact of drought on food security in West Pokot County, Kenya. *IJPRPs* Vol. 7, Issue 6, June, 2017. ISSN 2250-315. P9 (1-9).
- [34]. Lule, A.J (2016, November, 21). UPC calls for interventions on climate change. *The New Vision*. Retrieved on 11<sup>th</sup> April, 2018 from [www.newvision.co.ug](http://www.newvision.co.ug)
- [35]. MAF. (2016). *Rapid drought impact assessment: El Nino 2015/2016*. The Ministry of Agriculture and Fisheries, Republica Democratica De Tomor-Leste
- [36]. Maseruka, J. (2015). Drought hits Masaka, Rakai. *The New Vision*. Retrieved from [www.newvision.co.ug](http://www.newvision.co.ug) on 11 April, 2018
- [37]. McQueen, R & Knussen, C. (2002). *Research Methods for Social Sciences: An introduction*. Pearson Education Limited, Prentice Hall.
- [38]. Nakitende, H. (2016, November 18). Hunger: A deeper crisis that threatens to plunge millions into poverty. *The Sunrise*. Retrieved from <http://www.sunrise.ug> on 11 April, 2018
- [39]. Nabunya, C. (2016, July 25). Shortage of water hits Masaka district. Report on severe water shortage. *Uganda Radio Network*. Retrieved from <https://ugandaradionnetwork.com/story> on 11 April, 2018
- [40]. Oso, Y. and Onen, D. (2005). *A general Guide to writing Research Proposal and Report*. Kisumu, Kenya.
- [41]. Republic of Uganda. (2017). *National Food security and livelihoods Assessment Report* January 2017. Department of Relief, Disaster Preparedness and Management, Office of the Prime Minister, Uganda
- [42]. Sanyu, P. (2014, April 2). Climate change affecting food security. *The New Vision*.
- [43]. Saunders, M., Lewis, P & Thornhill, A. (2007). *Research methods for business students*. 4<sup>th</sup> Edition Pearson Education Limited
- [44]. Sekweyama, E. (2013, December 3). Coffee farmers hit hard by prolonged drought. Report on Agriculture, business and finance analysis. *Uganda radio network* Retrieved from [www.ugandaradionetwork.com/stories](http://www.ugandaradionetwork.com/stories) on 11 April, 2018
- [45]. Uganda IPC Technical Working Group (2017). *Integrated food security and livelihoods phase classification (IPC) analysis for Uganda: Evidence and standards for better food security and livelihoods decisions*, Government of Uganda (January – March, 2017).
- [46]. [www.fews.net](http://www.fews.net), (2017). *East Africa Food security and livelihoods outlook. Famine early warning*
- [47]. [www.reliefweb.int](http://www.reliefweb.int). Accessed on 14<sup>th</sup> March, 2018