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RESEARCH ARTICLE

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CLIMATE-RELATED CHALLENGES FACING CROP FARMERS IN UASIN GISHU COUNTY, KENYA

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ABSTRACT

Crop production is highly sensitive to climate variability. It is affected by changes in average rainfall and temperature, and extreme weather events. Climate change can cause disruption in food availability, reduce access to food, and quality. This study sought to establish climate-related challenges facing crop farmers in Uasin Gishu County, in Kenya. The authors collected survey data from 353 crop farmers in a region considered the breadbasket of Kenya. They analyzed data using Chi square and summarized it in frequencies and percentages. The findings of the study indicate that plant diseases (0.215), pests (0.751), weeds (0.099), increased rainfall (0.192), prolonged drought (0.981) increased flooding (0.251), increased soil erosion (0.733) and overlap of rainfall (0.537) affect farmers. Frost (0.041) and changes in onset of rains (0.008) did not pose significant challenges to the farmers.

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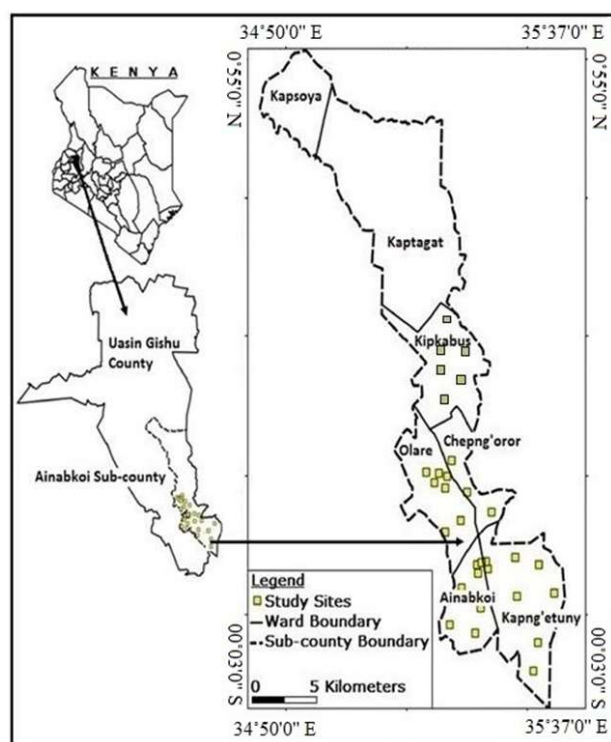
INTRODUCTION

Agriculture is an important sector that involves the livelihood of society, especially in Africa (Tedesco, 2018). Climate change has emerged as a significant global challenge affecting agriculture. Countries that highly depend on agriculture for livelihoods are vulnerable to shocks of climate change (IPCC, 2021). Sixteen percent of Kenya's land area falls within medium to high rainfall areas while the rest is arid or semi-arid with water scarcity (Republic of Kenya, 2017). In Kenya, just like many sub Saharan countries, agriculture is 98 percent rain-fed making it vulnerable to climate changes (Osumba, 2016). Kenyan economy depends on agriculture in terms of Gross Domestic Product (GDP), employment, provision of raw materials for industries and foreign exchange earnings. Agriculture sector contributes 23 percent of the country's Gross Domestic Product and an additional of 27 percent through manufacturing, distribution and service-related sectors. The consequences of climate variability to farmers in Kenya are dire (Osumba, 2016). Attempting to build resilience requires approaches such as investments in irrigation facilities, cultivating drought-tolerant crops, timing of production activities, and credit or insurance (Adakwah et al, 2021). Some of these strategies are often either not available or not feasible for many farmers in developing nations. (Ankrah et al, 2021).

MATERIALS AND METHODS

Study Area: The study was carried out the Ainabkoi/Olare ward in Uasin Gishu County in Kenya that lies between longitudes 34°50'0" East and 35°37'0" East and latitudes 00°03'0" South and 0°55'0" North (CGU, 2022). It covers a total area of 3,345.2 Km² (Figure 1). Uasin Gishu County is a highland plateau with altitudes falling gently from 2,700m above sea level in Timboroa in the East to about 1,500m above sea level in Kipkaren in the West (CGU, 2022).

Selection Criteria: There were 3,000 crop farmers registered with Agricultural Extension Officer (AEO) in the five locations of Ainabkoi/Olare ward (Personal communication.2021, April 20). Yamanne (1967) states that with a population of 3000, the sample size of 353 is selected. Primary data was collected from 353 crop framers through the use of survey research design between the months of May-August, 2022. Stratified sampling was used to make the strata of the 5 locations in Ainabkoi/Olare ward. Proportionate random sampling was used to identify the respondents from the strata within Ainabkoi/Olare ward. The sample size selected in the strata was proportionate to the population registered.



Source: (CGU, 2022)

Figure 1. Map of Ainaabkoi Sub County

The sample in the strata was derived by comparing the total population of registered farmers in the strata with total number of registered farmers in the ward and the quotient multiplied by sample of 353. A questionnaire which consisted of closed and open-ended questions was used to gather information on climate-related challenges facing crop farmers. Purposive sampling was used to identify key informants one (1) AEO and one (1) officer from Tupande by One Acre Fund. They provided information required on climate-related challenges through the interviews.

Data Analysis: Quantitative data collected through questionnaires administered were coded and entered to Statistical Package for Social Sciences (SPSS) version 26. They were analyzed using chi square and summarized in frequencies and percentages. Qualitative data collected from Key Informant Interviews (KIIs) were recorded and analyzed thematically.

RESULTS AND DISCUSSION

Demographic Characteristics of Respondents: Majority of the respondents (54.7%) were male and their ages ranged between 18 to above 48 years. This finding that there were more males than female farmers is in conformity to studies carried out by Adakwah *et al.*, (2021), Jephumba (2015), Kangume (2015) and Maxwell (2022) who found that crop farming is a male dominated venture and that decisions related to crop farming are mostly made by men. Marital status of respondents show 26.6% were single, 67.4% were married and 5.9% were divorced. This finding that majority of respondents were married concurs with the studies of Adakwah, *et al.*, (2021) and Maxwell (2022). Adakwah *et al.*, (2021) found that married people dominate crop farming in Ghana at (72%). Maxwell (2022) found that 79% of married respondents were involved in agricultural program due to increased responsibilities such as educating and feeding their children.

The results showed 23.8% had primary education while 76.2% had secondary education/post primary education. Although educational level is expected to enhance adoption of agricultural insurance (Rodgers, 2003), this isn't the case in the study area where 76.2% of farmers have secondary/post-primary education level and only 24.6% of crop farmers had adopted crop insurance.

Table 1. Demographics of Respondents

Factor	No of Farmers	Percentage (%)
Sex		
Male	193	51.6
Female	160	48.5
Age Group		
18-27	57	16.1
28-32	65	18.4
32-37	43	12.2
38-47	69	19.5
47 and above	119	33.7
Education level		
Primary education	84	23.8
Secondary/Post-Secondary	269	76.2
Marital Status		
Single	94	26.6
Married	238	67.4
Divorced	21	5.9
Forms of land ownership		
Factor		
Individual	131	37.1
Rented	128	34.6
Communal	98	27.8
Other forms of land ownership	2	0.6
Income		
Yes I have income	138	39.1
No Income	215	60.9

Source: Kosgei, 2025 (ongoing MA thesis)

The results show that 85% of crop farmers state weather change is the greatest risk facing them, pests (52.1%), diseases (41.6%), frost (20.1%) and weeds (11.9%) in that order. The finding that majority of farmers have experienced adverse weather change concurs with findings of Baagoe *et al.*, (2020), Kangume (2015), Kirimi, Mathenge and Njue (2015), Jephumba (2015), and Soni & Trivedi (2013) who found that crop failure was attributed to climatic condition. More than seventy percent of respondents (73.3%) indicated that weather changes vary from one season to another while (26.3%) stated that they experienced weather changes every season. The finding that weather varies every season concurs with studies by Baagoe *et al.*, (2020) who while carrying out studies in Nyeri county in Kenya found that majority of maize farmers (86.3%) had experienced negative effects of weather in farming.

Table 2. Climate-related Challenges

Risks	Frequency	Percentage
Diseases	147	41.6
Pests	184	52.1
Adverse Weather changes	300	85.0
Frost	71	20.1
Weeds	42	11.9

Source: Kosgei, 2025 (ongoing MA thesis)

The study revealed that majority of crop farmers (94.6%) have experienced negative effects of climate change in their farming activities. This agrees with findings of Baagoe *et al.*, (2020) who while carrying out studies in Nyeri county in Kenya found that climate changes are a major concern to farmers (86.3%).

Weather Phenomena Experienced: Table 3 shows changes in onset of rains is the most weather phenomena experienced (75.6%), followed by prolonged drought (46.5%), overlap of rainfall (18.4%), increased soil erosion (13.3%), increased rainfall (12.7%) and others (1.4%).

Table 3. Weather phenomena experienced

Phenomena	Frequency	Percentage
Increased rainfall	45	12.7
Prolonged drought	164	46.5
Increased flooding	17	4.8
Increased soil erosion	47	13.3
Changes in onset of rain	267	75.6
Overlap of rainfall	65	18.4
Other	5	1.4

Source: Field data, 2022

The agricultural officer in-charge of Ainabkoi/Olare ward stated that the ward is experiencing changes in rainfall. He noted that it did not rain in June 2021, a period of tussling of maize and that this reduced yields. An officer from Tupande by One Acre Fund (OAF) said that farmers face challenges of prolonged rains during harvesting, rotting of maize cob, uneven seed germination, and delays in supply of certified seeds. The finding that 12.7% of farmers had experienced increased rainfall concurs with findings by Baagoe *et al.*, (2020) and Kangume (2015).

Baagoe *et al.*, (2020) found that 36% of maize farmers have experienced increased rainfall. Kangume (2015) noted that majority (77.9%) of respondents had experienced too much rain. The finding that there are changes in onset of rains (75.6%) concur with findings by Kangume (2015) who found that over a third (30.5%) of farmers rank it as very high. The chi square test indicated that plant diseases, pests, weeds, increased rainfall, prolonged drought, increased flooding, increased soil erosion, and overlap of rainfall had significant effect on farmers (Table 2). This was in contrast with frost and changes in onset of rains (Table 2).

Table 4. Chi Square Significance of Climate-Related Risks

Weather Phenomena	Pearson Value	Significance
Plant diseases	1.539	0.215
Pests	0.101	0.751
Frost	4.168	0.041
Weeds	2.729	0.099
Increased rainfall	1.703	0.192
Prolonged drought	0.001	0.981
Increased flooding	1.316	0.251
Increased soil erosion	0.116	0.733
Changes in onset of rains	6.947	0.008
Overlap of rainfall	0.382	0.537

Source: Kosgei, 2025 (ongoing MA thesis)

Table 5. Farmers' effort of adapting to the challenges

Adaptation strategy	Frequency	Percentage
Off farm investments	36	10.2
Diversification	213	60.3
Altering planting dates	86	24.4
Insurance of crops	87	24.6
Using water saving technology	45	12.7
Growing climate tolerant crops	127	36.6
Using weather advisory	17	4.8
Intercropping	157	44.5
Planting trees	86	24.4

Source: Kosgei, 2025 (ongoing MA thesis)

Farmer have applied several adaptation measures to cope with climate change and variability. As shown in Table 4, diversification is the most used adaptation strategy (60.3%) and this concurs with findings by Fonta *et al.*, (2018) in their study in Burkina Faso who found that more than 63% of the respondents reported making use of crop diversification as an important climate change adaptation strategy. Intercropping as an adaptation strategy was employed by (44.5%) of crop farmers. This agrees with studies by Baagoe *et al.*, (2020) who in their studies in Nyeri County in Kenya established that some farmers were intercropping maize and beans as a protection against pests. About a third (36.6%) of farmers are growing climate tolerant crops. Baagoe *et al.*, (2020) also established that maize farmers were planting drought resistant varieties (47.7%). Altering planting dates, planting trees (24.4%), insurance of crops (24.6%), using water saving technologies (12.7%), off farm investment (10.2%) and using weather advisory (4.8%) were also employed as adaptation strategies. This research reports that some farmers (10.2%) practice off farm investments and it concurs with findings by Fonta *et al.*, (2018) who also found (57%) of farmers practiced trading and craftsmanship as an adaptation. The AEO reported that farmers are aware of changes in weather and as a result plant short season varieties of potatoes and napier grass and others have ventured into growing vegetables. The AEO reported that some farmers were changing to varieties of potatoes that last for long without going bad.

CONCLUSION

This study established that weather changes is the greatest climate-related challenge experienced by crop farmers compared to other challenges such as pests, diseases, frost and weeds. Majority of farmers indicated that weather change varies every season. Most farmers have had climate change negatively affecting their production. The most experienced weather phenomena in crop farming is changes in the onset of rains. To mitigate weather changes, farmers reported making use intercropping, adopting crop insurance, among others.

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