Journal of Economics

ISSN Online 2617 - 5800

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ISSN: 2617-5800

Stratford Peer Reviewed Journals and Book Publishing
Journal of Economics
Volume 10||Issue 1||Page 117-133||June ||2026|
Email: info@stratfordjournals.org ISSN: 2617-5800

Effect of Climate Change on Access to Food by Households in Neboi Location, Mandera County, Kenya

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How to cite this article: Salat, H. A., & Wawire, N. H. W. (2026). Effect of Climate Change on Access to Food by Households in Neboi Location, Mandera County, Kenya. *Journal of Economics*, 10 (1), 117-133. https://doi.org/10.53819/81018102t5434

Abstract

Climate change as an emerging global challenge has attracted considerable attention by policymakers due to its adverse impacts on society, the economy, and the environment. In Kenya, climatic changes have resulted in sharp weather variations that have disturbed agricultural ecosystems, undermined production patterns of agricultural goods and affected household access to food. In Neboi Location of Mandera County, an ASAL area, climatic adversities have negatively impacted production, storage, and marketing of food crops and livestock. The adverse climate changes have presented significant danger to residents who rely on pastoralism as their main economic activity, driving many households into food insecurity and poverty. This study determined the effect of climate change on access to food by households in Neboi Location. Primary data was collected via semi-structured questionnaires and face-to-face interviews, supplementing secondary data sources covering 1990-2015. Quantitative data was analyzed using a Generalized Method of Moments (GMM) regression model while NVivo was used to analyze qualitative data. Descriptive results revealed that 85.5 percent of households could not access safe and adequate food. Climatic calamities consisting of prolonged droughts, flash floods, pest infestations, and cyclones were found to significantly explain inadequate food access (t-statistic = 7.649, p = 0.0002). Monthly household income also significantly affected food access (t = 1.9259, p = 0.0633). The study recommends that households adopt climate-smart agriculture by planting drought-resistant crops like cassava, cowpea, sweet potatoes, sorghum, pearl millet, and groundnuts to supplement livestock production. The County Government of Mandera should collaborate with the National Government and non-governmental organizations to provide subsidized seeds, establish food storage facilities, and facilitate alternative income-generating activities.

Keywords: *Climate change, food security, food access, ASAL, Mandera County, household vulnerability*

Stratford Peer Reviewed Journals and Book Publishing
Journal of Economics
Volume 10||Issue 1||Page 117-133||June ||2026|
Email: info@stratfordjournals.org ISSN: 2617-5800

1.0 Introduction

Climate change, as an emerging global challenge, has attracted considerable attention by policymakers due to its profound impacts on society, particularly regarding food security (Herrera, Ruben & Dijkstra, 2018; UNEP, 2017). The phenomenon manifests through increasing rainfall patterns in some regions and declining precipitation in others, alongside recurring and devastating droughts and flooding, all of which adversely affect society, the economy, and the environment (FAO, 2015). These climatic variations have far-reaching consequences for household food access, especially in vulnerable communities that depend heavily on climate-sensitive agricultural systems for their livelihoods. The United Nations member states adopted the Sustainable Development Goals in 2015, with SDG 1 aiming to eradicate poverty globally. However, changing climatic conditions have complicated the attainment of this noble goal, particularly concerning food security. Poor people and societies are disproportionately affected and are more likely to be driven into abject poverty when climate-related shocks such as floods, heat waves, prolonged droughts, and cyclones destroy their livelihoods and food production systems (Hallegatte, Bangalore & Bonzanigo, 2016).

Adverse climatic changes subject people to poverty through multiple pathways, including damage to physical capital, destruction of human lives, and erosion of social capital through floods and droughts (Kar & Das, 2015; Zewdie, 2014). These climatic impacts directly threaten household food security by disrupting agricultural production, increasing food prices, and reducing household incomes available for food purchases. Changing climatic patterns modify weather conditions, increasing or decreasing the frequency and intensity of climate-related calamities that drag households into poverty and food insecurity (Weyant, 2017). Adverse climatic effects on crops, people, and livestock bring poverty through several channels including prices, assets, productivity, and opportunities, all of which directly impact household access to adequate food (Weyant, 2017).

The consequences of adverse climatic conditions include changes in crop production, water availability, pest infestations, disease outbreaks, and animal diseases-all of which fundamentally undermine food security (FAO, 2010). People who largely rely on climate-dependent resources suffer most from these harmful impacts, experiencing declining agricultural produce due to increasing cases of droughts, floods, and pest infestations (World Bank, 2016; Speranza, 2011). Long droughts or floods destroy crops and kill livestock, directly reducing food availability and driving crop and livestock owners into hunger and poverty. In Kenya, climatic changes have resulted in sharp weather variations that have disturbed agricultural ecosystems, undermining production patterns of agricultural goods and resulting in declined farm output, shrunk household incomes, and escalated food insecurity (World Bank, 2011).

Kenya depends heavily on climate-reliant sectors of the economy, with the agricultural sector supported primarily by natural rainfall. Adverse weather conditions affect the production of key staple foods and cash crops, and with 75 percent of Kenyans engaged in these sectors, more than half of the Kenyan population faces risks of hunger and poverty (Kenya National Bureau of Statistics, 2016). Sherwood (2013) argued that drought, short rains, erratic rains, and floods create poverty traps for households by destroying their food production capacity. The 2009-2010 prolonged droughts exemplify this reality, leading to massive crop failures and placing approximately 3.3 million Kenyan households at risk of hunger, malnutrition, and starvation (Republic of Kenya, 2016).

Mandera County, one of Kenya's dry and semi-arid regions, exemplifies the severe impacts of climate change on household food access. The county is home to 38% of Kenya's ASAL population and accounts for 12% of the GDP, with subsistence farming as the main source of livelihood. However, the effects of climatic changes have negatively impacted residents, resulting in several households facing acute food poverty and depending heavily on food aid (Tawane & Mugalavai, 2018). The county is frequently affected by prolonged droughts and flash floods that cause soil degradation, loss of livestock, and destruction of crops-all directly threatening food security. During prolonged droughts, residents are forced to spend their meager savings to buy food, which typically becomes scarce and expensive during such seasons (Tawane & Wakhungu, 2018). Pest infestations common in the Northern region destroy vegetation and crops, further exacerbating food insecurity.

In Neboi Location specifically, the adverse impacts of climate change on food access have been particularly severe. Flash floods destroy crops, livestock, and infrastructure including roads, impacting negatively on transportation of agricultural produce to markets and limiting access to farm inputs (Republic of Kenya, 2016). Livestock rearing, which is a vital source of income for over 84 percent of households and contributes approximately 72 percent to household incomes, is severely threatened by climatic changes. As a result of persistent droughts and other climate-related calamities, many households have been driven into poverty and face chronic food insecurity, with families depending increasingly on food aid. According to the Department of Agriculture, Livestock and Fisheries (2017), 89 percent of households in Mandera County were living below the poverty line of one dollar a day, unable to access adequate and nutritious food. However, it remains empirically unclear precisely how climate changes impact household food access in Neboi Location, necessitating this focused investigation to inform targeted policy interventions for improving food security in this vulnerable community.

1.1 Statement of the Problem

The effects of climatic changes have exacerbated already existing challenges faced by households in terms of access to adequate and nutritious food in Neboi Location of Mandera County. Extremely arid locations (ASALs) like Neboi are particularly vulnerable to flooding and droughts brought on by sudden shifts in weather patterns, which directly threaten household food security by destroying crops, decimating livestock herds, and disrupting food supply chains. Despite the best efforts of non-governmental organizations, the national government, and the Mandera County administration to support climate adaptation and build household resilience, the catastrophic consequences of climate change on food access have not been adequately lessened. Families continue to encounter significant difficulties in obtaining sufficient food, with many households reporting chronic food insecurity, increased dependence on food aid, and rising malnutrition rates, particularly among children and vulnerable populations. The persistent nature of these challenges, despite ongoing interventions, underscores the need for a comprehensive examination of how climate change specifically impacts household access to food in this vulnerable community.

Previous empirical studies on climate change conducted in Mandera County have not adequately investigated the specific impacts of climate change on household food access from an economic perspective. For instance, Tawane and Mugalavai (2018) evaluated mitigation mechanisms for climatic change and survival in Mandera County but did not present detailed analysis of the adverse effects of climate change on household food security. Similarly, Tawane and Wakhungu (2018) studied risks associated with climatic changes on agro-pastoral growth in Mandera County but did not specifically quantify the relationship between climate change

and household food access. Furthermore, these studies focused on the impacts of climatic changes primarily from a geographical point of view rather than determining the effect of climate change on household food access from an economic perspective using rigorous econometric models. This study therefore addresses the identified knowledge gaps by employing economic analytical frameworks and quantitative methods to determine the effect of climate change on access to food by households in Neboi Location of Mandera County, providing empirical evidence to inform targeted policy interventions for enhancing food security in this climate-vulnerable region.

1.2 Objective of the Study

The objective of the study was to determine the effect of climate change on access to food by households

2.0 Literature Review

This chapter highlights the theoretical and empirical literature underpinning the study. Each of the section is discussed in depth.

2.1 Theoretical Literature

The study was anchored on Amartya Sen's Entitlement Theory of 1981, which provided the framework for understanding how climate change affects household food access in Neboi Location. The theory was particularly relevant because it directly addresses how climate and weather shocks impact prices of goods, access to food products, and changes in household income-the core mechanisms through which climate change undermines food security. Sen's theory highlights household capabilities in generating income and accessing food during crises by emphasizing their abilities to exploit various endowments including land, livestock, labor, and other productive capital under existing production conditions, prices, legal guidelines, and social and cultural contexts (Seaman, Sawdon, Acidri & Petty, 2014).

When integrated with sustainable livelihoods frameworks (Scoones, 1998), the theory conceptualized the linkage between climatic shocks and household livelihood changes by incorporating expanded forms of capital such as physical, natural, social, financial, and human capital (Adger & Kelly, 1999; Turner et al., 2003a). In Neboi Location's context, where households depended heavily on climate-sensitive agriculture and livestock production, this theoretical framework demonstrated how climatic changes directly affect the exploitation of natural resources, livestock production, human capital, and overall economic productivity. The theory posited that household food access functioned as: Household Food Access = f (human, physical, environmental factors).

The theory's applicability to the study lay in its capacity to guide policy interventions for designing adaptive responses during climate-related crises threatening household food security. In Neboi Location, harsh prolonged droughts, flash floods, pest infestations, and other weather-related calamities triggered uncontrolled consumption of savings and forced sale of assets and livestock, undermining household entitlements to food through three pathways: production-based entitlements (when climate shocks destroy crops and kill livestock), trade-based and market-based entitlements (when depleted income prevents food purchases despite market availability), and transfer-based entitlements (when disasters disrupt social networks and community support systems). This comprehensive framework made Sen's Entitlement Theory suitable for examining how climate change affects household food access in Neboi Location

and provided a basis for developing holistic policy interventions to strengthen household resilience.

2.2 Empirical Literature

Studies have examined the relationship between climate change and household food security across different contexts, providing insights relevant to understanding the situation in Neboi Location. Zewdie (2014) conducted a literature-based review on climatic changes and food security in Sub-Saharan Africa and found that climatic components including precipitation, carbon dioxide emissions, temperatures, and other adverse climatic changes significantly impact food security of households in terms of accessibility and utilization of food. In Kenya specifically, Kabubo-Mariara and Kabara (2014) studied climatic changes and food security covering the years 1975-2012, employing Atmospheric Oceanic Global Circulation Models and Special Report on Emissions Scenarios to simulate future impacts. Their findings revealed that climatic variability and changes escalated food insecurity, while favorable agro-ecological conditions and soil patterns were positively related to food security.

Similarly, Kabubo-Mariara et al. (2016) investigated impacts of climatic changes on nutritional poverty and food production among Kenyan households using household survey data for 2004, 2007, and 2010, with Standardized Precipitation-Evapotranspiration Index, temperature, and rainfall employed as measures of climate change. The study findings showed non-linear impacts of climatic elements on food produced and nutritional state of households, with sufficient precipitation leading to increased food production. Ochieng, Kirimi and Mathenge (2016) further examined the impact of climatic variations and changes on agricultural production among smallholder farmers in Kenya, focusing on production and revenue growth for crops like maize and tea, and found that climatic changes significantly impacted agricultural productivity, with temperature variations having greater impact on crop production than rainfall. Mulwa, Rao, Gummadi and Kilavi (2016) investigated the impacts of climatic changes on agricultural productivity and household welfare in Kenya, collecting primary data from 441 households, and revealed that 36-66 percent of households in agro-ecological zones receive little rainfall, with agricultural productivity influencing per capita income, net returns from farm, and poverty traps of households.

Despite these contributions, significant knowledge gaps remain that this study addresses. Studies by Tawane and Mugalavai (2018) and Tawane and Wakhungu (2018) on climate change in Mandera County focused on mitigation strategies and risks to agro-pastoral growth respectively but did not discuss in depth the adverse economic effects of climate change on household food access or establish quantitative relationships between climate variables and food security outcomes. Furthermore, these studies approached climatic impacts from a geographical perspective rather than determining the effect of climate change on households from an economic point of view using rigorous econometric models. International studies, while informative, have contextual limitations for application to Neboi Location.

For instance, Herrera, Ruben and Dijkstra (2018) studied climate variation and household susceptibility to poverty in Nicaragua using a multilevel empirical approach, finding that climatic changes negatively impacted household per capita consumption. However, Nicaragua enjoys humid and fairly consistent year-round precipitation, unlike Mandera County which experiences hot dry conditions most of the year, suggesting that the effects and coping strategies might differ significantly and findings cannot be generalized. Similarly, Makoka (2008) studied the impact of drought on rural household vulnerability in Malawi, revealing that

households experiencing two-period droughts were more susceptible than those experiencing drought in only one period, but the economic livelihoods of households in Malawi may differ substantially from those in Neboi Location. This study therefore fills the identified gap by employing economic analytical frameworks and econometric models to quantify the specific effect of climate change on household food access in the unique ASAL context of Neboi Location, Mandera County, providing empirical evidence to inform targeted policy interventions for this climate-vulnerable pastoralist community.

3.0 Research Methodology

The study employed an explanatory research design to examine the effect of climate change on household access to food in Neboi Location, Mandera County. The explanatory design was appropriate as it clarifies causal linkages between variables, specifically how climate change affects household food access.The target population comprised 1,528 households in Neboi Location, from which 317 household heads were selected using Yamane's (1967) sample size formula with a 95% confidence level and 5% margin of error. Stratified random sampling was employed with each sub-location constituting a stratum to ensure representativeness and reduce selection bias. Additionally, purposive sampling was used to select 5 government officers and 7 Non-Governmental Organization officers engaged in climate mitigation activities. Both primary and secondary data were collected covering the period 1990-2015. Primary quantitative data were gathered using semi-structured questionnaires administered to households, while qualitative data were collected through interview guides with key informants from government and NGOs. Secondary data on household income levels, educational attainment, and food consumption patterns were obtained from Kenya Economic Surveys, Kenya Bureau of Statistics publications, and Mandera County Government reports. Based on Amartya Sen's Entitlement Theory, the study specified the following econometric model:

$$FA_t = \beta_0 + \beta_1 CC_t + \beta_2 LE_t + \beta_3 MI_t + \mu$$

Where FA represents access to food (measured as percentage of households unable to access safe and adequate food), CC represents climatic calamities (incidences of prolonged drought, flash floods, pest infestations, and cyclones), LE represents level of education of household head, MI represents monthly household income, and μ represents the error term. Data analysis was conducted using EVIEWS software, employing descriptive statistics (means, standard deviations, minimums, and maximums) and inferential statistics through Generalized Method of Moments (GMM) regression to determine the effect of climate change on food access. Qualitative data were analyzed using thematic content analysis, with participants' responses grouped according to themes and reported narratively to triangulate and enrich the quantitative findings. A 95% confidence interval was employed to test the significance of coefficient estimates, ensuring robust empirical evidence on the relationship between climate change and household food access.

4.0 Empirical Results and Discussion

The results and discussions are presented in sections.

4.1 Response Rate

Table 1 shows the response results.

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Table 1: Response Rate

Questionnaires	Frequency	Percent
Returned	167	52.7
Unreturned	150	47.3
Total	**317**	**100**

The results in Table 1 show that of the 317 questionnaires distributed to households in Neboi Location, 167 were properly completed, representing a 52.7 percent response rate. This response rate was adequate to support a viable study, considering Bailey's (2000) assertion that a response rate of 50 percent and above is acceptable and good. The favorable response rate was attributed to notifying study participants in advance about their inclusion in the study, encouraging voluntary participation, and conducting follow-ups on distributed questionnaires (Bailey, 2000). Additionally, twelve key informant interviewees participated in the interviews, representing a 75 percent participation rate.

4.2 Descriptive Statistics of Explanatory Variables

This section presents the demographic information of the household heads in Neboi Location, Mandera County including education attainment, household income, occupation and nature of climatic related calamities experienced in the region.

4.2.1 Level of Education of Household Heads in Neboi Location

The study investigated the educational attainment by the household head in Neboi location. Level of education of household heads and other residents in Neboi Location is critical determinant when seeking employment opportunities and also understanding climatic related calamities and how to cope with it. Results of the study are presented in Figure 1.

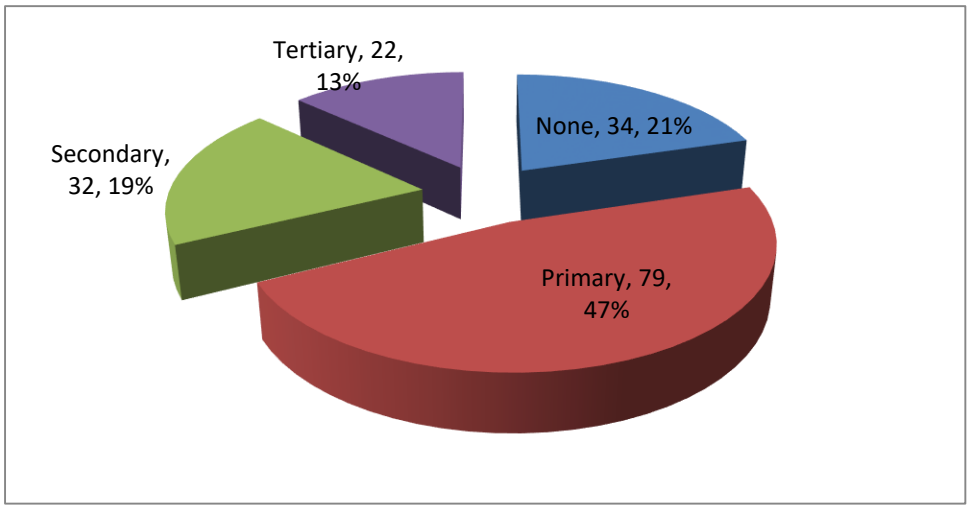

Figure 1: Level of education of households' heads in Neboi location

The level of education of Neboi Location is indicated in figure 1 where most of the household heads stopped at primary school level, while 21% of them have not been schooled at any level, 19% attained secondary level of education, and only 13% of them achieved tertiary education

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level. Poverty of a household may lessen as household head pursues more education. Education may provide employment to households and also facilitate diversification of livelihood portfolio through use of human capital acquired in school. Education impacts socioeconomic growth of the household and thus may help household earn a living (Awan, Malik, Sarwar & Waqas, 2011; Arsani, Ario & Ramadhan, 2020). Educational attainment plays significant role in poverty alleviation because beneficiaries of education are able to apply what is learned in school to fend for their households including starting small businesses, employing modern ways of agricultural production and livestock rearing. Educated household heads can seek employment opportunities to generate income. The results agree with Barbier and Hochard (2018) that educational attainment of the household head reduces household poverty. Elhadi, Nyariki, Wasonga and Ekaya (2012) further noted that education attainment by the household heads enables household earn a living and thus fight food insecurity. However, Akona (2014) who studied factors affecting poverty levels in Kenya found that education may not necessarily help fight poverty and food insecurity.

4.2.2 Monthly income of household head in Neboi location

The study determined the average monthly income earned by the household heads in Neboi Location. The monthly average income of the household head is a significant predictor of household poverty and its consideration in this study is important. The results are presented in Figure 2.

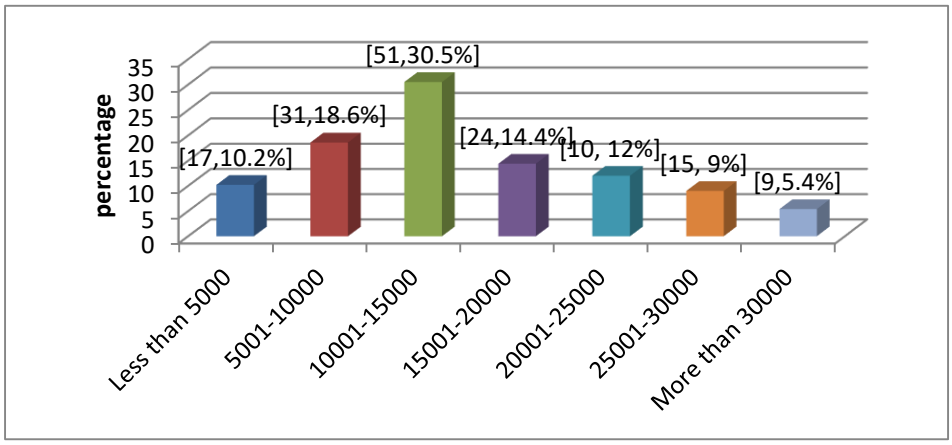

Figure 2: Monthly income for household head in KES

The results showed that most of household heads, 30.5 percent earned income of KES 10,001-15,000 a month. Very few household head in Neboi Location earned income of more than KES 30,000. Households in arid regions access few resources and low income as avenues of income generation are limited by the nature of climatic conditions in there. Access to economic opportunities by households in the arid areas tends to be affected by adverse climatic conditions like erratic rainfalls, floods and pests infestation, tend to limit the amount of income. These findings are in line with the findings Teka, Woldu and Fre, 2019 who found that income levels play a significant role in reducing poverty among pastoral and agro-pastoral households in Ethiopia, and Elhadi et al, 2012 who found that improving income generating livelihoods helps in reducing poverty in semi-arid Kenyan communities.

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4.2.3 Occupation of the household heads in Neboi location

Occupation of household heads in Neboi Location was investigated. Nature of occupation undertaken by the household heads determines the amount of income generated to cater for household needs including food, health and education. The results are presented in Figure 3.

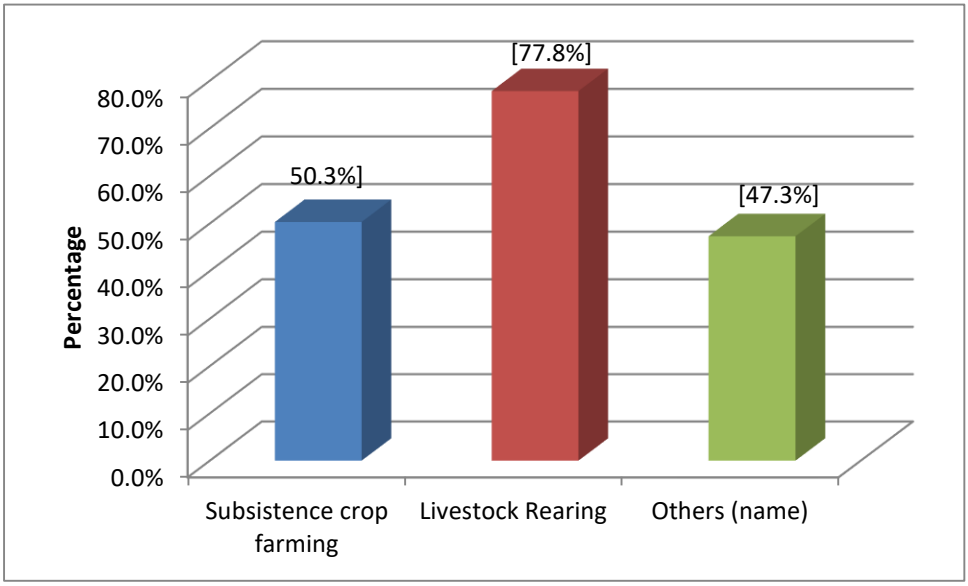

Figure 3: Occupation of the household heads in Neboi location

Results in Figure 3 reveals that majority of household heads in Neboi Location depend on livestock rearing for livelihood (77.8 percent). However, some of the households are also engaged in subsistence crop farming (50.3 percent), small trading business and some forms of employment particularly in teaching and county government (47.3 percent). Climate change, degradation of lands, depleting natural resources and loss of biodiversity are some of hurdles to sustenance of people's livelihoods in Neboi Location. Limited sources of income and high dependence on climate dependent livelihood like farming and livestock pushes household to poverty during prolonged drought or torrential floods whereby livestock and crops are destroyed.

4.2.4 Common Climatic Calamities in Neboi Location

The study investigated common climatic calamities affecting households in Neboi Location. The results are presented in Figure 4.

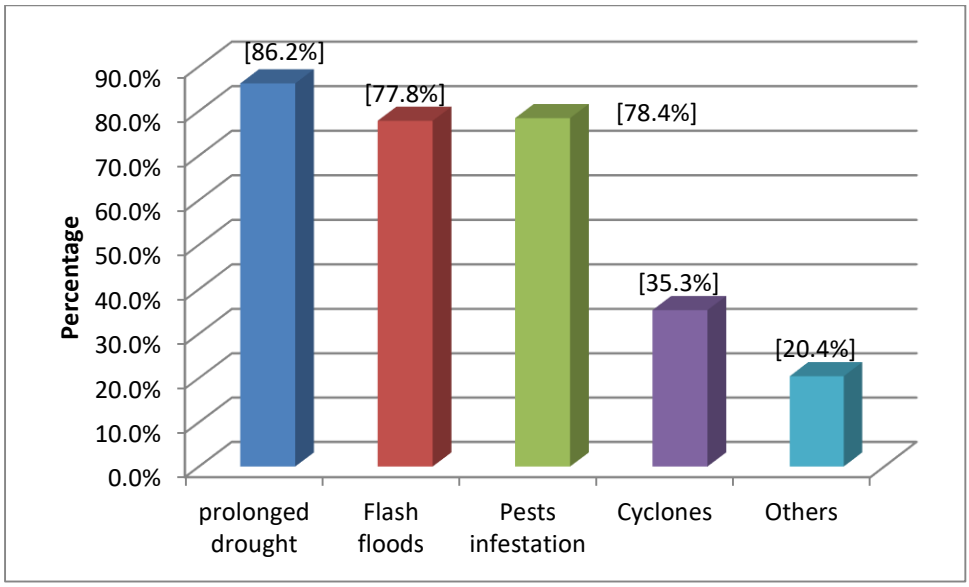

Figure 4: Common climatic related calamities in Neboi Location

It was established that some of the most common climatic calamities in Neboi Neboi Location are prolonged drought (86.2 percent) and pest infestation (78.4 percent). It was also established that flash floods (77.8 percent) and cyclones (35.3 percent) are also common in the area. Extreme climatic conditions like prolonged drought and flash floods destroys crops, livestock and loss of life. As a result, many households are deprived of their means of livelihood, spending on the available savings thereby pushing many households to poverty. Moreover, pest infestation and flash floods triggers disease outbreak where many households are forced to spend their savings and sale cattle to cater of medical care which in some cases may result to catastrophic health care expenditures. Catastrophic health care expenditures are often some of bad expenditures that drive many households to poverty.

4.3 Generalized Method of Moments Regression Results

The study employed Generalized Method of Moments to estimate the model equation of the study. Generalized method was suitable as it allowed more moment conditions than there are parameters to compute allowing the estimates to be over identified (Cragg, 1983).

Effect of Climate Change on Access to Food

Table 2 presents the econometric results examining the effect of climate change on household food access in Neboi.

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Table 2: Generalized Method of Moments Results

Lack of Access to Food.				
Method: Generalized Method of Moments				
Instrument specification: Level of Education of Household Head; Climatic Calamities/Changes; and, Monthly Size of Income of Household Head.				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
Level of Education of Household Head	0.1645	0.3167	0.5192	0.6073
Climatic Calamities/Changes	0.8496***	0.1117	7.649	0.0002
Monthly Size of Income of Household Head	0.4290*	0.2228	1.9259	0.0633
Constant	0.1645	0.3167	0.5192	0.6073
R-squared	0.6519	Mean dependent var		.....
Adjusted R-squared	0.6182	S.D. dependent var		.....
S.E. of regression	0.01305	Sum squared resid		.....
Durbin-Watson stat	1.7470	J-statistic		1.5785
Instrument rank	4			

*Sig at 10% **Sig at 5% ***Sig at 1%

Climatic calamities or changes such as prolonged droughts and floods, and monthly size of income of Heads of Households satisfactorily explained the variations in access to food. This is supported by adjusted R-squared of 0.6182, meaning that the explanatory variables explain 61.82 percent of the variation in household lack of access to food. Climate change may impact adequate supply of food because of crop destruction resulting from prolonged drought and floods. The regression results showed that the coefficient of climatic calamities which were captured by incidences of prolonged drought, flash floods, pests infestations and cyclones was positive and significant at both 1 percent and 5 percent levels (t-statistic = 7.649, p = 0.0002). This implies that an increase in the percent of climatic calamities leads to an increase in the percent of households unable to access adequate food. To corroborate this result, in an interview with an NGO Officer, the Officer stated the following:

> *"Adverse climatic changes are common in Neboi Location. The changes manifest itself in form of prolonged droughts and flash floods that often destroys crops and livestock triggering food shortage and famine"* NGO officer 1 [Key Informant, 2020]

Climate change particularly disrupts rainfall patterns thereby impacting food production as households cannot plant food crops at the right time. Insufficient and erratic rainfalls destroy crops triggering food inadequacy and insecurity. Many households are unable to get water for their cattle which die for lack of water. Livestock form part of food store for many households in Neboi location and other dry areas in Mandera county. Climatic changes impact food crop maturity time affecting nutritional status of the households. As a consequence, households have to use their savings and available income to buy food items that are deficient.

Deficiency in some food requirements may result to malnutrition related diseases especially among children. People are forced to spend their little income to purchase food stuffs whose prices sharply increase. As a result, more households are driven below the poverty line because all resources are used to purchase food depriving households of their savings and other forms of wealth. The results on access to safe and adequate food caused by climate calamities corroborate the findings of Kabubo-Mariara and Kabara (2014) who found that climatic variability and changes escalated food insecurity.

In the event of prolonged droughts, households have to spend most of their time seeking water for domestic use and for cattle at the expense of engaging in economic productivity triggering resource and food shortage. Rising high temperatures impact the water cycle by influencing when, where, and how much precipitation falls. Insufficient access to clean water for drinking limits proper digestion and absorption of food. Another NGO officer stated:

> *"High persistent conditions of extreme temperatures have destroyed water points in most places in Neboi Location. Households have to spend most of their time seeking water for domestic and animal consumption at the expense of engaging in economic productivity triggering resource shortage"* NGO officer 2 [Key Informant, 2020]

The analysis showed that monthly household income had a positive and statistically significant effect at the 10 percent level ($t = 1.9259$, $p = 0.0633$). This finding indicates that when incomes fall, families in Neboi Location struggle more to obtain enough food during periods of climatic stress. Climate-related shocks do not affect all groups equally, and households with limited financial resources are consistently the most exposed. In Neboi, many families rely directly on rainfall, pasture, and small-scale farming for their livelihoods, making them extremely sensitive to erratic weather patterns. Unpredictable rains, delayed seasons, and prolonged dry spells often wipe out crops and livestock, leaving households without food or income. Unlike households in wealthier settings, low-income families in such environments rarely have access to insurance or savings that could help them recover from these disruptions. The education level of the household head, however, showed a positive but statistically insignificant relationship ($t = 0.5192$, $p = 0.6073$), meaning that higher educational attainment did not translate into a stronger ability to secure adequate food during climate shocks in Neboi Location.

5.0 Conclusion

The study concludes that climate change significantly undermines household access to food in Neboi Location, Mandera County. The empirical evidence demonstrates that climatic calamities-specifically prolonged droughts, flash floods, pest infestations, and cyclones-have severe and statistically significant negative effects on household food security. These climate-related shocks destroy crops, decimate livestock herds, disrupt food supply chains, and trigger sharp increases in food prices, making adequate food inaccessible to most households. The effects are inequitable, with low-income and marginalized pastoral communities bearing disproportionate burdens due to lack of savings, insurance, and alternative income sources. Monthly household income plays a critical role in determining food access during crises, as wealthier households demonstrate greater resilience. Addressing food insecurity requires holistic interventions that strengthen adaptive capacity, diversify livelihoods, build climate resilience, and ensure social protection mechanisms.

6.0 Recommendations

The study recommends that multiple stakeholders implement comprehensive interventions to enhance household food security in Neboi Location. Households should be supported to adopt climate-smart agriculture, particularly cultivating drought-resistant crops like sorghum, cassava, sweet potatoes, pearl millet, cowpea, and groundnuts to supplement livestock production. The County Government of Mandera, National Government, and non-governmental organizations should provide subsidized drought-resistant seeds, training programs, and establish food storage facilities to preserve harvests during emergencies. Alternative income-generating activities beyond agriculture should be facilitated, including small-scale trading and artisanal crafts, to diversify livelihoods. Targeted cash transfer programs and social protection schemes should be implemented for vulnerable households during climate emergencies. The County Government should invest in climate-resilient infrastructure, establish early warning systems linked to emergency food distribution, and strengthen extension services.

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