Journal of Policy and Development Studies

[ISSN 2958-1141]
Volume: 03 Issue: 01 | June-2024

JPDS

The nature of livelihood insecurity among agropastoral households in South Kerio Basin, Elgeyo Marakwet County

Authors
Juster Gitonga[1]; Henry Rono [2]; Daniel Muia [3]
Main author email: justerkath16@gmail.com

(1.2.3) Kenyatta University, Kenya.

Cite this article in APA
Gitonga, J., Rono, H., & Muia, D. (2024). The nature of livelihood insecurity among agropastoral households in South Kerio Basin, Elgeyo Marakwet County. *Journal of policy and development studies, 3*(1), 15-27. https://doi.org/10.51317/jpds.v3i1.524

OPEN ACCESS
A publication of Editon Consortium Publishing (online)

Article history
Received: 20.04.2024
Accepted: 08.05.2024
Published: 13.06.2024

Scan this QR to read the paper online

Abstract
This study assessed the nature of livelihood insecurity in the South Kerio Basin, Elgeyo Marakwet County, Kenya, a semi-arid region. The study, a cross-sectional survey design with a mixed methods approach, was guided by the theory of livelihood insecurity. The unit of analysis included households in three locations: Keu, Kibargoi, and Arror. From a population of 8,199 registered households in the three locations, a sample of 383 households was determined using Yamane (1967) formula and distributed proportionately. An interview guide was used to collect quantitative data, while qualitative data was collected using key informant interviews and a focused group discussion guide. Every kind of ethical consideration was taken into consideration. The statistical package SPSS V22 was used to generate quantitative descriptive and inferential statistics, and the Excel spreadsheet was used to analyze the qualitative data. The study established that households experienced varied livelihood insecurities in terms of environmental variability, deficiencies in livestock production, land use and productivity and income and household endowments. These drove households to adapt to new livelihood strategies, including diversification into horticultural production. The study concluded that despite livelihood insecurities, horticultural production offered households new livelihood pathways to meet their needs. The study recommends partnerships and integration between the National and County governments and the local community to address livelihood insecurities and develop policies for strengthening households' local capacity and coping mechanisms.

Key terms: Adaptation, agropastoral households, horticultural production, livelihood insecurity, semi-arid region.

INTRODUCTION

Several indicators have been used to assess livelihood insecurity. The most common indicators include the rate of hunger and food deficiency, the rate of assets deficiency, income insecurity, or socioeconomic vulnerability (Ahammad et al., 2021; Irungu et al., 2021). The Food and Agriculture Organisation [FAO] (2022) report on world food security and nutrition status estimated that in 2021, 33 per cent of the world population experienced livelihood insecurity, food deficiency and poverty. The report also indicated that 30 per cent of the world population was severely insecure about livelihood and food, and 40 per cent faced severe food insecurity (FAO, 2022). Other estimates based on the global multidimensional poverty index indicate that by 2018, 26.5 per cent (1.45 billion) of the world's total population experienced severe livelihood insecurity. Most of this population was in low-middle-income countries (FAO, 2022). The United Nations Convention to Combat Desertification (UNCCD) classifies approximately 40 per cent of the world's total land area under ASAL (FAO, 2022), dominated by pastoralism and agro-pastoralism (Sewando, 2022).

The livelihood insecurity has been relatively high in Sub-Saharan Africa (SSA). By 2020, 20.2 per cent of the population experienced livelihood insecurity, food deficiency and poverty, and 12 per cent lived with severe livelihood insecurity and severe food deficiency (Intergovernmental Panel on Climate Change [IPCC], 2022; FAO, 2022). Most affected were in areas of marginalized, arid and semi-arid (FAO, 2022). In Sub-Saharan Africa, 43 per cent of the land mass is Arid and Semi-Arid Land (ASAL), supporting over 50 per cent of the total continental population (Bjornlund et al., 2019; FAO, 2018). The ecological-pastoral-agricultural zones in these ASALs are generally characterized by environmental vulnerability (drought), low agricultural productivity and low livelihood outcomes (Sewando, 2022).

In addition, livelihood insecurity in the East and Horn of Africa (EHOA) has been considerably high. By 2020, 29 per cent of the total population in EHOA experienced chronic livelihood insecurity. This proportion remains high in rural and ASAL areas (FAO, 2022). The ASAL region of East Africa stretches from Sudan through the northern part of Kenya, Somalia and Ethiopia, occupying nearly 70 per cent of total land mass. It is characterized by low and erratic rainfall (0-700mm/year) and high temperatures reaching 50°C in some regions. Similarly, the ecological-pastoral-agricultural zones in these ASALs are characterized by environmental vulnerability, low agricultural productivity and low livelihood outcomes related to persistently high levels of chronic poverty and insufficient food consumption (IPCC, 2022).

Between 2018 and 2021, Kenya was ranked by the Global Hunger Report as serious food deficient. While the index of livelihood insecurity, food deficiency and socioeconomic deficiency stood at 37 per cent at the national level, it remained at 57 per cent in Elgeyo-Marakwet County (EMC) and 67 per cent at the Kerio River Basin (Kenya National Bureau of Statistics [KNBS], 2021; Index, 2022; Andrews et al., 2021; Ministry of Devolution and Planning [MoDP], 2018). The KNBS report estimated that 1.3 million chronically poor and food-insecure populations were in the arid and semi-arid zones. The agricultural performance was hampered by low productivity due to drought, poor mechanization and increased commodity and global prices (KNBS, 2021).

Approximately 84 per cent of the total land mass in Kenya is classified as ASAL, stretching from the northwest to the northeast part of the country (Ministry of Agriculture, Livestock and Fisheries [MoALF], 2010). These ASALs are characterized by environmental and socioeconomic deprivations and low adoption of improved crop production technologies (Bjornlund et al., 2019; Dhraief et al., 2019; FAO, 2018). This directly impacts household poverty levels and food security (Andrews et al., 2021; MoDP, 2018; Index, 2022).

The Kerio River Basin forms part of the ASAL in Northwestern Kenya. The valley experiences intermittent droughts and socioeconomic and environmental insecurities, which have continued to devastate the livelihoods of households living within the Basin (MoDP, 2018). Given this, this study assesses the nature of livelihood insecurities among the agropastoral households in the South Kerio basin, an ASAL region.

LITERATURE REVIEW

Livelihood insecurity refers to increasingly inadequate (or eroded) assets or capabilities to maintain the desired standard of living, including required food, health, shelter and socioeconomic well-being (King et al., 2017). Critical factors associated with livelihood insecurities in agropastoral systems include climate change and environmental vulnerabilities, loss of livestock and critical reduction of arable land and household endowment (FAO, 2022; Mugonya & Hauser, 2022; Ellis, 2000; Chambers, 1990). Limited access to livelihoods is also attributed to the eroded livelihood security occasioned by the loss of land due to conflicts, increased human and livestock population, poverty, and inequality associated with marginalized areas (IPCC, 2022). These have continued to erode the livelihoods of households with implications on their resilience (Dhraief et al., 2019; FAO, 2022; MoDP, 2018) and pose limitations on achieving the SDGs (FAO, 2018; Amwata, 2016 Fratkin, 2013).

Environmental vulnerabilities such as climate change-induced drought negatively impact household agricultural productivity, adequate food production, and livelihood stability (Amwata, 2016)). Recent IPCC (2022) data on climate change show an increased frequency of droughts and flooding in arid and semi-arid zones, introducing new impacts for agropastoral households through a direct effect on their livelihood activities and livelihood insecurities. Prolonged drought leads to acute shortage of pasture, resulting in decreased livestock products such as milk and meat and, eventually, loss of livestock. Climate change-related insecurities on agricultural-based livelihoods are also manifested through changes in cropping patterns and reduced agricultural productivity (IPCC, 2022). This leads to loss of income and reduced food and nutrition security in the household. Due to their marginality, vulnerability to risks and inadequate access to income and capital assets, the agricultural livelihoods of agropastoral households will continue to escalate livelihood insecurities in the wake of climate change (Golla, 2021). In addition, the weak resource base and overreliance on natural-based livelihoods limit the range of livelihood options available to households whose capacity to respond to livelihood opportunities is already constrained by socioeconomic deprivations. King et al. (2017) noted that increased population growth drives human encroachment into former grazing lands, diminishing pasture availability. Households that lack key forms of human, financial, social and physical capital would, therefore, be constrained to engage in livelihood activities of their choice.

The South Kerio basin forms part of the arid and semi-arid zones within the Elgeyo Marakwet County (EMC). It is dominated by pastoralism, traditional food crop production and, recently, diversification into new and improved forms of crop cultivation (MoDP, 2018). It is characterized by agroecological zones ranging from 3 to 5, and while the average annual precipitation stands at 680 mm in Kenya, the average yearly rainfall in the South Kerio Basin ranges between 450mm and 350mm, leading to increased shocks to agricultural production. For centuries, livestock livelihoods have been a major livelihood activity for households living along the Basin, where they relied on rearing and selling livestock and livestock products for survival (Seroney, 2019). The MoDP (2018) report indicated intermittent droughts have depleted livestock holdings, affecting household resilience. It also showed that food demands in the Basin had grown faster than food production or supply. The report stated that the rate of food production in the entire EMC was 25 per cent per annum, which did not keep pace with the annual population growth of 3.3 per cent. Given these challenges, a study was conducted within the Basin to assess the nature and scale of livelihood insecurities and provide insight into processes driving and/or influencing adaptation into other livelihood activities.

The study was guided by the livelihood insecurity theory, which was used to understand the processes that erode agropastoral household assets and reduce their capacities to generate sustainable livelihoods that meet the needs (desired standard of living), including food, health, shelter and socioeconomic well-being. A livelihood comprises household assets, activities to generate a suitable standard of living and the factors that enhance or impede access to these assets and activities. According to Chambers (1990), "*A livelihood comprises the assets (stores, resources, claims and access), capabilities, and the activities needed to generate a means of living*". According to Ellis (2000), "*A livelihood entails the assets (human,*

social, natural, financial, physical), strategies, activities and their access that together define household livelihood while being facilitated by institutions and household social relations".

According to the theory, a household utilizes the available assets to construct livelihood activities that generate its desired outcomes, such as increased income, food and nutrition security, improved socioeconomic well-being, reduced vulnerabilities and increased asset base. However, undesirable consequences such as reduced income, food and nutrition security expose households to livelihood vulnerabilities (trends, shocks and seasonality) that facilitate their resilience to external processes, livelihoods and capacity for survival. These external processes include environmental variability (vulnerabilities), population increases, diseases and socio-political conflicts and land tenure (ownership) that erode assets of the agropastoral communities and reduce their socioeconomic capacities (FAO, 2022; Mugonya & Hauser, 2022). The livelihood insecurities, in turn, adversely affect households' ability to choose livelihood options. Due to their low socioeconomic endowment, agropastoral households face greater exposure to livelihood vulnerabilities and are more susceptible to shocks. Their ability to cope with the insecurities (risks) will depend on the level of the vulnerabilities and the livelihood options (Mwatu et al., 2020).

METHODOLOGY

The study used a cross-sectional survey research design to collect data in Keu, Kibargoi, and Arror locations in the South Kerio basin, EMC. Based on the KNBS (2019) Census, the population for the three locations was 8,199 households, with Keu having 2,949 households, Kibargoi having 2,886 households, and Arror having 2,364 households. Concerning the 8,199 households, the Yamane (1967) formula is at a 95% confidence level.

$$\text{Sample Size (n)} = \frac{N}{(1+N(e)^2)}$$

Accordingly, a representative sample of 383 households was generated. Proportional sampling was used to distribute the determined sample in the three locations, as shown in Table 1.

Table 1: Proportional Distribution of the Sample

Locations	No. of households	Percent (%)	Sample size
Keu	2,949	36	138
Kibargoi	2,886	35	134
Error	2,364	29	111
Total	8,199	100	383

Data collection methods included household interviews, key informant interviews and focus group discussions. A program of interviews was employed to gather household data where respondents were requested to indicate the rate of environmental vulnerability, deficiency in land productivity, deficiency in livestock production, deficiency in livelihood security and socioeconomic endowment in the last five years on a scale of 1 to 4. The scale was based on the IPCC/FAO classification of hunger and poverty where 1) represented experience of no deficiency, 2) mild deficiency, 3) moderate deficiency and 4) extensive, severe deficiency. Key informant interviews and focused group discussions were conducted using a checklist covering livelihood insecurities. Program (V22), while the qualitative data was analyzed thematically using an Excel Spreadsheet.

RESULTS AND DISCUSSION

Increased Environmental Vulnerability

The increased environmental vulnerability consists of increased rainfall resulting in environmental degradation (soil erosion), changes in land cover and land use, or the alternative, increased deficiency of rains accompanied by environmental degradation (soil erosion), changes in land cover and land use. The study assessed increased environmental vulnerability on a scale of 1 to 4 in the last five (5) years. Responses (Table 2) indicated that 53 per cent of households in the South Kerio Basin had experienced no or mild deficiency in rainfall in the last five years, and 47 per

cent had experienced extensive to severe rainfall deficiency in the previous five years.

Table 2: Increased Environmental Vulnerability

Scale	Deficiency in rainfall	Frequency	Per cent
1	No deficiency	59	15.7
2	Mild deficiency	141	37.3
3	Extensive deficiency	146	38.7
4	Severe deficiency	31	8.3
	Total	**378**	**100.0**

Mean 2.40, Mode 3

Responses were more or less similar to reports in previous studies, which highlighted the vulnerability of increased rainfall accompanied by environmental degradation (soil erosion), changes in land cover and land use, and alternating rainfall deficiency resulting in ecological degradation, changes in land cover and land use. A study of the rainfall within the Basin between 1972 and 1986 concluded that 9 out of 15 years witnessed severely depressed rainfall and extensive crop failure (Ostberg & Caretta, 2017). Between 2004 and 2018, the Kerio basin experienced heavy rainfalls, which were accompanied by soil erosion, changes in land cover and land use, which in turn affected the livelihoods of the local households (Boitt & Gathoni, 2022; Boitt et al., 2020). In addition, Boit and Gathoni (2020) mapped out geo-hazards for the years 1990, 2000, 2010 and 2020 and concluded that the Basin has typically been susceptible to increased hazards, particularly in terms of landslides in highlands and the escarpment, alternating flooding and drought in the lowlands (the Basin) depending on the volume of the rainfall, related soil erosion, changes in land cover and land use. Laibuni (2020) indicated that in 2012, at least ten people lost their lives in the Kerio basin after landslides occasioned by heavy rainfall. Consequently, floods destroyed crops and caused livestock and human diseases, which affected labour availability for other livelihood activities. Similar findings were reported in a study conducted by Mkonda (2018) in a semi-arid zone in Tanzania, which reported that fluctuations in the mean annual rainfall in the study region had led to degradation in the soil fertility, adversely affecting the livestock and crop production livelihoods of the households, thus negatively impacting on their food security.

During the survey, respondents pointed out that *the valley experienced heavy rainfall in 2020, resulting in farm flooding and poor harvests.* The study also established that the highlands' seasonal rivers and surface runoff flooded the basin floor during the rainy season. A lead farmer key informant reported, '*This village does not have an irrigation scheme, and we depend on the flood rain and the Kerio River for our vegetable farming. However, during heavy rains like what we experienced in 2020, we lose all our crops to flooding and water logging. My fruit nursery dried up, and I incurred huge losses. Only permanent trees survived the flooding.*' This study noted that most seasonal rivers dried up during the dry season, leaving little water for livestock and home consumption, and households would travel as far as 5 Km to source water.

Deficiency in Land Productivity

Agropastoral households largely depend on the available productive resources such as land, capital and infrastructural development to meet their food production needs. Inadequate access to these resources, coupled with the effects of climate change, expose households to deficiencies in subsistence food production, availability and access. Given this, the study assessed deficiency in the productivity of the land and responses (Table 3) indicated that 53 per cent of households had experienced no or mild deficiency in the productivity of their land in the last five years, while 47 per cent had experienced extensive to severe deficiency in land productivity.

Table 3: Deficiency in Land Productivity

Scale	Deficiency in land productivity	Frequency	Per cent
1	No deficiency	72	19.1
2	Mild deficiency	130	34.3
3	Extensive deficiency	148	39.2
4	Severe deficiency	28	7.4
	Total	**378**	**100.0**

Mean 2.35, Mode 3

These observations were substantially similar to the previous studies (Boit & Gathoni, 2020; Boit et al., 2020; Ostberg & Caretta, 2017). These studies reported that the number of processes had increased, intensified their interaction and reduced the productivity of the land. Among the fundamental processes that were reported to have affected the productivity of the land at the Escapement and the floor of the Basin were an increase in human population, livestock, communal land rights, pests and diseases, and climate change. Mortimore (2013) maintained that agropastoral livelihoods have been affected by land use changes recently occasioned by population growth, increased land privatization, fragmentation and rapid economic change.

A study by Boitt and Gathoni (2022) reported that between 1990 and 2020, the total land under forest decreased from 19 per cent to 10.7 per cent in the Kerio Basin, the area under crop decreased from 31 per cent to 10.3 per cent; the area under pasture increased from 23 per cent to 43.4 per cent while idle land decreased from 24 per cent to 21.2 per cent within the same period. The study also reported increased use of space for infrastructural developments from 3 per cent in 1990 to 13.3 per cent in 2020. Decreased forested area, cropland and idle land were linked to increased population and infrastructural developments within the Basin, as with other arid and semi-arid zones.

The MoDP (2018) reported on the emerging land use patterns within the Basin, which include increased use of agricultural land for crop cultivation, agro-forestry, and commercial development. A study by Ostberg and Caretta (2017) in the Kerio basin identified the main land uses as crops, grass, and bare land. A survey by Kipkorir and Kareithi (2013) reported that due to the declining land productivity, various areas within the Kerio basin faced periodic hunger due to declining availability and access to subsistent food. The study also reported that by 2007, the production of maize and sorghum had declined. This was attributed to household overdependence on irrigation furrows, which, due to deterioration and lack of maintenance, population increase and climate change, constrained households from adequate food production, increasing their vulnerability to food deficiency. Additionally, Kiptoo et al. (2023) noted that deficiency in food production in the Kerio basin was aggravated by inter-ethnic conflict over resource access and use, leading to loss of livestock and abandonment of lands and crops.

Observations during data collection indicated that households cultivating land are already depleted due to overcultivation, soil erosion, and lack of ground cover. Focus group discussants revealed that '*bushes and indigenous trees were cleared to open up more land for cultivation. In addition, free-range livestock consumed the stover, trampling on the bare land, which increased the rate of soil erosion, resulting in low soil fertility*. The study established that, despite continuous surface runoff from the escarpment that carried rich soil to the Basin, overuse of the land for crop cultivation and livestock grazing resulted in low soil fertility and low productivity. Following these findings on deficiency in lan productivity, the study argues that despite promoting horticultural cultivation as a diversification strategy for households, land use and productivity within the Basin highly depended on the household resource base and the socioeconomic environment.

Deficiency in Livestock Production

The sustainability of livestock livelihoods for agropastoral households depends on access to natural assets such as land, pasture, and water and the political and social environment within which the households operate. Livestock production has an immediate, important function among the agropastoral communities as a means of subsistence in terms of dairy products, meat and other products, also as a means of exchange for other products and services and as commercial products (Amwata et al., 2016; Saina et al., 2013). These studies emphasized the importance of livestock production as essential for livelihoods and survival among the agropastoral communities. Livestock could be easily moved during droughts and was exchanged for grains during famine. Given this importance, respondents were requested to indicate their experience with a deficiency in livestock production in the last five (5) years. Responses (Table 4) showed that 51.5 per cent of households had experienced extensive or severe deficiency in livestock production in the last five (5) years. Accordingly, 48.5 per cent of the households had experienced no deficiency and mild deficiency in livestock production. The study analysis results also indicated that the type and the average number of livestock per household in the South Kerio Basin were six cows, 21 goats, ten sheep, and around 20 poultry.

Table 4: Deficiency in Livestock Production

Scale	Deficiency in livestock production	Frequency	Per cent
1	No deficiency	50	13.2
2	Mild deficiency	133	35.3
3	Extensive deficiency	141	37.3
4	Severe deficiency	54	14.2
	Total	**378**	**100.0**

Mean 2.52, Mode 3

These findings concur with studies by Chirchir (2021), EMC (2019), and MoALF (2017). The studies reported that nearly 54 per cent of the households in the Kerio basin had experienced a significant reduction of livestock primarily because of environmental conditions, increased population, progressive shift to crop production and inter-ethnic conflicts, among others. The MoALF (2017) reported that the average livestock per household in the Kerio basin was five cows, 14 goats, eight sheep and around ten poultry. Specifically, households kept goats and sheep for their livelihood and because of their adaptability to the climatic conditions in the Basin. During the rainy season, livestock was kept at the homesteads in the escarpment. In the dry season, the animals were driven to the floor of the Basin, where they grazed freely on the communal pasture land. In a study by Mburu et al. (2017) among agro-pastoralists in Northern Kenya, it was reported that households recorded low Total Livestock Units (TLUs) due to the constant sale of livestock to meet household expenses, resulting in decreased household stock. Another study by Mugonya and Hauser (2022) on livestock livelihoods reported that the loss of animals due to environmental vulnerabilities consequently led to income loss, increasing household vulnerability to poverty. These findings were similar to those by Ostbe g and Caretta (2017), who observed that decreasing herd sizes were a result of diminishing communal land which was utilized for pasture, where the traditional Sahiwal cattle breeds were slowly being replaced by exotic breeds which households kept under zero grazing. Land pressure within productive parts of the Erio Basin had resulted in an increasing proportion of land being used for crop production, resulting in the loss of grazing area.

This study thus concluded that deficiency in livestock livelihoods was associated with diminishing land sizes and land privatization, changes in climate and environmental conditions, conflict of interest between extensive livestock production and intensive crop production and cattle rustling. One household head respondent, 53 years old, said that, *"I reduced livestock in my household to concentrate on vegetable farming. I currently own three cows and five goats. He ding is time-consuming, and vegetable farming consumes expensive labour and time."*

Deficiency in Livelihood Security

Deficiency in livelihood security refers to increasingly inadequate (or eroded) assets or capabilities of the households to maintain the required or desired standard of living, including needed food, health, shelter and socioeconomic well-being (King et al., 2017). Agropastoral livelihoods mainly revolve around livestock and crop cultivation. Accordingly, the study assessed the deficiency in livelihood security experienced by households in the South Kerio basin. Responses in Table 6 indicated that 43 per cent of the households experienced extensive deficiency, 39 per cent experienced mild deficiency, and 14 per cent experienced no deficiency in livelihood security in the last five years. These findings revealed that the experience of livelihood deficiency varied among households, with the majority unable to sustain their livelihoods.

Table 6: Deficiency in Livelihoods Security

Scale	Deficiency, inability to secure household livelihoods	Frequency	Per cent
1	No deficiency	54	14.2
2	Mild deficiency	146	38.7
3	Extensive deficiency	161	42.6
4	Severe deficiency	17	4.4
	Total	**378**	**100.0**

Mean 2.33, Mode 2

Focused group discussions indicated that households in the Kerio basin had substantial livelihood activities, including farm-related activities, small businesses, brick-making, sand harvesting, charcoal production and firewood collection. However, socioeconomic and environmental vulnerabilities and reduced land productivity have continuously eroded household livelihood security. This was related to the semi-arid nature of the Basin, intermittent drought and floods, land sub-divisions, social conflicts, and cattle rustling from neighbouring communities. In reporting on the erosion of livelihood security and well-being, a respondent indicated, *"I sold all my livestock due to cattle rustling and used the money to start a farm enterprise. However, heavy rains flooded my farm, and I lost the crop. Despite securing a casual labour job, my income is insufficient, and I depend on well-wishers and government aid to survive."*

These findings support earlier findings on livelihood insecurities within agropastoral systems. The EMC (2019) reported that around 51 per cent of the households in Kerio Valley had experienced loss or reduction of livelihood security and, therefore, increased inability to meet basic needs and socioeconomic obligations. Specifically, Chirchir (2021) reported that the inability of households to achieve income security in the Kerio basin was associated with social conflicts leading to the loss of livestock through cattle rustling and loss of productive lives. According to Mugonya and Hauser (2022), the loss of animals and reduction of arable land have continuously reduced livelihood opportunities for households and consequently increased their vulnerability to livelihood insecurities. Another report by the KNBS (2021) indicated that households within the Kerio basin needed more access to sustainable resources, which constrained their ability to achieve livelihood security. The report also showed that 67 per cent of households in the Basin lived below the poverty line due to deficiencies associated with insufficient resource endowments.

These findings reveal that deficiencies in household ability to achieve sustainable livelihoods varied within households. Overall, the livelihood deficiency scale revealed that most households faced some livelihood insecurity. Focused group discussants indicated that households adopted new production technologies, innovations, and management practices that were resilient to their environment to ensure livelihood security. In addition, they also engaged in available f-farm and nonfarm income-generating activities. These findings, therefore, pointed out that despite household access to various livelihood activities within the Basin, their contribution to overall livelihood

security could have been higher. According to Winters et al. (2010), growth in the rural economy was critical for household livelihood security as they diversified away from farming into nonfarm income-generating activities while the household capital base influenced the ability to access land for productive activities.

Deficiency in Inherited Assets and Endowment

Inheritance of parental assets and wealth has been considered an essential aspect of agropastoral resilience (Akall, 2021; Lesorogol et al., 2013;). Critical inherited assets among the agro-past realists have been the land, livestock and social capital in the form of extended family networks. Other studies, such as Winters et al. (2010), have emphasized that inherited household endowment consists of natural, social, physical and economic assets. These studies have reported that households with inherited modest livelihoods or socioeconomic assets could meet basic needs and socioeconomic obligations. Given this contention, respondents were requested to indicate their experience with the inherited assets or endowment deficiency. Responses (Table 7) showed that 50.4 per cent of the households had experienced extensive or severe deficiency in the ability to sustain inherited endowment, and 49.5 per cent of households had experienced no or mild deficiency in the ability to sustain inherited endowment in the last five years.

Table 7: Deficiency in Household Endowment (Inheritance)

Scale	Sustainability of household endowment	Frequency	Per cent
1	No deficiency	93	24.5
2	Mild deficiency	94	25.0
3	Extensive deficiency	161	42.6
4	Severe deficiency	30	7.8
	Total	**378**	**100.0**

Mean 2.02, Mode 1

These responses were consistent with reports from previous studies. Studies by Lesorogol et al. (2021) and Akall, 2021) reported that nearly half of the agropastoral households in Northwestern Kenya, including the Kerio basin, had experienced a severe reduction of inherited assets and socioeconomic endowment. The key processes driving erosion have included environmental conditions and changes, reduced access to land and related resources, reduced agropastoral production, and increased population and resource conflicts. Other sources indicated that high literacy and low labour skills contributed to a deficiency in household endowment.

The study established that land within the Basin was inherited family land or land still under communal ownership. Communal land demarcation and registration of individual property rights decreased the available communal land for grazing and farming, which constrained household farming livelihoods. Land privatization also created long-standing land disputes, increasing deficiency in land use. Land disputes were discussed at the clan level, and most remained unsolved.

Results from focused group discussions indicated that households fenced off land they considered their own to cope with long-standing disputes on inherited land. They also sought legal documents for land inherited from the family or communal land acquired through land subdivisions. This conformed to a study by Karmebäck et al. (2015) in a survey on assessing gender roles in a changing landscape in agropastoral areas of West Pokot County, which established that land enclosures enhanced farm-related livelihoods in areas where agriculture was practised. However, during this survey, respondents in fused group discussions noted that '*more often, thorny bushes used for fencing were destroyed by goats within three months of planting, creating disputes with grieved households. Therefore, households with farms near the sch mes guarded the farms by day and employed guards to wade off wild animals during the night*. The study also revealed that '*planting vegetables during the rainy*

season minimized crop destruction by wild animals due to pasture availability in the game reserve.'

This study also established that the increasing land cost within the Basin was another factor for household endowment deficiency. Households were compelled to sell part of the r inherited land to meet their immediate needs, exposing them to asset vulnerabilities. A key informant respondent indicated that. *'An acre of land in the Basin was sold at KES 100,000-150,000 (USD 694-1,042). Leasing land for irrigation/acre/year ranged between KES 3000-6000 (USD 21-42). Most households with limited land resource endowments cultivated vegetables due to the short maturity period and for subsistence'.*

In addition, the study established that nearly half of the household respondents were not members of social groups, which could contribute to the high responses to severe deficiency. From a sociological view, a social endowment includes the Indigenous social organizations and support systems formed through membership to various community groups, including family, livestock, and water management groups. Groups assisted in the form of gifts and loans to community members in times of crisis, especially during famine, floods and outbreaks of diseases. Lack of group membership could contribute to increased severity in access to resources for livelihood creation.

Adaptation Strategies for Households

With increased livelihood insecurities within the Kerio basin, the study established that households adopted various measures to adapt to the insecurities. Focused group discussions indicated a diverse cation into crop production, specifically horticultural production. Horticultural production involves intensive use of agricultural inputs and improved varieties of fruits and vegetables. The small household land holding had the potential to encourage the allocation of land to seasonal horticultural crops such as vegetables, which provided households with more flexibility and enhanced income. More specifically, households could harvest short-term horticultural crops up to three times a year. Adaptation to horticultural production thus increased crop portfolios per small area and enabled households to spread risks, thereby increasing their livelihood options. Other essential adaptation strategies include borrowing from friends and family, reducing household expenses, selling livestock for food, and migration. However, based on the findings on livelihood insecurities, while diversifying into crop production presented an opportunity for households to adapt their livelihoods for enhanced outcomes, it could instead increase their insecurities due to environmental vulnerabilities, deficiencies in land productivity and socioeconomic deprivations.

CONCLUSION AND RECOMMENDATIONS

Conclusion: The findings of this study revealed that livelihood insecurities in the South Kerio basin impacted the livelihoods of households, resulting in low livelihood outcomes related to food, nutrition, and income deficiencies. In particular, the susceptibility of the Basi to increased hazards, particularly in landslides, alternating flooding and drought, related soil erosion, and changes in land cover and land use, have varied levels of impact on households. These factors have directly contributed to soil fertility, low productivity, livelihood security, and household endowments. The study also concluded that livelihood inside purities in the Basin created a need for varied forms of livelihood diversification. Most households had diversified their livelihoods and sources, including horticultural production.

Recommendations: The study established that households in the Kerio basin faced various environmental and socioeconomic deprivations which affected their livelihoods. Therefore, all actors promoting alternative livelihoods within the Basin must partner and integrate with local communities to address livelihood insecurities. This is done by reviewing and generating policies for equitable solutions to the livelihood deficiencies that impede household livelihoods in the Basin to strengthen household capacity to overcome livelihood insecurities. There is also a need for the county government to integrate the local knowledge of communities living within the Basin towards a better understanding of the local coping mechanisms for livelihood insecurities, assess their effectiveness, and enhance those that function effectively for better adaptation.

REFERENCES

Ahammad, R., & Stacey, N. S. (2021). Assessing land use changes and livelihood homes of rural people in the Chittagong Hill Tracts region, Bangladesh. *Journal of Land Degradation and Development, 2:3626–3638.* https://Doi.Org/10.1002/Ldr.3795

Akall, G. (2 21). Effect of development interventions on pastor l livelihoods in Turkana County, Kenya. *Journal of Pastoralism*, *11*(1). https://doi.or /10.1186/s13570-021-00197-2

Am ata, D. A., Nyariki, D. M., & Musimba, N. R. (2016). Factors influencing pastoral and agropastoral household vulnerability to food insecurity in the drylands of Kenya: a case study of Kajiado and Makueni Counties. *Journal of International Development, 28(5), 71-787.* https://doi.org/10.1002/jid.3123

Andrews, C., Montesquiou, A., Sánchez, I.A., P. Dutta, V., Boban, V. P., & Sarang, C. (2021). *The State of Economic Inclusion Report 2021: The Potential to Scale.* https://doi.org/Doi: 10.1596/978-1-4648-1598-

Bjornlund, H., Zuo, A., Wheeler, S. A., Parry, K., Pittock, J., Mdemu, M., & Moyo, M. (2019). The dynamics of the relationship between household decision-making and farm household income in small-scale irrigation schemes in southern Africa. *Journal of Agricultural Water Management, p. 213, 135-145.* https://doi.org/10.1016/j.agwat.2018.10.002

Boitt, M., & Gathoni, J. (2022). Geo-Hazard Susceptibility Assessment and Its Impacts on Livelihoods in Kerio Valley, Kenya. *International Journal of Geosciences, 13(3), 99-243.* https://doi.org/10.4236/ijg.2022.133011

Boitt, M. K., Albright, O. M., & Kipkulei, H. K. (2020). Assessment of Soil Erosion and Climate Variabon Kerio Valley Basin, Kenya. *Journal of Geoscience and Environment Protect on, 8(6), 97–114.* https://doi.org/10.4236/gep.2020.86008

Chambe s, R. (1990). Vulnerability, coping and policy. *IDS Bulletin, 20*(2), 1–7.

Chirchir, W. (2021). *Effects of Social Conflicts on the Livelihood of Households in Kerio Valley Basin, Kenya.* Master's Thesis, Kenyatta University.

Dhraief, M. Z., Dhehibi, B., Hassen, H. D., Zlaoui, M., Khatoui, C., Jemni, S. & Rekik, M. (2019). Livelihoods strategies and household resilience to food insecurity: A case study from rural Tunisia. *Sustainability Journal (Switzerland)*, *11*(3), –17. https://doi.org/10.3390/su11030907

Elgeyo Marakwet County (EMC). (2019). *Forest Conservation and Management Policy; Elgeyo Marakwet*. https://www.elgeyomarakwet.go.ke

Ellis, F. (2000). The Determinants of Rural Livelihood Diversification in Developing Countries. *Journal of Agricultural Economics 51(2), 289– 02*. https://doi.org/10.1111/j.1477-9552.2000.tb01 29.x

Food and Agriculture Organisation (FAO). (2022). *The State of Food Security and Nutrition on in the World 2018. Building Climate Resilience for Food Security and Nutrition.* https://doi.org/10.4060/cc3017en

Food and Agriculture Organisation (FAO). (2018). *Pastoralism in Africa's drylands: Reducing risks, addressing vulnerability and enhancing resilience.* https://www.researchgate.net/publication/3308 2153

Fratkin, E. (2013). Seeking alternative livelihoods in pastoral areas. (pp. 217–225). In C. Andy, L. Jeremy, S. Ian Eds.), *Pastoralism and Development in Africa*. Routledge. https://doi.org/10.4324/9780203105 79

Golla, (2021). Agricultural production system in arid and semi-arid regions. *J. Agric. Sci. Food Technology*, *7*(2), *234–244* https:// oi.org/10.17352/2455-815X.000113

Index, G. (2022). *Global Hunger Index - Kenya Policy Brief.* https://policycommons.net/artifacts/2480607/2 21/3502779/

Intergovernmental Panel on Climate Change (IPCC). (2022). *Climate Change 2022: Impacts, Adaptation, and Vulnerability. Contribution of Working Groups I, II and III of the Fourth Assessment Report.* https://dx.doi.org/10.1017/9781009325844

Irungu, M., Muriithi, J., & Njue, J. (2021). Outcomes of Livelihood Diversification among Agropastoral Households in Laikipia County, Kenya. *Journal of Poverty, Investment and Development, 6(1), 1-17.* https://doi.org/10.47604/jpid.1422

Karmeback, V. N., Wairore, J. N., Jirstrom, M., & Nyberg, G. (2015). Assessing gender roles in a changing landscape: diversified agro-pastoralism in drylands of West Pokot, Kenya. *Pastoralism Journal*, 5(1). https://doi.org/10 1186/s13570-015-0039-4

Kenya National Bureau of Statistics (KNBS). (2021). *Economic Survey 2021.* https://www.knb .or.ke. Pdf

Kenya National Bureau of Statistics (KNBS). (2019). *Kenya Population and Housing Census. Vol. II: Distribution of Population by Administrative Units*. https://www.knbs.or.ke.pdf

King, E. G., Unks, R. R., & German, L. (2017). Constraints and capacities for novel livelihood d adaptation : lessons from agricultural adoption in an African dryland pastoralist system. *Journal of Regional Environmental Change.* https://doi.org/10.1007/s10113-017-1270-x

Kipkorir, D., & Kareithi, J. (2013). Indigenous Irrigation and Food Security in Tot Division, Kerio Valley, Kenya. *Journal of Anthropology & Archaeology*, *1*(1), 2–27. https://www.aripd.org/jaa

Kiptoo, L. P., Rono, H., & Kerre, F. (2023). The contribution of resource conflict to food insecurity in the Kerio river basin. Journal of Humanities and Social Sciences (JHSS), 2(1), 86-95. https://doi.org/10.51317/jhss.v2i1.332

Laibun, N. (2020). *Implications of Drought and Floods on Household Food and Nutrition Security in Kenya's Arid and Semi-Arid Lands.* The Kenya Institute of Public Policy Research and Analysis. https://repository.kippra.or.ke/handle/123456 89/3553

Lesorogol, C., Chowa, G., Ansong, D. (2013). The roles of livestock inheritance and formal education in intergenerational wealth transmission among Samburu District, Kenya pastoralists. *Journal of Developing Studies*, 29(213–232). https://doi.org/10.1177/0169796X13479710

Mbur, S., Otterbach, S., Sousa-Poza, A., & Mude, A. (2017). Income and Asset Poverty among Pastoralists in Northern Kenya. *Journal of Development Studies, 53(6), 971–98.* https://doi.org/10.1080/00220388.2016.1219346

Ministry of Agriculture, Livestock and Fisheries (MoALF). (2017). *Climate Risk Profile for Elgeyo Marakwet County, Kenya*. https://cgspace.cgiar.org

Ministry of Agriculture, Livestock and Fisheries (MoALF). (2010). *Agricultural Sector Development Strategy [ASD] (2010-2020). Nairobi, Kenya:* https://www.kilimo.go.ke.

Ministry of Devolution and Planning [MoDP], (2018). *County Integrated Development Plan (CIDP): Elgeyo Marakwet County 2018-2022:* http://10.0.0.19/handle/123456789/881

Mkonda, M. Y., & He, X. (2018). Vulnerability assessment of the livelihoods in Tanzania's semi-arid agro ecological zone under climate change scenarios. *Climate*, 6(2), 27. https://doi.org/10.3390/cl 6020027

Mortimore, M. (2013). *The place of crop agriculture for resilience building in the Drylands of the Horn of Africa: an opportunity or a threat.* http://www.disasterriskreducation.net/east-ce trial-Africa/Regular

Mugonya, J., & Hauser, M. (2022). Determinants of quality-based payments for livestock in conflict-prone areas in Kenya. *Journal of Arid Environments, 200, 10471.* https://doi.org/10.1016/j.jaridenv.2022.10471

Mwatu, M. M., Recha, C. W., & Ondimu, K. N. (2020). Assessment of livelihood vulnerability to rai fall variability among crop farming households in Kitui South sub-County, Kenya. *Open Access Library Journal*, *7(6), 1–14*. Http: //doi.org/10.4236/oalib.1106317

Ostberg, W., & Caretta, M. A. (2017). Kerio Valley, (1973).–2013: A case study of Kenyan smallholder agriculture. *African Studies*, *76*(3), 402–422. https://doi. org/10.1080/00020184.2017.1285664

Saina, C. K., Cheserek, G. J., Owino, J. O., & Murgor, F. A. (2013). Coping strategies to famine among the Keiyo people living in Kerio Valley, Kenya. *Journal of Emerging Trends in Economics and Management Sciences,* 4(2), 163-169 https://hdl.handle.net/10520/EJC135865

Seroney, E. K. (2019). *The Relationship between Choice of Farm Entry Rises and Food Security among Households Living along Kerio Valley, Tambach Ward, Elgeyo-Marakwet County, Kenya*. Doctoral dissertation, Egerton University. http://41.89.96.81:8080/xmlui/handle/12345678 /2265

Sewando, P. T. (2022). Efficacy of risk-reducing diversification portfolio strategies among agro-pastoralists in the semi-arid area: A modern portfolio theory approach. *Journal of Agriculture and Food Research*, *7*(1), 100262. https://doi.org/10.1016/j.jafr.2021.100262

Stockemer, David, Parker, J. (2019). Quantitative methods in the social sciences. In *A Handbook for Teaching and Learning in Hi her Education*. https://doi.org/10.4324/9780429259500-24

Winters, P., Essam, T., Zezza, A., Davis, B., & Carletto, C. (2010). Patterns of rural development: A cross-country comparison using microeconomic data. *Journal of Agricultural Economics*, *61*(3), 628-651. https://doi.org/10.1111/j.1477-9552.2010.0026 .x

Yamane, T. (1967). *Elementary Sampling Theory*. First Edition, Prentice Hall.