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Original Research Article

Assessment of Socioeconomic and Structural Factors Influencing Household Vulnerability to Drought among Cattle Keeping Households in Migori County

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Abstract: Cattle play a critical role in food security and socio-cultural life in both developed and developing regions. In sub-tropical areas, they provide meat, milk, and income and hold cultural, religious, and social significance, being used in dowries, ceremonies, and as status symbols. However, most cattle are raised under extensive systems, making them vulnerable to environmental stressors, particularly drought. This study focused on the effectiveness of household response strategies to drought hazards. This study focused on Migori County in Kenya, a region that is prone to frequent and severe drought events. Within the county, Nyatike and Kuria East sub-Counties are particularly affected due to their semi-arid conditions. The study found that household socio-economic characteristics significantly influenced drought vulnerability. Factors such as household size, income diversity, land ownership, and livestock holdings were critical. Larger families with fewer income sources and a heavy reliance on cattle were more vulnerable, while households that diversified income or practiced mixed farming were more resilient. Environmental and livestock-related stressors including declining water sources, pasture shortages, livestock disease, and reduced milk yield further compounded vulnerability. In response, households employed coping strategies like livestock sales, alternative agriculture, mixed farming, off-farm employment, and remittances. Effectiveness varied by location; while livestock sales offered short-term relief, they were often unsustainable, especially in Masaba Ward. Remittances were more effective in areas like Muhuru and Komosoko. Using a survey research design, data were collected from 383 randomly selected households via structured questionnaires and interviews. About 69.6% found livestock sales effective; 43.6% in Masaba and 40.7% in Muhuru adopted alternative agriculture. However, strategy success varied widely across wards. The study underscores the need for targeted interventions to build resilience in cattle-keeping households. Recommendations include improving water access, promoting pasture conservation, enhancing veterinary services, and encouraging income diversification. Policy gaps in drought preparedness must be addressed through coordinated action, climate-smart practices, early warning systems, and community-led contingency planning to safeguard livelihoods and food security in drought-affected regions, warning systems, and community-driven contingency plans to protect livelihoods and food security in drought-prone areas.

Keywords: Socioeconomic factors, structural factors, household vulnerability, Drought, cattle-keeping households.

INTRODUCTION

Drought imposes significant socioeconomic challenges on cattle farmers, especially in Kenya and similar arid regions globally. The depletion of water sources and pasture scarcity during droughts critically undermines livestock health, reducing milk production, increasing disease prevalence and escalating mortality rates (Njuki et al., 2021; Oba & Kaitira, 2023). These direct impacts substantially lower the economic value of cattle and threaten the livelihood security of households reliant on livestock income (Mwangi et al., 2020).

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As drought frequency and severity increase due to climate change, the productivity of cattle diminishes, forcing many farmers into poverty as they struggle to meet basic household needs. The premature sale or slaughter of livestock is a common coping mechanism to prevent total herd loss (Mwangi *et al.,* 2020; Wambua *et al.,* 2022). Globally, recurrent drought episodes have similarly led to severe feed shortages and water scarcity, causing widespread losses in pastoral communities (Ng'ang'a *et al.,* 2019).

The vulnerability of cattle farming to drought is intricately linked to environmental and hydrological factors. Hydrological droughts, characterized by the reduction in surface and groundwater availability, severely affect water access for livestock, reducing feed intake and animal health (Kangalawe *et al.,* 2021). Water sources such as rivers, ponds, and boreholes are especially vulnerable during extended dry periods, with replenishment rates often insufficient to meet demand (Muriuki *et al.,* 2022).

The interconnectedness of meteorological, hydrological, and socioeconomic drought highlights the complex interactions between climate systems and rural livelihoods (Kamau *et al.,* 2021). In pastoral systems, water scarcity directly influences grazing patterns, livestock mobility, and herd composition, often leading to overgrazing and land degradation (Otieno *et al.,* 2023).

Household vulnerability to drought depends on a complex interplay of socioeconomic factors. Key determinants include wealth status, herd size and diversity, education level, gender of household head, access to veterinary and extension services, early warning systems, and social safety nets (Mutiso *et al.,* 2022; Chebet *et al.,* 2021). Wealthier households, often with diversified income sources beyond livestock, tend to be more resilient to drought shocks (Mutiso *et al.,* 2022).

Education plays a critical role in enhancing adaptive capacity by improving access to climate information and facilitating informed decision-making (Chebet *et al.,* 2021). Conversely, poorer households, particularly those headed by women, face heightened vulnerability due to limited access to land, credit, and support services (Kamau *et al.,* 2021). Additionally, larger households may have increased labor capacity but also higher resource demands, complicating coping strategies (Otieno *et al.,* 2023).

Access to institutions, infrastructure, and social networks significantly shapes drought resilience. Early warning systems and government or NGO support enable proactive drought management, yet many remote pastoral communities lack adequate access to such resources (Mwangi *et al.,* 2020; Wambua *et al.,* 2022). The erosion of traditional coping strategies, such as livestock mobility and communal resource management, due to land fragmentation and political boundaries, further exacerbates vulnerability (Njuki *et al.,* 2021).

Social capital and mutual aid remain important buffers against drought impacts, but their effectiveness can diminish under prolonged stress conditions (Chebet *et al.,* 2021). Gender disparities persist as female-headed households frequently encounter institutional barriers that limit their adaptive options (Mutiso *et al.,* 2022).

Drought also fuels competition over scarce resources, often escalating into violent conflicts, particularly in arid regions dominated by pastoral livelihoods. Resource-based conflicts over grazing and water points have increased in areas such as northern Kenya, contributing to displacement and social instability. This nexus between drought and conflict underscores the importance of integrated approaches to resource management and peace building (Ochieng' *et al.,* 2023).

Moreover, drought-induced livestock losses exacerbate food insecurity and deepen poverty in vulnerable communities. As climate change intensifies drought patterns, environmental degradation accelerates, further reducing resource availability and increasing household stress (IPCC, 2023). Designing inclusive drought mitigation strategies that address socioeconomic disparities and strengthen institutional support is essential to bolster the resilience of cattle-dependent households.

RESEARCH METHODOLOGY

The study was conducted in Nyatike and Kuria West sub-counties, situated within Migori County in southwestern Kenya. Migori County occupies a total area of approximately 2,613.5 square kilometers, of which about 478 square kilometers consist of water bodies, mainly Lake Victoria. The County lies between latitudes 1°06′51″S and 0°45′34″S and longitudes 34°02′24″E to 34°21′42″E, and shares international borders with Tanzania to the south, making it a strategic area for cross-border trade and cultural exchange.

Nyatike and Kuria West sub-Counties were purposively selected for this study due to their contrasting agro-ecological zones and socio-economic contexts. Nyatike is located in the Lower Midland (LM) zones LM4 and LM5, characterized by low and erratic rainfall, high temperatures, and shallow, less fertile soils. These features make it predominantly arid to semi-arid, thus more suitable for pastoralism and subsistence livestock rearing. Agricultural

productivity is constrained by water scarcity and soil degradation, and communities in the region frequently experience food insecurity, particularly during prolonged dry spells.

In contrast, Kuria West lies in the Upper Midland (UM) zones UM2 and UM3, which are relatively more humid and fertile. This region receives higher and more reliable rainfall, allowing for a wider variety of agricultural activities, including intensive farming, horticulture, and dairy production. Its topography includes undulating hills and valleys, which support smallholder mixed farming systems that integrate crop cultivation and livestock keeping. Kuria West's proximity to Tanzanian markets also offers local farmers additional trade opportunities.

Migori County comprises eight sub-counties: Suna East, Suna West, Nyatike, Uriri, Awendo, Rongo, Kuria East, and Kuria West. Administratively, the county is further subdivided into 23 divisions, 88 locations, and 202 sub-locations. According to the 2019 Kenya Population and Housing Census, the county had a population of approximately 1.1 million people, with a youthful demographic profile and a significant portion dependent on agriculture for their livelihoods. (Government of Kenya (GoK), 2017). The contrasting environmental and socio-economic conditions between Nyatike and Kuria West make them ideal for comparative analysis of household vulnerability to drought, particularly in relation to cattle keeping. Understanding how these communities adapt to and are affected by climatic variability offers valuable insights for designing region-specific resilience and adaptation strategies. Figure 3.1 illustrates the location and extent of the study area.

Location of the Study Area

The study was conducted in Kuria East sub-County which lies in the latitude of 0°15' north and 1°45' south and longitudes of 35°15' East and 34° West, situated in Migori County, southern part of Nyanza Region (Figure 3.1). The sub-County altitude varies between 1400 metres-1887 metres above sea level.

Population Size

Kuria East sub-County covers an area of 188 square kilometer with a population density of 435 persons per square kilometer. According to the 2009 Population Census Report, the sub-County had a total population of 81,833 comprising of 40,248 males (49.2%) and 41,585 females (50.8%). The population was projected to grow to 126,337 by 2017. Density of persons covers an area of 435 per square kilometer (RoK, 2009).

Physical Features

Kuria East sub-County is characterised by undulating hills interspaced with a few stretches of flat land that cover most of the Sub-County surface area (GoK, 2008-2012). The sub-County is characterized by a rugged terrain and high surface run off making road maintenance and construction difficulty and costly Topographically, the undulating hills have river valleys which run from the south towards the north interspersed with few stretches of flat areas.

The main rivers in the sub-County are Hibwa, Ragana, Nyangoto and Tebesi, all of which originate from the higher rainfall region of the Republic of Tanzania, and transverse the sub-County to join River Migori. Often when there is heavy rainfall, all the above rivers over flow and cause havoc in the lower parts of the sub-County. There is no lake in this sub-County but there are quite a number of man-made dams distributed in the divisions to provide high potential for domestic use.

Climatic Conditions

The study area has a modified tropical equatorial climate type. It is modified by the effect of relief which ranges between 1400 meters and 1887 meters above sea level, due to the influence of Lake Victoria, the division receives bi-modal rainfall with peaks in April and November. Dry seasons occur in the months of December, February and in September. Annual rainfall averages between 1500 mm and 2600mm. Temperatures are generally warm and rarely fall below 18^{o}C. Annual temperatures range between 27^{o}C and 31^{o}C. The climate is suitable for various crops such as maize, coffee, tobacco and horticultural crops. The main economic activity in Kegonga division is farming, where tobacco, maize, beans, and sweet potatoes are the main crops (GoK, 2008-2012).

Soils

The major soils found in the sub-County are volcanic and clay-to-clay loam soils. The other types of soil are silt, loam, nitrohumic ferrasols, and nitrohumic ferrasols planosols. Volcanic soils are deep and well drained are found to the south of Ntimaru Division while nitrohumic ferrasols are found both in Kegonga and Ntimaru Divisions. Poorly drained planosols are found in valley bottoms. Regosols and lithosols are found around rock outcrops and may occur on hill tops (GoK, 2008-2012). According to the soil maps and description from the National Soil Map of the Kenya Soil Survey by Jätzold and Schmidt (1982) in the former South Nyanza Province where Kuria East Sub-County falls has some patches of phaeozems soils which are well drained, less weathered clayed soils with high organic contents of organic humic substance in top soil

Agro ecological Zones

On the basis of land use the sub-County is divided into three zones, namely; Upper Midlands (UM_2, UM_3) and Lower Midlands (LM_4). UM_2 and UM_3 are characterised by small farm size and used for intensive agricultural activity; whereas UM_4 is more suitable for livestock production. The potential of the land has, however, not been fully exploited since only about 61.53 percent of all arable land (15926 Ha) is under crop cultivation. The remaining 38.47 per cent is put under grazing and forests. Farming is mainly under small scale.

Data Sources and Sample Size

The study employed a cross-sectional survey design, which was deemed most appropriate for assessing the current status of drought impacts and household-level response strategies at a specific point in time. This approach allowed for the efficient collection of both quantitative data such as household demographics, livestock losses, and income variations and qualitative data including perceptions of drought response strategies within a clearly defined timeframe. According to Creswell and Creswell (2018), cross-sectional designs are particularly valuable for describing patterns and relationships among variables when time and resources are limited.

A longitudinal design, which involves repeated observations of the same variables over an extended period, was not selected due to constraints related to time, funding, and the immediate need for actionable data. Additionally, longitudinal studies require sustained participant engagement and complex data management, which were not feasible within the scope of this research (Bryman, 2016).

The cross-sectional design was effective in capturing demographic variations in drought experiences across diverse agro-ecological zones in Migori County. It facilitated comparative analysis between wards revealing geographical disparities in vulnerability, adaptive capacity, and institutional support. Furthermore, the integration of mixed methods of combining household questionnaires with qualitative key informant interviews enhanced the validity of the findings by enabling triangulation of data sources (Creswell & Plano Clark, 2017). To ensure robustness and consistency, data collection instruments were pre-tested, and enumerators received thorough training to minimize bias and maintain standardization across all study sites (Kumar, 2019).

Target Population

The target population comprised 15,685 households engaged in cattle farming across four purposively selected sub-locations within Nyatike and Kuria West sub-counties. These households were considered representative of the wider cattle-keeping population in the region, particularly within Lower Midlands (LM) and Upper Midlands (UM) agro-ecological zones. Selection was based on the existence of both rain-fed and mixed farming systems, as well as varying levels of exposure to drought hazards.

In addition, six (6) key informants were purposively selected based on their expertise and roles in community leadership, livestock management, and natural resource governance. These included four (4) assistant chiefs, each representing one of the selected wards who provided essential administrative and local insights on drought patterns and household-level responses; one (1) County Livestock Officer, who offered technical perspectives on livestock-related drought impacts such as disease outbreaks, animal mortality, and mitigation strategies; and one (1) officer from the Water Resource Users Association (WRUA), who contributed valuable information on the status of water resources, seasonal variability, and water governance mechanisms during periods of drought.

The study focused on four wards: Kanyarwanda (1,818 people), Muhuru (6,184 people), Komosoko (1,098 people), and Masaba (6,584 people). These locations were strategically chosen to reflect different socio-ecological conditions, land use patterns, and drought vulnerability profiles. By combining household and expert-level data, the study ensured a holistic understanding of the drought impacts and response strategies among cattle-keeping households in Migori County.

Sampling Procedure and Sample size

According to KNBS (2019), Nyatike sub-county had 39,358 households across 24 locations, while Kuria West had 39,723 households distributed across 14 locations (GoK, 2019). A multi-stage sampling technique was employed to select the study areas and respondents. In the first stage, two sub-counties i.e. Nyatike and Kuria West were purposively selected based on their agro-ecological variability and prominence in cattle farming within Migori County. The second stage involved simple random sampling to select four sub-locations: Kanyarwanda and Muhuru (Nyatike), and Komosoko and Masaba (Kuria West), representing diverse agro-ecological zones and vulnerability to drought. A comprehensive list of livestock-keeping households was developed using the 2019 census enumeration data, and households were used as the primary unit of analysis. Enumeration areas within each agro-ecological zone (AEZ) were selected purposively to ensure representativeness of the environmental conditions affecting cattle farming.

The sample size for the study was determined using the Krejcie & Morgan (1970) formula (Equation 1), which provides a statistically valid sample size for finite populations based on desired confidence levels and margins of error:

$$S = \frac{[X^2 NP(1-P]}{[d^2(N-1)+X^2 P(1-P)]} \quad (1)$$

Where:
S = required sample size
N = the population size (39,358)
X^2 = the table value of chi-square for 1 degree of freedom at the desired confidence level (3.841)
P = the population proportion (0.5)
d = the degree of accuracy expressed as a proportion (0.05)

Using the formula, the required sample size was calculated to be 383 households. This sample was proportionately distributed across the four sub-locations based on household population data to ensure equitable representation. Table 3.1 shows the sample distribution per ward and respective AEZs. This sampling approach enabled the study to capture geographical, ecological, and socio-economic variations affecting drought vulnerability among cattle-keeping households. This stratified approach also helped reduce sampling bias and ensured reliability of generalizations made from the collected data.

Table 3.1: Distribution of Sampled households Head per ward

Sub-county	Wards	AEZ	Number of Households	Sample size per sub-location	Sample size
Nyatike	Kanyarwanda	LM 4	1,818	1,818/15,685 ×383	44
	Muhuru	LM 5	6,184	6,184/15,685 ×383	151
Kuria West	Komosoko	LM 2 /LM 3	1,098	1,098/15,685 ×383	27
	Masaba	UM 2-4/LM 2	6,585	6,585/15,685 ×383	161
Total			**15,685**		**383**

Source: Kenya National Bureau of Statistics (2019)

Data Collection

The study relied on both primary and secondary data sources to achieve a comprehensive understanding of drought effects on cattle-keeping households in Migori County

Primary data

Primary data was collected using a combination of structured household questionnaires and a key informant interview schedule. The household questionnaire (Appendix I) was administered to the heads of selected households, who are often responsible for key decisions regarding livestock and drought coping strategies. The questionnaire was divided into thematic sections to collect data on: household demographic and socio-economic characteristics, patterns of drought occurrence and severity, socio-economic effects of drought on cattle production and livelihoods, and household-level preparedness and adaptation strategies to drought hazards. The use of a standardized questionnaire ensured uniformity in the data collection process, allowing for reliable comparisons across different wards and agro-ecological zones.

While the questionnaire was primarily administered in English, interpretation into Kiswahili was provided for respondents with limited proficiency in English to enhance clarity and response accuracy. The data collection process was conducted with sensitivity to local cultural norms and respect for community protocols, especially when accessing households' heads and engaging community leaders. Photographs of cattle conditions and grazing patterns were also used to visually document field observations, and official data on cattle assets was triangulated with household responses to enhance reliability.

Additionally, qualitative insights were gathered through key informant schedules using a structured schedule (Appendix II). These informants were selected purposively based on their roles and expertise in community leadership, livestock management, and resource governance. These included four assistant chiefs, one from each sub-location within the selected wards, one County Livestock Officer, and one officer from the Water Resource Users Association (WRUA). The interviews explored issues such as institutional responses to drought, livestock health and productivity trends, and local water resource challenges during prolonged dry spells.

Secondary data

Secondary data was obtained through documentary review and content analysis from various credible sources to complement and validate primary findings. These included reports and records from the Ministry of Livestock and Agriculture, government databases, census data from KNBS, and scholarly literature. Specifically, the secondary data

focused on livestock population statistics, drought incidence reports, common livestock diseases, market trends, and previous drought mitigation programs in Migori County.

Relevant literature was sourced from textbooks, peer-reviewed journals, government publications, theses, and policy documents. This mixed-method approach to data collection enriched the depth and breadth of the study, enabling the researcher to analyze both empirical data and contextual factors influencing household vulnerability and resilience to drought in cattle-farming communities.

Methods of Data Analysis

Descriptive statistics were used to assess the levels of preparedness and adaptation strategies adopted by households in response to drought. These included Practicing other agricultural activities, Re-allocating to other places, seeking for off-farm employment, practicing mixed farming, increasing land under grazing, herd size reduction, reliance on remittances from relatives and friends and sale of cattle during drought. The frequency and distribution of these strategies were analyzed across the four wards and compared against household socio-economic characteristics.

RESULTS AND DISCUSSION

Socio-economic Characteristics of the Households

This section presents an overview of the socio-economic characteristics of the households engaged in cattle keeping within the study area. Understanding these characteristics is essential in assessing the vulnerability and adaptive capacity of households to drought-related hazards. The analysis includes variables such as gender distribution, level of education, age of the household head household size, sources of income and experience of keeping cattle. These factors play a critical role in shaping the resilience of cattle-keeping households and their ability to cope with and recover from the impacts of drought. By examining these socio-economic dimensions, the study aims to provide deeper insights into how household conditions influence responses to drought hazard.

Gender distribution of the Household Head

In most societies all household members are involved in livestock production, but decision-making processes within the family and the division of labour for activities such as feeding, milking, health care, processing and marketing differ between regions, societies and households. Livestock production systems offer the potential for introducing a wide range of project activities relating to gender promotion, including improved production methods, redistribution of intra-household tasks and responsibilities, family nutrition, processing of products, marketing, increasing household economy, sustainable environmental practices (Richter, 1997).

Results from Table 4.2, found that 62.8% of household heads involved in cattle farming were male, while 37.2% were female, indicating a male-dominated pattern in livestock production. This gender distribution aligns with similar studies conducted in Kenya and elsewhere, highlighting a widespread trend in which men are often the recognized heads of livestock-keeping households, while women provide essential but under-recognized labor input. For instance, Njuki *et al.,* (2011) found that in Kenyan households, men are more likely to be recorded as livestock owners, despite women undertaking a majority of daily livestock-related activities. Similarly, Maina *et al.,* (2020) reported a male dominance in household decision-making and cattle ownership in arid and semi-arid regions of Kenya, though women were more involved in small livestock care and milk processing.

Globally, similar patterns are evident. A study by Farnworth *et al.,* (2015) across Sub-Saharan Africa emphasized that women carry out up to 90% of labor related to cattle rearing such as milking, feeding, and cleaning yet this contribution rarely translates into ownership or decision-making power. Ahmad (2014), analyzing rural livestock management in Pakistan, confirmed that women's involvement in livestock is extensive but often unacknowledged, particularly in smallholder systems. These gender disparities are further reinforced by socio-cultural norms, where livestock especially large animals like cattle are considered symbols of wealth and prestige, typically controlled by men (GALVmed, 2011a).

However, studies such as Doss *et al.,* (2008) argue that traditional survey tools often misrepresent ownership and decision-making because they do not disaggregate data by sex. As a result, women's roles in livestock economies may be systematically underreported. In Ethiopia, Tangka *et al.,* (2019) observed that interventions targeting female empowerment in dairy cooperatives led to improved household income and food security, underscoring the importance of including women in livestock value chains more equitably. A report by FAO argues that if women were to have access to the same level of resources as men, agricultural productivity would increase by up to 30%, agricultural output by up to 4%, and the number of poor people would reduce by up to 17% (FAO, 2018). Therefore, while this study's findings reflect prevalent patterns in gendered household headship, they also underscore the need for deeper inquiry into women's unrecognized contributions, especially given their critical role in the productivity and sustainability of cattle farming systems.

Table 4.2: Gender of Household head (N=379)

	Frequency	Gender of Household Head (%)
Male	238	62.8
Female	141	37.2
Total	**379**	**100.0**

Source: Survey Data 2023

4.3.2 Level of Education of the Household Head

Education is considered as one of the most important resources for enhancing productivity in any occupation. Literacy plays a crucial role in understanding key issues, such as the effects of drought and response strategies. In the current study, 44.6% of household heads had attained primary education, followed by 25.8% with secondary education, 19.3% with informal education, and 10.3% with tertiary education. This trend is consistent with findings of Timu *et al.,* (2012) who found that primary and secondary education significantly influenced the adoption of improved sorghum varieties among Kenyan farmers, showing the role of basic education in agricultural innovation uptake.

Comparatively, Davis *et al.,* (2010) noted that household heads with primary and secondary education in Kenya were more inclined to participate in Farmer Field Schools (FFS), highlighting that education enhances engagement with agricultural extension services. This was not mirrored in Uganda, where uneducated farmers were more engaged, suggesting that education's influence may be context-dependent based on national outreach strategies and socio-economic dynamics.

According to a study conducted in India and Pakistan by Ali & Flinn (1989) emphasized the importance of farmer education in improving farming efficiency, similar to findings in this study. However, Kabubo-Mariara (2007), also argued that more educated farmers tend to keep fewer livestock due to alternative income sources, suggesting that education might indirectly reduce dependence on livestock farming, rather than enhance it.

Adong *et al.,* (2015) in Uganda demonstrated that education level positively influenced participation in farmer groups, with participation probability increasing from 5% for primary-educated individuals to 10% for those with A-level education. Similarly, Bennin *et al.,* (2008) found that post-primary education increased the likelihood of farmers joining the National Agricultural Advisory Services (NAADS) in Uganda, reinforcing the broader impact of education on farmer organization participation.

In Nigeria, research by Adetiba (2005), Adeoti (2002), and Ajani (2000) all affirmed that education is a key factor for productivity across various ecological zones. This aligns with Ajibefun & Abdulkadri's (2004) study which showed that literate farmers are more likely to adopt productivity-enhancing technologies. The current study reflects patterns observed in Kenyan and Sub-Saharan African contexts where education facilitates awareness, adaptation, and innovation in agriculture. It also highlights global trends. Differences, such as those observed between Uganda and Kenya or between livestock dependency and education in India, illustrate that education's impact is multi-dimensional and highly context-specific.

Table 4.3: Household level of Education (N=379)

	Frequency	Household Level of Education (%)
Informal	73	19.3
Primary	169	44.6
Secondary	98	25.8
Tertiary	39	10.3
Total	**379**	**100.0**

Source: Survey Data 2023

Age of the Household Head

The age of the household head remains a critical determinant in shaping the response strategies adopted against drought, especially among livestock-keeping communities. In Migori County, Kenya, findings from a 2023 survey reveal that 39.3% of household heads are aged between 35–44 years, followed by 23.7% aged 45–54 years, and 19.3% between 25–34 years. Older age groups such as 55–64 years accounted for 12.1%, while the youngest group, 18–24 years, comprised only 4.2%. A small proportion, 2.7%, were above 65 years. This age distribution implies that a significant portion (over 60%) of household heads are in their most economically active years, directly involved in cattle farming and managing drought-related impacts. Younger household heads, comprising about 23.5%, are increasingly pursuing off-farm income opportunities such as formal employment and micro-enterprises, leading to a declining youth presence in direct livestock production (Survey Data, 2023).

These trends are consistent with findings from Northern Ethiopia. Gebrehiwot *et al.,* (2023) reported that 47% of household heads in the Ethiopian highlands fall within the mature adult age group, suggesting that age positively influences the accumulation of livestock assets and enhances drought coping abilities. Similarly, in Tigray, Ethiopia, Negesse *et al.,* (2024) found that 46.6% of household heads were in the 45+ age group, and food security was significantly associated with older age, as older farmers tend to possess more farming experience and resilience strategies.

Youth engagement in livestock farming across East Africa paints a more nuanced picture. According to Bullock *et al.,* (2023), youth involvement in livestock production across Kenya, Uganda, Ethiopia, and Tanzania does not show uniform trends. In their study, less than 30% of young people (under 35 years) owned substantial livestock assets or participated meaningfully in market-oriented livestock production. Instead, education levels and access to improved livestock practices were more significant predictors of market participation than age alone.

Kariuki *et al.,* (2023) noted a gradual shift among youth which represented approximately 35% of rural populations towards small livestock like poultry and dairy cows, which offer quicker economic returns. However, they also highlight that about 40% of these young livestock keepers are vulnerable to climate-induced shocks such as droughts and cold spells, which significantly hinder their productivity and long-term commitment to the sector.

Studies demonstrate that the age of the household head is a strong indicator of drought resilience, largely due to the accumulated experience and greater livestock ownership among older individuals. While over 60% of household heads in Migori County are in the productive age bracket (35–54 years), youth under 35 represent less than a quarter of household heads, with similar patterns observed across East Africa. These statistics underscore the need for policy interventions to bridge the generational gap in agricultural knowledge and promote youth involvement in drought-resilient livestock farming.

Table 4.4: Age of Household Head (N=379)

	Frequency	**Household Age (%)**
18-24	16	4.2
25-34	69	19.3
35-44	149	39.3
45-54	90	23.7
55-64	46	12.1
65^{+}	9	2.7
Total	**379**	**100.0**

Source: Survey Data 2023

Household size

The results from Table 4.5 shows that, majority (43.3 %) of the respondents had household more than 5 members, followed by 41.9 % of the household that had 3-4 members and 14.8 % had 1-2 members. The findings of the current study, which show that larger households in Kenya are more likely to keep cattle than smaller ones. According to the study, households with more than five members represented the largest group among cattle keepers, a trend attributed to the availability of family labor for tasks such as herding (Survey Data, 2023).

This observation is consistent with research by Mwangangi *et al.,* (2022), who found that in Kenya's pastoral communities, household size is positively associated with livestock ownership, particularly because larger households can more easily meet labor demands required in extensive livestock systems. Similarly, Koech *et al.,* (2021) noted that in arid and semi-arid regions of Kenya, family labor significantly contributes to the viability of livestock as a livelihood strategy, with household size being a determining factor in productivity and resilience during drought periods.

In South Africa, where Nkonki-Mandleni *et al.,* (2018) found that livestock ownership among smallholder farmers was heavily influenced by the availability of family labor which is similar to Kenya. In Nigeria, Akinyemi & Mushunje (2019) also highlighted the role of household size in supporting smallholder agricultural productivity, including livestock management, noting that labor availability influences the ability to manage herds effectively. In Ethiopia, research by Berhanu *et al.,* (2020) supports these conclusions, showing that larger family units often have better livestock outcomes due to greater internal labor mobilization, which enhances farm efficiency.

Developed countries, such as those in Europe and North America, the relationship between household size and livestock farming is less pronounced. This is largely due to the mechanization of farming and the use of hired labor, which reduces dependency on family members for agricultural labor (de Vries *et al.,* 2021). In these settings, household size does not significantly influence livestock management, as economic scale and access to external labor markets play a larger

role. This contrast highlights how socio-economic and technological contexts influence the role of household demographics in farming systems.

Kenyan context reflects a strong correlation between larger household sizes and cattle ownership due to labor availability, a pattern shared by many developing regions. This relationship weakens in more industrialized nations where technological advancements reduce the reliance on family labor. These similarities and contrasts emphasize the importance of context-specific strategies in designing livestock development interventions.

Table 4.5: Number of Household Membership (N=379)

	Frequency	Number Household Members (%)
1-2	56	14.8
3-4	164	43.3
5^{+}	159	41.9
Total	**379**	**100.0**

Source: Survey Data 2023

Household Heads' Source of income

Table 4.6 reveals that rural households diversify their sources of income beyond cattle farming. Whereby 35% of respondents identified livestock keeping as a primary income source, a significant proportion (41.6%) engaged in crop farming, followed by business (16.5%), government employment (6.4%), and casual labor (0.5%) (Survey Data, 2023). This trend of income diversification aligns with broader findings across rural areas in Sub-Saharan Africa, where households rely on multiple livelihood strategies to buffer against shocks such as drought, market volatility, or livestock disease outbreaks. In Kenya, studies by Asfaw *et al.,*(2019) & Wanyama *et al.,*(2021) affirm that rural households increasingly engage in mixed livelihood activities which include crop farming, small-scale trade, and remittances as a means of improving food security and economic resilience.

This Kenyan scenario mirrors experiences in other developing regions. For instance, in Malawi, Chirwa *et al.,* (2017) found that non-farm income significantly contributes to household welfare by enhancing total income and smoothing consumption during agricultural off-seasons. Similarly, in Ethiopia and Nigeria, non-farm economic activities such as petty trade, craft production, and wage labor are seen as crucial components of rural livelihoods (Rehan *et al.,* 2019; Shan & Ahmed, 2020). These studies corroborate Ellis's (2010) foundational argument that diversification is a deliberate strategy among rural households to minimize income variability and reduce vulnerability to external shocks. Thus, the Kenyan findings are consistent with regional and global patterns, where diversification acts as a buffer and a catalyst for socioeconomic advancement.

Despite these similarities, there are notable contrasts between income diversification in Kenya and in developed economies. In high-income countries, such as those in Europe or North America, rural income diversification is often driven by technological innovation, access to financial services, and integration into global markets (Barrett *et al.,* 2021). In contrast, in Kenya and much of Sub-Saharan Africa, diversification is more survivalist in nature, motivated by necessity rather than opportunity (Gautam & Andersen, 2016). This reflects systemic disparities in infrastructure, access to capital, and employment opportunities. Moreover, while casual labor and government employment form a small fraction of rural income in Kenya is only 6.9% combined, these sectors are relatively more significant in urbanizing rural zones of Asia, where formal job creation has made greater strides (Lanjouw & Murgai, 2009).

Income diversification is a key livelihood strategy for rural households, particularly in vulnerable environments. The similarities lie in the role diversification plays in enhancing household welfare and reducing risk, while the contrasts stem from the contextual drivers i.e. survival versus opportunity and the structural support available in different regions. As climate variability and economic uncertainty persist, supporting diverse income-generating activities remains central to rural development strategies both in Kenya and globally.

Table 4.6: Household Heads' Source of Income (N=375)

	Frequency	Household heads source of income (%)
Crop farming	156	41.6
Livestock	131	35.0
Government job	24	6.4
Business person	62	16.5
Casual labour	2	0.5
Total	**375**	**100.0**

Source: Survey Data 2023

Experience of keeping cattle among household

The results on Table 4.7 show that, the majority of households engaged in cattle farming have between 2 to 10 years of experience, with 37.2% having 2–5 years and 35.6% having 6–10 years of experience (Survey Data, 2023). Only a small portion (5.3%) have less than 2 years of experience, while 21.9% reported over 10 years of practice. This pattern suggests that cattle keeping is a moderately long-standing activity among many rural households, with a significant number gradually acquiring knowledge and skills through practice. These findings resonate with a study by Alam (2014) in Indonesia, where most cattle farmers reported between 7 to 9 years of experience, highlighting the importance of cumulative knowledge in managing livestock effectively. Experience, as noted, contributes positively to farmers' abilities to anticipate and manage cattle-related challenges, including disease outbreaks, drought, and feeding practices.

Similar results have been reported in other African contexts. Goni *et al.,* (2018) found that in the Eastern Cape of South Africa, many livestock farmers had more than 10 years of experience, with several exceeding 16 years. This longer duration of experience was particularly associated with older farmers, indicating a generational knowledge transfer in livestock farming. Likewise, studies by Yawa *et al.,* (2020) in Nigeria reported that a large number of cattle farmers had more than 21 years of experience. These long durations are often associated with the socio-cultural importance of cattle and the economic dependence on livestock in many African societies. Therefore, the Kenyan findings align with the broader African trend where livestock keeping is a long-term livelihood strategy deeply rooted in rural traditions.

In contrast, findings from developed countries present a different picture. For example, Mathis *et al.,* (2020) in the United States found that the average cattle farmer had over 15 years of experience, but this was often linked to professional training and commercial scale operations rather than subsistence or cultural practice. Moreover, in many industrialized nations, younger generations are increasingly less involved in livestock farming due to urban migration and the mechanization of agriculture (FAO, 2021). This creates a demographic gap in experience levels and raises concerns over the future of traditional farming practices.

Many studies in Africa, particularly in Kenya, indicate a moderate to high level of experience among cattle-keeping households, comparable to similar contexts in Indonesia and other parts of Sub-Saharan Africa. These similarities highlight the value of accumulated livestock knowledge in managing herds effectively. However, a contrast emerges in the scale and intergenerational dynamics of livestock farming in developed regions, where farmers often have longer experience but face challenges such as youth disengagement and increased commercialization. These insights underscore the importance of supporting both novice and experienced farmers through targeted training and incentives, especially in areas where livestock farming remains a key pillar of rural livelihoods.

Table 4.7: Experience of Household on Cattle keeping (N=376)

Years	**Frequency**	***Experience of Household on cattle keeping (%)***
Less than 2	20	5.3
2-5	140	37.2
6-10	134	35.6
above 10	82	21.9
Total	**376**	**100.0**

Source: Survey Data 2023

Conclusion and Recommendation

Household socio-economic characteristics play a critical role in determining vulnerability to drought among cattle farmers. Larger households and those with limited income diversity face greater risks. In contrast, livelihood diversification and effective resource management enhance household resilience. Environmental and livestock-related stressors such as declining water sources, reduced pasture, livestock diseases, and decreased milk production further exacerbate vulnerability. Coping strategies like mixed farming, remittances and off-farm employment provided some relief; however, their effectiveness varied by location. These findings highlight the need for localized, ward-specific interventions that promote improved livestock management, diversified income sources, and targeted resilience-building strategies to mitigate the effects of drought on cattle-keeping households.

Based on the findings, the socio-economic profile indicates that cattle-keeping households possess important adaptive resources, including labour availability, farming experience, livelihood diversification and accumulated livestock knowledge. Nevertheless, vulnerabilities remain because of gender inequalities, limited higher-level education, relatively low youth participation and substantial dependence on climate-sensitive agricultural activities. Consequently, interventions aimed at improving drought resilience should address these socio-economic characteristics rather than treating cattle-keeping households as a homogeneous group

REFERENCES

- Adong, A., Mwaura, F., & Okoboi, G. (2013). What factors determine membership to farmer groups in Uganda? Evidence from the Uganda Census of Agriculture 2008/9. *Journal of Sustainable Development, 6*(4), 37–46. https://doi.org/10.5539/jsd.v6n4p37
- Ali, M., & Flinn, J. C. (1989). Profit efficiency among Basmati rice producers in Pakistan Punjab. *American Journal of Agricultural Economics, 71*(2), 303–310.
- Barrett, A. B., Duivenvoorden, S., Salakpi, E. E., Muthoka, J. M., Mwangi, J., Oliver, S., & Rowhani, P. (2020). Forecasting vegetation condition for drought early warning systems in pastoral communities in Kenya. *Remote Sensing of Environment, 248*, 111886. https://doi.org/10.1016/j.rse.2020.111886
- Bosire, C. K., Mtimet, N., Enahoro, D., Ogutu, J. O., *et al.,* (2022). Livestock water and land productivity in Kenya and their implications for future resource use. *Heliyon, 8*(3), e09006. https://doi.org/10.1016/j.heliyon.2022.e09006
- Bullock, R. M., Auma, J. O., Baltenweck, I., Dione, M., Okeyo Mwai, A., Ndiwa, N., Omore, A., Ouma, E., & Yami, M. (2023). Youth engagement in livestock production and marketing in East Africa. *Outlook on Agriculture, 52*(4), 424–433. https://doi.org/10.1177/00307270231215368 Sage Journals+1
- Doss, C., Grown, C., & Deere, C. D. (2008). *Gender and asset ownership: A guide to collecting individual-level data*. World Bank. FAO AGRIS
- Ellis, F. (2000). The determinants of rural livelihood diversification in developing countries. *Journal of Agricultural Economics, 51*(2), 289–302. https://doi.org/10.1111/j.1477-9552.2000.tb01229.x University of East Anglia+1
- Ellis, F. (2000). *Rural livelihoods and diversity in developing countries*. Oxford University Press.OUP Academic
- Farnworth, C. R. (2015). *Gender, livestock and reducing greenhouse gas emissions in Costa Rica* (CCAFS Working Paper No. 149). CGIAR Research Program on Climate Change, Agriculture and Food Security. CCAFS+1
- Gathiaka, J. K., & Muriithi, M. K. (2020). Empirical analysis of livelihood strategies and food insecurity in Turkana County, Kenya. *Tanzanian Economic Review, 10*(1). https://doi.org/10.56279/ter.v10i1.60
- Gautam, Y., & Andersen, P. (2016). Rural livelihood diversification and household well-being: Insights from Humla, Nepal. *Journal of Rural Studies, 44*, 239–249. https://doi.org/10.1016/j.jrurstud.2016.02.001 ScienceDirect+1
- Gichure, J. N., Njeru, S. K., & Mathi, P. M. (2020). Sustainable livelihood approach for assessing the impacts of slaughterhouses on livelihood strategies among pastoralists in Kenya. *Pastoralism, 10*, Article 26. https://doi.org/10.1186/s13570-020-00184-z
- Kabubo-Mariara, J. (2008). Climate change adaptation and livestock activity choices in Kenya: An economic analysis. *Natural Resources Forum, 32*(2), 131–141. https://doi.org/10.1111/j.1477-8947.2008.00178.x DOI
- Kabubo-Mariara, J., & Mwabu, D. K. (2007). Determinants of school enrollment and education attainment: Empirical evidence from Kenya. *South African Journal of Economics, 75*(3), 572–593. https://doi.org/10.1111/j.1813-6982.2007.00138.x Wiley Online Library+1
- Karanja, A. M. (2021). Drought risks livelihoods in Laikipia County. *Kenya Policy Briefs, 1*(1). https://doi.org/10.66563/4g4bs718
- Lanjouw, P., & Murgai, R. (2009). Poverty decline, agricultural wages, and nonfarm employment in rural India: 1983–2004. *Agricultural Economics, 40*(2), 243–263. https://doi.org/10.1111/j.1574-0862.2009.00373.x Wiley Online Library+1
- Miller, B. A. (2011). *The gender and social dimensions to livestock keeping in Africa: Implication for animal health interventions*. Global Alliance for Livestock Veterinary Medicines (GALVmed). Galvmed
- Mwangi, V., Owuor, S., Kiteme, B., & Giger, M. (2020). Beef production in the rangelands: A comparative assessment between pastoralism and large-scale ranching in Laikipia County, Kenya. *Agriculture, 10*(9), 399. https://doi.org/10.3390/agriculture10090399
- Njuki, J. (2011). *Key livelihood and gender issues in livestock*. International Livestock Research Institute. ILRI
- Njuki, J., Kariuki, J., Waithanji, E., Mburu, S., & Lyimo-Macha, J. (2010). *Women's participation in livestock markets in Kenya*. International Livestock Research Institute. ILRI
- Njuki, J., Poole, J., Johnson, N., Baltenweck, I., Pali, P., Lokman, Z., & Mburu, S. (2011). *Gender, livestock and livelihood indicators*. International Livestock Research Institute. ILRI
- Njuki, J., Waithanji, E., Macha, J., Mburu, S., & Kariuki, J. (2011). *Gender and livestock value chains in Kenya and Tanzania*. International Livestock Research Institute. ILRI
- Richter, M. (1997). *Who milks the cow? Gender-and-development in livestock farming*. Universum Verlagsanstalt.FAO AGRIS
- Sala, S. M., Otieno, D. J., Nzuma, J., & Mureithi, S. M. (2020). Determinants of pastoralists' participation in commercial fodder markets for livelihood resilience in drylands of northern Kenya: Case of Isiolo. *Pastoralism, 10*, Article 18. https://doi.org/10.1186/s13570-020-00166-1
- Wambua, R. M. (2022). *Drought assessment and forecasting using indices and artificial neural networks for the upper Tana River basin, Kenya* [Master's thesis, South Eastern Kenya University].