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Nomadic Pastoralism and Sustainable Livelihoods in the 21st Century: An Assessment of Current Practices, Challenges and Prospects for Pastoralists in Samburu County, Kenya

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This study aimed to assess the current practices, challenges and prospects of nomadic pastoralism and sustainable livelihoods in the 21st Century in Samburu Pastoralists in Samburu County, Kenya. Nomadic pastoralism describes a season-based lifestyle that entails a random, irregular, and intentional movement of livestock and people to new places in search of a better supply of pastures and water. The sustainability of nomadic pastoralism in the 21st century is doubtful due to the factors militating against the system. For example, there are threatening factors like global warming, prolonged implications of climate change, unstable utilisation of natural resources like land and water, and the environmental degradation arising from uncontrolled extractive industries and urbanisation. This study utilised a mixed method approach with quantitative data collected from a random sample of 140 households and supplemented by two focus group discussions. Analyses found that households that exhibit the least livelihood diversification, as reflected by reliance on pastoralism as the main source of livelihood, are more likely than others to experience negative outcomes. This study recommends concerted efforts in support of livelihood diversification that the County Government of Isiolo should necessarily spearhead.

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INTRODUCTION

Nomadic pastoralism is a global phenomenon; thus, the world is home to about 30–40 million nomadic pastoralists (Oxfam, 2020). Most of them come from arid and semi-arid regions like East and Central Asia, and some African countries like Somalia, Nigeria, and Sahel in West Africa. In essence, nomadic pastoralism is one of the most ancient forms of land usage, which has become well-adapted to local climatic problems over the past thousands of years (Berman, 2023). Ordinarily, nomadic pastoralists are employed as a strategy for survival in the semi-arid and arid regions of the world. In that regard, the nomadic communities have maintained sustainable and productive livelihoods until, most recently, issues of climate change have upset their lives (Luiza and Leif, 2023). Indeed, nomadic pastoralism is the dominant production system in arid and semi-arid areas (ASALs) that cover North Eastern, Upper Eastern, and South Western regions in Kenya, which collectively account for 80 per cent of the country's land mass (Elmi & Birch, 2013). These areas, large as they are, share a number of characteristics, the main one being sporadic and insufficient rainfall, reliance on rangelands for grazing livestock and markedly higher vulnerability to short-term and long-term climatic changes. It is not uncommon, for instance, for these regions to lose huge numbers of livestock – the main source of livelihood – every time rain falls. For instance, Kenya and Tanzanian pastoralists lost between 70 and 90% of their livestock in the drought of 2009 (Huho et al., 2011)

It is instructive that ASALs in Kenya have suffered systematic neglect and marginalisation by the national government since independence owing to their supposedly low economic potential relative to regions that experience sufficient amounts of rainfall for agricultural production, which partly explains their poor development indicators (Nkedianye et al., 2011). For instance,

according to the Kenya Demographic and Health Survey of 2014/15, the North Eastern region scored a mean of 15.4 (38%) among the households that lack food or do not have money to purchase food, and 69% have no formal education (KNBS and ORC Macro, 2015). Pastoralist communities exhibit remarkable adaptation to their unique environment as reflected by well-evolved mechanisms for sharing resources, such as rangelands and watering points, which are communally owned (Borrini & Jaireth, 2007). Sustainable use of resources is embedded in the cultures of the pastoralists. For instance, the Maasai have a culture of keeping cattle which use available resources to maintain their livelihoods and contribute to the conservation of environmental resources (Conroy, 2013). Movement from one geographic area to another in traditional nomadic movement ensures that the rangeland is given time to recover its productivity and that many pastoralists reserve some sections of their rangelands for use in prolonged drought. Pastoralists also engage in adaptive migration, which “involves recourse to other routes, grazing land, or water points than those usually used, either within or across borders. Unlike traditional nomadic movements, it may affect the land of other pastoral communities, farmers and other private owners, and in such cases pastoralists sometimes have to pay grazing fees” (Schrepfer & Caterina, 2014:14)

By and large, nomadic pastoralism requires access to huge tracks of rangelands as well as the freedom to move from one geographic area to another. Thus, one of the main disruptors of nomadic pastoralism is a change in land tenure and the creation of administrative units, as happened during colonisation of Africa (Lukas et al., 2022). Besides the loss of huge tracks of rangelands during colonial times, nomadic pastoralists must also content with diminishing rangelands owing to population growth as well as the need to reduce pressure on areas reserved for

wildlife which traditionally served as part or grazing lands. This problem is aggravated by climate change (Butt, 2010). Like other pastoralist communities in Kenya, the challenges discussed above are evident in Isiolo County. For instance, Fratkin (2001) asserts that the way of life of East African pastoralists such as the Maasai, Rendilles and Samburus is challenged by drought, population growth, loss of land to game parks and famine. Thus, understanding the current situation and the coping mechanisms in response to these challenges and isolating prospects for sustainable livelihoods is useful for securing and transforming the livelihoods of poor communities (Tugjamba et al., 2022).

The Problem

Pastoralist communities are faced with many challenges that are disruptive to their way of life, the main ones being diminishing rangelands due to population growth, the need to access social amenities such as schools in the context of poorly developed infrastructure for offering educational services to nomadic communities, and changes in land tenure system that curtails free movements of livestock. Viewed against the backdrop of climate change, these problems can potentially push pastoralist communities into destitution. Adaptation to the political, social, cultural, economic and climate change realities, on the other hand, offers not only a feasible mechanism for ameliorating vulnerability but also a pathway to a stable and economically viable future. Expansion of livelihood opportunities such as mixing agriculture with pastoralism and improving access to water enhance livelihoods in general by, for instance, improving food security and giving the local community a steady source of income. Expansion of opportunities need not be disruptive to people's social and cultural foundations. This assertion is based on the view that development should not entail supplanting traditional practices with some alien practices (Sen, 1999). Implied here is that a model for managing imminent transitions in ASALs occasioned by socio-political and climatic changes should be holistic in its understanding of

challenges and opportunities for sustainable livelihoods in such contexts (Oxfam, 2020).

Although there is a growing body of empirical research that is comprehensive in its analysis of the status of communities living in arid and semi-arid areas, their challenges and coping strategies or adjustments, they are making in a world in flux (see, for instance, Elmi and Birch, 2013; Huho et al., 2011; Dong et al., 2011), there is a dearth of research that pays close attention to the micro-level context where their changes are taking place. The study sought to understand the status of livelihoods of Samburu pastoralists in Isiolo County as well as to assess the nature of adjustments they are making in the face of reducing rangelands and unreliable rainfall occasioned by climate change and, ultimately, the prospects for leading sustainable and economic stable lives. The goal of this study was to understand the situation of the Samburu pastoralists in Isiolo County, and the specific objectives were To determine the sources of vulnerability of Samburu pastoralists' livelihoods, To assess the adjustments the community is undertaking to cope with emerging sources of vulnerability as a means of securing its livelihood; and to establish the role of the community's asset base in promoting sustainable livelihoods. The findings of this study are expected to be helpful to policymakers and development experts keen on making decisions on the direction the community ought to take to secure itself economically in the face of the many changes taking place.

LITERATURE REVIEW

Theoretical Review

This work adopted the theory of change. In essence, the process of development encounters many complex constraints that are caused by diverse factors (Enderle, Southerland, and Grooms, 2013). For instance, the sociocultural factors, legal, climatic and lack of access to critical services necessary for augmenting sustainable change (Ghate, 2018). Largely, the employment of the theory of change helps the researcher to describe and illustrate how change

takes place, and the reasons the desired change is thus expected to happen in a particular ecosystem, and context (Phillips and Klein, 2023). More so, the theory of change may also be used to explain how the assumed intervention is expected to lead to the desired development change. Therefore, the theory enables a theory-driven evaluation to be carried out, for the purposes of designing a program and directing how it works, and whether the expected outcomes have been realized (Enderle et al., 2013). In that regard, this theory is helpful in determining whether the anticipated interventions are functional or otherwise; and the usage of new knowledge and experience to refine assumptions, improvement of products and services, and making informed decisions (Reinholz and Andrews, 2020). This theory helps to evaluate the reasons why the pastoral community has persisted in practicing pastoralism despite the challenges facing the practice.

Empirical Review

An empirical study by Akall (2023), investigated the effects of development interventions on pastoral livelihoods in Turkana County, Kenya. The study explores monumental challenges presently facing the pastoral communities: perennial floods coupled with droughts, emergent pandemics like covid-19, food insecurity, climate change complexities and risks, livestock diseases due to high mobility, natural resource-based conflicts, and the small arms proliferation occasioning regional conflicts. However, the study left some gaps unfilled, for example, it did not address effective coping mechanism, did not address interventions to help in minimizing the challenges facing the pastoral communities; or ways to initiate change of life for the pastoral communities. Additional empirical study was carried out by Boles, Shoemaker, and Courtney (2019) investigated the historical Ecologies of Pastoralist Overgrazing in Kenya. They concluded that pastoralism continued to be practiced despite the challenges like environmental degradation, poor land management and lack tenure insecurity, and effects of climate change. However, the study

leaves some gaps unfilled. For example, lack of sustainable interventions against the problems affecting the pastoral communities; inadequate legal framework and strong policy ecosystem. In Ethiopia, Amenu, Szonyi, Barbara, and Wieland (2017) studied important knowledge gaps among pastoralists on causes and treatment of udder health problems in livestock in southern Ethiopia. The empirical study concluded that due to gender inequality, women lack adequate access to natural resource, and essential services. However, the study fails to avail interventions, to close the gap on access, control and social justice, and sustainability (Akall, 2023).

Vulnerability Challenges Facing Pastoralist Communities

People live in internal and external environments that dictate their livelihoods. Petersen and Pedersen (2010) assert that in the external environment, there are critical trends such as population and technological trends, shocks such as natural disasters, and economic inflation and seasonality. These external factors are more often than not beyond human control, and they immensely affect their assets and, therefore, their livelihoods. For example, with inflation, prices of commodities go up, and this affects the financial assets. Pastoral communities are faced with many vulnerabilities, most of which are ecological. Food availability largely affects the livestock population. In arid and semi-arid areas, unpredictable rainfall patterns have led to the degradation of vegetation cover and, thus, low populations of livestock. This can lead to conflict and strife among and between the pastoral communities.

In a vulnerability assessment among pastoralists, Dong et al. (2011) found out that different pastoralists have different global vulnerabilities, such as climate variability and climate change. In Mali, the pastoralists have contrasting patterns of migration depending on the vulnerabilities and the migrations are linked to social networks (De Haan et al., 2002).

Livelihood Diversification: Adjustments In Response to Challenges Experienced

Livelihoods should be able to adjust and adapt to the different vulnerabilities that are presented, such as shocks and stresses. There have to be mechanisms and strategies – whether long-term or short-term – that are put in place to deal with changes to achieve sustainable livelihoods. People in different communities should be able to adopt measures that make them resilient depending on the vulnerabilities that they are facing. Pastoral communities have to migrate in times of drought for food and water for their livestock. The environmental variability demands that the pastoral communities find ways to deal with and cope with the climate fluctuations. Among the pastoralist communities, livelihood strategies adopted include livestock production, agricultural production, and off-farm income strategies such as casual employment as a herdsman or driver in game reserves (Homewood et al., 2009).

Vulnerabilities lead to livelihood diversification. A case study on livelihood diversification among the Maasai in Northern Tanzania revealed that migration in the community is a response to cultural norms and economic conditions (McCabe et al., 2014). Fratkin & Mearns (2003) indicated that the Maasai have resulted to agriculture and pastoralism to sustain themselves. However, it was found that diversification to agriculture for pastoralists living in arid regions is not considered. Similarly, an examination of the Garri pastoralists in Southern Ethiopia revealed that the pastoralists had to find other ways of sustaining their livelihoods through keeping poultry for meat and eggs, which were consumed in the homes or sold rather than agriculture.

At the Mkomazi game reserve in Tanzania, it was found that the status of the women in pastoral society has changed as they are more involved in income-generating activities such as selling milk to sustain their livelihoods (Brockington, 2001). A study on the pastoral societies in northeastern Kenya revealed that the wealthy and poor people are involved in diversification. Wealthy families

diversify to reduce risk while the poor diversify to survive (Little et al., 2001).

Asset Base and Prospects for Nomadic Pastoralists

Ashley and Carney (1999) identified assets as factors that influence the sustainability of livelihoods. This is because people need assets to achieve better outcomes out of their livelihoods. People need to differentiate between different types of assets to understand what will best work for them and the combinations they can use to make a living. The five types of assets or capital that comprise livelihoods are human, physical, natural, social, and financial. Social capital ‘is the capacity of networks to mobilise resources to obtain beneficial outcomes for individuals’ (Gomulia, 2006: 9). Gomulia asserts that individuals build networks to enable them to mobilise the resources that they need to develop themselves. These networks are built based on trust, common norms, and frequent communication between and among individuals. Financial capital refers to the financial resources individuals need to live the livelihoods they aspire to have. Physical capital refers to infrastructure and producer goods that are needed to support livelihoods. Human capital refers to the knowledge, skills, and good health that people need so that they can be able to achieve the livelihoods that they desire. Natural capital refers to natural resources, such as soil, air and water, and environmental services, such as the hydrological cycle (Krantz, 2001).

METHODOLOGY

This study used descriptive research design because of the need to quantify and describe the various indicators of interest. The study was conducted in Samburu region in Isiolo County. Samburu was preferred for the study because it is undergoing through an augmented national interest by the state and other actors to promote nature and wild conservation. Therefore, pastoral mobility is no longer seen as the most effective strategy to manage the shifting resources in the area. For example, policy and project

implementation to secure more improved land tenure, better-quality pasture to transform the pastoralists' mobility ecosystem for the sustenance of their livelihoods. A standardized questionnaire was used to collect quantitative data while an interview guide was used to collect qualitative data from the FDGs. The target population was 4,200 rural household heads practicing mobility pastoralism in the Wamba and Waso East Wards. The researcher prepared a sampling frame and used the systematic sampling which is a statistical method to select a sample of 140 elements, a 30% of the target population. Quantitative data was analysed using the SPSS software; for qualitative data, emerging themes, patterns and relationships were used to analyse data, then the researcher interpreted the meaning coming out.

FINDINGS

Characteristics of Survey Respondents

Table 1: Distribution of respondents according to background characteristics (N=140)

Characteristic	Categories	Per cent	Number
Age of the head of the household	35 years or younger	37.1	52
	36-45	31.4	44
	46 and older	31.4	44
Gender of the head of the household	Male	83.6	117
	Female	16.4	23
The education level of the head of the household	No/incomplete primary education	70.7	99
	Primary complete	24.3	34
	Some secondary	5.0	7
	University	0.0	0
Number of people in the household	2	10.0	14
	3	15.0	21
	4	9.3	13
	5	10.0	14
	6	22.1	31
	7	12.9	18
	8	14.3	20
	9	6.4	9
Average number of household members	5.42		

Vulnerability challenges

It may be recalled that the first objective of the study was to understand the status of nomadic pastoralists in Isiolo County in Kenya, with a special emphasis on their vulnerabilities and

According to the results presented in *Table 1*, 37.1% of the households had heads who were 35 years or younger. The 36 to 45 year and over 45 years age brackets accounted for 31.4% of each sample. Most households were male-headed (83.4%) compared to female-headed (16.4%). With respect to levels of education, the majority of the household heads had no formal education or had not completed the primary level of education (70.7%), while those with complete primary education and those with at least some secondary education accounted for 24.3% and 5%, respectively. No household was headed by a person who had a university level of education. Results further indicated that households in the study site are relatively large. The average number of household members is 5.42, which is way above the national average of 3.9 people (KNBS and ICF Macro, 2014). In fact, many households had as many as 8 and 9 members.

challenges. As an ASAL region, the county continues to experience various challenges emanating from climatic changes, diminishing rangelands, changes in land tenure, and a burgeoning population.

The respondents were also in agreement that there has been a continued reduction in rangelands over the years, which is exemplified by the frequency with which neighbouring communities get into violent conflicts because of such resources. The people are keenly aware of the genesis of this problem: population increase and annexation of their former rangelands to create privately owned conservancies.

People are many. The numbers are increasing. The more people, the more need for bigger lands to grace livestock, but then there is also this issue of conservancies. These are our lands, and that is why we forcefully graze in them when there is nowhere else to graze (A male FGD participant).

Diminishing rangelands and access to water are the main sources of conflict between the different communities in Isiolo County as well as those in neighbouring counties. It is instructive that practically everyone is aware of the danger posed by these conflicts. Implied here is that conflicts over resources, particularly rangelands and watering points, create a general sense of insecurity among the people, which in itself undermines the development of the region.

As expected, ASAL areas are some of the poorest regions in Kenya. While livestock herding was sufficient to meet the people's basic needs in the past, it is currently not a very viable source of livelihood. Poverty is widespread, and the majority of the people cannot fully dependent on livestock, hence overreliance on relief food. Poverty was also blamed for a lack of disruption in school attendance, particularly among children in the poorest households as well as poor access to health services.

While hardships have always characterised the lives of pastoral communities, there was consensus that the situation is not changing for better but for worse, which can be attributed to climate change, among other factors. The general

feeling is that livestock diseases are increasing with more devastating effects. Some of the common diseases identified were calf scours, black quarter, rift valley fever, and heart water, among others. Access to good veterinary services is usually poor in this community because of the nomadic nature of herders, which means there is frequent loss of livestock, and this confounds an already delicate situation. As noted earlier, rainfall patterns have also changed over time. According to the people who participated in this study, long dry spells force people to go outside their usual rangelands, and this inevitably creates conflicts between communities.

Current Practices and Livelihood Adjustments

This study further sought to assess the nature of adjustments the people are making in response to the new challenges they are facing, particularly the unreliability of nomadic pastoralism as a source of livelihood and adverse changes in rainfall patterns. To achieve this, the study asked respondents several questions relating to their main source of livelihood and whether they have ventured into farming.

As shown in *Table 2*, close to 80 per cent of the households surveyed reported that their main source of livelihood is livestock keeping, which means that the level of transition from livestock herding to other types of livelihoods has not taken root in this community. Indeed, only 2.9 per cent and 2.1 per cent of the households (just 4 and 3 households, respectively) reported farming and formal employment as the main source of livelihood. It may be noted that the four households who reported farming as the main source of livelihood came from a village on the bank of a tributary of Ewaso Nyiro River, which is a permanent river that runs across the study site. On the other hand, it is worth emphasising that small businesses such as shops, barbershops and saloons, vegetable and cereals selling enterprises are the main livelihood diversification strategy.

Table 2: Distribution of households according to the main source of livelihood (N=140)

Categories	Per cent	Number
Herding	77.9	109
Farming	2.9	4
Business	17.1	24
Formal employment	2.1	3
Total	100	140

To further investigate the extent to which the community has started shifting from relying solely on livestock keeping to other sources of livelihood, particularly farming, respondents were asked if they owned livestock and farmland and if they were, in fact, practising farming. Their responses are presented in *Table 3*. Livestock keeping is almost universally practised in this community, which means that even households that reported that livestock keeping was not their main source of livelihood (*Table 2*), most of them

still own livestock. Results further suggest that slightly more than ten per cent of the household's land. These results are largely expected. For instance, land has traditionally been communally owned, and private ownership has recently emerged. Similarly, only a tiny proportion of households practice crop farming. It may be concluded that the community has not readily embraced farming, but it appears to be gravitating towards small-scale businesses as an alternative to livestock farming.

Table 3: Distribution of households according to ownership of cattle and land for farming (N=140)

Ownership of cattle and land	Responses	Per cent	Number
Household owns cattle	Yes	97.1	136
	No	2.9	4
Household owns land	Yes	12.9	18
	No	87.1	122
Household cultivates food crops	Yes	5.0	7
	No	95.0	133

There are many logical explanations for this situation. First, farming, appealing as it may be and despite its potential, cannot be a viable alternative to livestock keeping because of unreliable rainfall. Without any meaningful alternative sources of water, such as boreholes and dams to store rainwater, rain-fed agriculture will remain a risky bet. Indeed, many people expressed their frustrations with farming because of the losses they incur when they plant crops and rain fails or is insufficient. Perhaps one of the causes of total or near-total crop failure is the choice of crops to plant. According to community members, the main crops cultivated are kales, beans, and maize all of which require relatively higher amounts of rainfall compared with more resilient ones like cassava.

Adoption of new practices such as food crop farming is an uphill task, as summarised by one respondent:

“Farming is new to us. No one has given us with crops that can survive here. Maybe cassava would do ok if it requires little rainfall, but we have not tried it because we have not come across it”.

Although this may be the dominant view in the region, it is important to note that organisations such as the World Food Programme have started various livelihood diversification initiatives, such as supporting the construction of small rainwater collection pits through a food-for-work programme. Groups that are beneficiaries of this program use the water mainly for the cultivation of fodder for their animals as well as for limited crop farming. Fodder availability within the community heralds a shift from reliance on pure nomadic pastoralism to a more sedentary lifestyle. Another positive development in livelihood diversification is that most of the respondents had tried farming in the past, which means that the

community holds positive attitudes towards agriculture and would, therefore, embrace farming with the requisite support.

The community is making other adjustments to respond to livelihood challenges include water harvesting and storage. However, water harvesting is ineffectual because it is small in scale – practised at the household level where water is stored in small tanks and hence insufficient for food crop farming. Water collection pits are also not very effective because they are small in capacity and cannot last the usually long dry spells experienced in the county.

The community is also slowly embracing livestock insurance, which is being promoted by the government in addition to destocking. These measures have mitigated the loss of livestock during the dry season. Another important finding is that many of the households who have ventured into business reported that they got initial capital from the sale of part of their livestock. This strategy seems to be especially appealing to the extent that it mitigates the loss of livestock during the dry season, reduces pressure on rangelands and promotes livelihood diversification.

The key question of interest here is whether these adjustments are sufficient to respond to the huge challenges faced by the community. Evidently, it

is safe to conclude that the community is adapting to the new situation, but the adjustment rate is too slow to ensure that the community is safe from the ravages of climate change and disruptions in their pastoral lifestyle. Crop production is such a small scale that it is not making any significant impact in the community. In fact, according to FGD participants, reliance on relief food is a common phenomenon, particularly during prolonged drought, which is usually accompanied by loss of livestock. Thus, it can be concluded that the best indicator of livelihood diversification is ownership of a business, however small.

This study found compelling evidence that engaging in a business is associated with a lower likelihood of experiencing food poverty. Although the data could not allow regression analysis (too few cases in some categories in background variables), descriptive analysis strongly suggests that owning a business is associated with a proportionately lower likelihood of reporting missing a meal in the last six months.

As shown in *Table 4*, households that reported that their business was the main source of livelihood have the largest proportion who said they had not missed a meal in the last six months (70.8%) compared with those who reported other occupations (mainly livestock keeping, agriculture) as the main source of livelihood.

Table 4: Distribution of households according to missing a meal in the last 6 months by background characteristics (N=140)

	Categories	Missed a meal in the last 6 months	Did not miss a meal in the last 6 month	Chi-square test
Household business as the main source of livelihood	Yes	29.2	70.8	*
	No	98.3	1.7	
The gender of the household held	Male	94.0	6.0	*
	Female	47.8	52.2	
The education level of the household head	No/incomplete primary education	96.0	4.0	*
	Primary complete	73.5	26.5	
	Secondary	14.3	85.7	
Age	20-35 years	82.7	17.3	NS
	36-45	93.2	6.8	
	46 and older	84.1	15.9	
	Total	86.4	13.6	

NS mean is not statistically significant

* Means Chi-square test statistic is significant at a 95% confidence level.

But which households are more likely than others to engage in business? To assess the factors associated with engaging in a business enterprise (as a measure of livelihood diversification), the study carried out a cross-tabulation of ownership

of a business on the one hand and several background characteristics (age, gender, and education level the head of the household). Results are presented in *Table 5*.

Table 5: Distribution of respondents by background characteristics according to whether the household owns a business (N=140)

Background characteristic	Categories	Household owns a business	The household does not own a business	Chi-square test results
Age of household head	20-35 years	17.3	82.7	NS
	36-45	13.6	86.4	
	46 and older	20.5	79.5	
Gender of household head	Male	6.0	94.0	***
	Female	73.9	26.1	
The education level of the household head	No/incomplete primary	5.1	94.9	***
	Primary complete	44.1	55.9	
	Some secondary	57.1	42.9	
	Total	17.1	82.9	

NS= not statistically significant

* Means Chi-square statistic is significant at a 95% confidence level

Results show that the diversification of livelihoods, as reflected by venturing into business, does not differ across age. In other words, the proportion of households that engage in business as the main source of livelihood does not change according to the age of the household head. In contrast, it is clear from these findings that female-headed households are proportionately more likely than male-headed ones to report business as the main source of livelihood. This is expected given that women are unlikely to venture into nomadic pastoralism, which is culturally a preserve of men. Another key finding is that households whose heads have no formal education or did not complete the primary level of education are the least likely to be engaging in business as the main source of livelihood (5.1%) compared with those with primary education (44.1%) and secondary education (57.1%).

Community Asset Base and Prospects for Resilience

Like many ASALs in Kenya, the community has a weak asset base owing to many years of systematic neglect by the national government.

This study found that the first asset, human capital, is inadequate to lift the community from poverty. First, the study found that at least among the poorest households, some primary school-age children are not currently attending school, and many of those in school are skipping school because of a lack of food. This assertion was aptly summarised by one female FGD participant:

School attendance to some is a by good luck. There is free primary education, but if there is no food at home, even attending school, whether there is food there or not, is not easy. Also, young boys are not attending school because many of them are busy grazing cattle. Girls are better off. There are a number of NGOs supporting girls, but boys are not benefiting (A female FGD participant).

According to Yaqub (2002), giving children a head start gives them a chance to escape poverty later in life. In other words, the earlier the intervention, the easier it is to reduce the chances of poor childhood leading to poor adulthood. Without a firm human capital foundation, there is no reason to believe that intergenerational transmission of poverty will not occur.

None of the respondents in our sample had a university level of education. This finding does not mean that there are no people with that level of education in this community because the more educated people are likely to be working in formal employment in big towns. However, the finding also implies the absence of trained and educated human resources at the local level. This gap has hindered the quick adoption of innovations and new ways of doing things. There is extensive literature demonstrating that more educated people are likely to adopt new ideas which the idea then diffuses to the rest of the community (Zanello et al., 2015).

One of the biggest natural capital the community possesses is land. The population density of Isiolo County is 6 people per square kilometre, which is well below the national average of 66 people (Republic of Kenya, 2011). This means that there is plenty of land available to the community, although part of it has been annexed to set up conservancies and national parks.

However, the biggest challenge with utilisation of this land is not the communal nature of ownership (even though that is an issue on its own) but the lack of sufficient water for a diversified production system that encourages agriculture in addition to livestock.

Isiolo County is hot and dry, with an annual average rainfall of about 580.2 mm (the Republic of Kenya, 2014). For this reason, the county government has prioritised access to water as a lasting response to climate change and the attendant disruptions of people's livelihoods (Republic of Kenya, 2011). Expanding access to water resources is expected to reduce the movement of livestock to faraway areas.

What is lacking in these interventions, however, is localised approach to water harvesting. The projects being implemented can be supplemented very effectively by the construction of localised water pans at the village level to harvest surface runoff during rainy seasons, which can increase the amount of water available to the household. Better management of the Ewaso Nyiro River can

transform the communities living in the Ewaso Nyiro basin radically. A good water management approach would be to set up a series of dams that can be fed systematically by the river one after the other downstream as well as by surface runoff during the rainy season rather than letting the water just drain into a swamp as it currently does. In other words, controlled management can ensure that the whole community benefits profoundly and sustainably. The approach would mitigate the ravages of climate change by making livelihoods more sustainable and helping push back the desert through tree planting.

The presence of many relief organisations can also be considered an asset to the extent that such communities are at the forefront of helping the community transition from nomadic pastoralism to a more diversified production system that includes small-scale business, water harvesting and agriculture. The main challenge identified in this approach is that these efforts are useful in mitigating the challenges experienced by the community but are not sufficient conditions for lifting the community from dependence on external support.

DISCUSSION

People are faced with many challenges that have persisted over time and have been captured in practically every research carried out in Isiolo County. For instance, the County Government of Isiolo (Republic of Kenya, 2013) asserts that most households in the county lack basic amenities such as water and rely on external support for food every time there is drought. Decades of food aid, however, have not transformed the people's lives, as their goal is to ameliorate immediate suffering rather than to bring about long-term socio-economic transformation.

The evidence shows that households that are making these changes, as reflected by ownership of small businesses, are less likely to suffer like others. This is supported by the government's report which found that the proportion of households who did not have enough to meet their basic food needs was highest among pastoralists

and lowest among those in business or have business in addition to livestock keeping, highlighting the importance of livelihood diversification in meeting household food needs (Republic of Kenya, 2014). A key finding of this study is that owning a business is a good indicator of the importance of diversification of livelihoods as it is associated with a lower likelihood of reporting having missed a meal in the recent past.

However, the rate of change is not fast enough given the rate of change in all spheres of pastoralists' lives. The majority of the respondents still rely on pastoralism as the main source of livelihood. This finding is supported by various reports from various sources, including the County Government of Isiolo County Integrated Development Plan (Republic of Kenya, 2014), which noted that over 90% of people in the county rely on livestock keeping.

CONCLUSIONS

The study concludes that livestock keeping is still the dominant source of livelihood, but the community is adopting new livelihood strategies, the main one being starting a business. Households that have diversified their livelihoods as captured by venturing into small-scale businesses are less likely to suffer adverse outcomes (missing a meal) than those whose main source of livelihood is livestock keeping.

People's appreciation of the inevitability of transitioning to diversified livelihood is evident, but the rate of change in that direction is constrained by many challenges. Insufficient and erratic rainfall coupled with a lack of knowledge about good farming practices undermines the widespread adoption of farming as an alternative or supplementary source of livelihood.

What is needed is a multifaceted approach that promotes, among others, pit and dam construction for water harvesting, access to credit, a good road network for increased trade, and access to markets. Expansion of pathways to diversified livelihoods is crucially important, especially in the face of climate change. Total reliance on nomadic pastoralism is not tenable at this point. While we

acknowledge the huge contribution of nomadic pastoralism to the economy of the county, climatic, social, and economic vicissitudes of the 21st century dictate that the community has at its disposal an array of livelihood choices.

Mushrooming literature confirms that the future of nomadic pastoralism is indistinct due to a combination of challenges that are seemingly beyond human interventions, especially among the nomadic pastoralist communities. For example, rangeland is being eliminated at an alarming speed due to other priorities like irrigation systems and political interference (Berman, 2023). Interethnic and community conflicts motivated by cattle rustling have created a cycle of violence that has created unprecedented insecurity and instability (Luiza and Leif, 2023; Oxford, 2023). Moreover, the younger generations among the nomadic pastoralists are pursuing a different direction in life; for example, some are pursuing education and have a vision of earning money and thus establishing an alternative economy away from the pastoral economy. The 21st century has revolutionised the world of nomadic pastoral communities; for example, the old traditional safety nets have collapsed due to climate change implications (Lucas et al., 2022). Therefore, long-distance migrations may no longer be viable. Additionally, the market opportunities where the nomadic communities used to sell their products have been replaced by the accessibility and availability of imported dairy products such as cheaper meat, milk, yoghurt, and ghee (Hebert and Williamson, 2023).

Recommendations

The community is adopting and diversifying its modes of production; hence, what is needed is a well-structured formal mechanism to accelerate the speed of livelihood diversification by the County Government. A holistic approach is necessary so no sector or individual is left out.

There is a need to scale up best practices such as water harvesting at the local level in addition to systematising harvesting and utilisation of water

resources, particularly Ewazo Nyiro River, borehole drilling and surface run-off. Such an intervention can only be carried out by the County Government and not relief agencies.

It is important to strike a balance between nomadic pastoralism and alternative or supplementary livelihood to cushion the community from shocks as well as to ensure long-term sustainable livelihoods. Conscious efforts by the County Government of Isiolo can go a long way to make the process effective.

Finally, there is a need to pay special attention to human capital given the extent of disadvantage experienced by boys occasioned by school non-attendance because of nomadic pastoralism. The goal is not to force the people to leave their nomadic pastoralism lifestyle; it is imperative that strategies are put in place to promote education for boys so they do not miss out on formal education and the attendant benefits.

As noted earlier, this research was based on a small data set that did not allow any robust analysis of causal mechanisms with statistical controls. It is therefore recommended that future research be carried out using a bigger sample that can allow the inclusion of statistical controls.

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