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**ROLE OF SOCIO-DEMOGRAPHIC AND LIVELIHOOD STRATEGY
DIVERSIFICATION ON PASTORALISTS' HOUSEHOLD STABILITY
IN MANDERA COUNTY, KENYA**

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ABSTRACT

Purpose: The study sought to determine the role of socio-demographic and livelihood strategy diversification on pastoralists' household stability in Mandera county, Kenya

Methodology: A community based cross-sectional analytical study design was used with a sample size of 154 households. Simple random sampling was used to select households. The study was guided by framework of DFID (1999) and is set to understand how people operate within vulnerability context from different actors and how they will use their asset base with aim of reducing challenges, and enhances survival strategies to attain basic needs (de stage *et al.*, 2002). Quantitative data was analyzed using the Statistical Package for Social Sciences (SPSS) version 21. Content analysis was used to analyze qualitative data based on thematic areas. Chi-Square statistical test was used to establish the association between categorical variables. Descriptive statistics was done using frequencies. Presentation of data was done through bar charts, pie charts and frequency tables.

Results: Results indicate that there was a significant relationship between socio-demographic characteristics ($p < 0.05$), household assets diversification strategies ($p = 0.001$), challenges influencing choice of livelihood diversification strategies ($p = 0.031$), adoption of diversification strategies by pastoralists ($p = 0.008$) and household stability among pastoralists in Mandera West Sub-County.

The unique contribution to the theory, practice and policy: The National Drought management Authority should put in place measures on mitigation strategies to be intensified in the study area through sensitization to reduce threats to livelihoods in the study area. This could be done through provision of water especially the use of the underground water that can serve as an alternative to limited overland flow in the area.

Key Words: *Pastoralism, Diversification, Socio-demographic, House hold stability, Mandera West Sub-County*

1.0 INTRODUCTION

Pastoralism makes a significant contribution to the Gross Domestic Product (GDP) (Davies & Hatfield, 2007). In Kenya, over 60% of the livestock in the country is held by pastoralists, producing about 10% of the GDP (Huho et al., 2011). Despite their high development potential, the ASAL regions record the lowest score on many development indicators and record high poverty incidence in Kenya (Humanitarian Policy Group, 2009). Mandera County is one of the poorest counties in Kenya with poverty level of 89.1% compared to the average national poverty level of 45.9% (Kenya Initial Rapid Assessment (KIRA), 2012). Moreover, pastoralists in Mandera County have been confronted with extreme climatic conditions, conflicts, over grazing; population growth which has led to lessened vegetative spread for animal grazing (ALRMP, 2010). This has negatively impacted on the household stability as displayed by the high poverty levels in the area.

According to Maye, Libery and Watts (2009), several reasons have been advanced to suggest why diversification takes place. Two reasons for diversification are necessity and choice. Poor households succumb to push factors that make them diversify out of necessity so as to survive, while wealthier households take advantage of the pull factors that present them with opportunities of creating wealth (Watete et al., 2016).

Diversification is said to have occurred when a household unit adopts or develops a new product or provides a new service at a regular fee without forfeiting production of the existing ones (Fabusoro *et al.*, 2010). In some rare cases, a household unit may decide to shift from the original product and adopt two or more new income generating activities. In either case, diversification implies variation in income activities. Hussein and Nelson (2016) notes that diversification can have both positive and negative outcomes, depending on factors that make a household to diversify. Several forces are pushing pastoral households of Mandera County in Kenya to diversify. The current resource base is inadequate to support livestock numbers needed to sustain a purely pastoral system and so the need to avail alternative livelihood options to individuals who drop out of the pastoral production system is necessary and urgent. According to Watete et al., (2016) diversification is also increasing with sedentarization, both forced from loss of access to grazing lands and drought-related destitution and proactive sedentarization of individuals who wish to grasp new economic opportunities.

According to Samatar, (2015) livelihood strategies diversification attempts to find alternative ways to generate income and diminish environmental challenges and are at the centre of development. Pastoralism is the extensive mobile rearing of livestock on communal rangelands (Kassahun, Snyman & Smit, 2008) and the prevailing livelihood and production system practiced in the world's arid and semi-arid lands it is highly depended on accessibility of water, grazing fields and labour to guard the herds (World Bank, 2013). The practice of pastoralism supports the livelihood of one billion people most of who are poor across the world (Wassie, Colman & Fayisaa, 2008).

In Africa, pastoralism is mainly practiced in arid and semi-arid areas (Butt, 2010). In the horn of Africa, arid and semi-arid areas account for more than 60 percent of the total surface area with a pastoral population of between 12 million and 22 million people (World Bank, 2013). Across Africa the livestock sector represents 20% to 25% of agricultural GDP providing most of the meat consumed in these countries (Humanitarian Policy Group, 2009). Pastoralism supports over 20 million East Africans (Abiodun, 2014). Traditionally, pastoralists employed various coping mechanisms to sustain their pastoral economy. To minimize challenges in a variable and unpredictable environment, they adopted four mechanisms - stock mobility, herd

maximization, herd diversification and herd dispersion (Kassahun et al., 2008). Stock mobility ensured that animals accessed fresh pastures, sufficient minerals, and water supplies and avoided overgrazing, competition and diseases (Kipainoi, 2013). It was also a technique of expansion. Stock mobility ensured that animals got fresh pastures and minerals; accessed water supplies; avoided overgrazing resources, human competitors and disease-carrying insects. Its pattern can be trans-human or nomadic.

In Kenya, arid and semi-arid territory constitutes about 82% of the land mass (Greiner, 2016). The pastoralist community forms a relatively small amount (30%) of the entire population but is reported to produce over 70% of all livestock products (African Union, 2012). More specifically, this study shows that in Mandera County, residents were diversifying their livelihood into crop farming, trade, sale of charcoal and firewood, wages and salaries, remittances, lease and sale of land among others. Other areas of diversification were livestock diversification from the traditional cattle to include sheep, goats, camels and donkeys. Diversification entails combining different species under the same management to reduce the challenges of total loss when risks such as diseases strike (Alderman, 2008). In addition, cattle, goats and sheep differ in their rates of producing meat, milk, fat or blood thereby fulfil different purposes. Furthermore, different animal species enable the pastoralists to efficiently use available pasture resources as different species have non-competitive grazing and browsing habits. It also increases cumulative productivity (Saranta, 2013).

Nonetheless, Kumssa, Jones and Williams (2009) notes that there is notable decrease in production capabilities of traditional livestock keeping in North Eastern. It is no longer enticing communities in Northern Kenya as traditional coping strategies have been affected by climatic and socio-economic changes such as population pressure, infrastructural development, political instability and land tenure disputes (Tangus, Esilaba & Mokua, 2014). As a result, pastoralism in Northern Eastern has increasingly become susceptible to shocks resulting in livelihood unsustainability (Huho, Ngaira & Ogindo, 2009). In response to these shocks, many pastoralists are beginning to diversify their livelihood strategies in an attempt to avoid or alleviate poverty as well as to spread the challenges associated with the increasingly vulnerable pastoral livelihood. Therefore, it is important to investigate the role of non-traditional livelihood strategies diversification on household stability of pastoralist's households in Mandera West Sub- County.

Due to these risks herders are increasingly diversifying their livelihood strategies in order to reduce the challenges attributed to the practice of engaging in solely pastoralism activities. The strategies adopted include incorporating pastoralism with agro-pastoralism and creating alternative income-generating initiatives. However, the role of non-traditional livelihood strategies on pastoralists' households' stability remains unclear as research has been able to definitely establish this phenomenon. This study therefore sought to investigate the role of livelihood diversification strategies influence on household stability of pastoralists in Mandera West Sub-County in order to address this gap and inform the practice of none traditional livelihood strategies adoption among pastoralists.

2.0 MATERIALS AND METHODS

2.1 Research Design

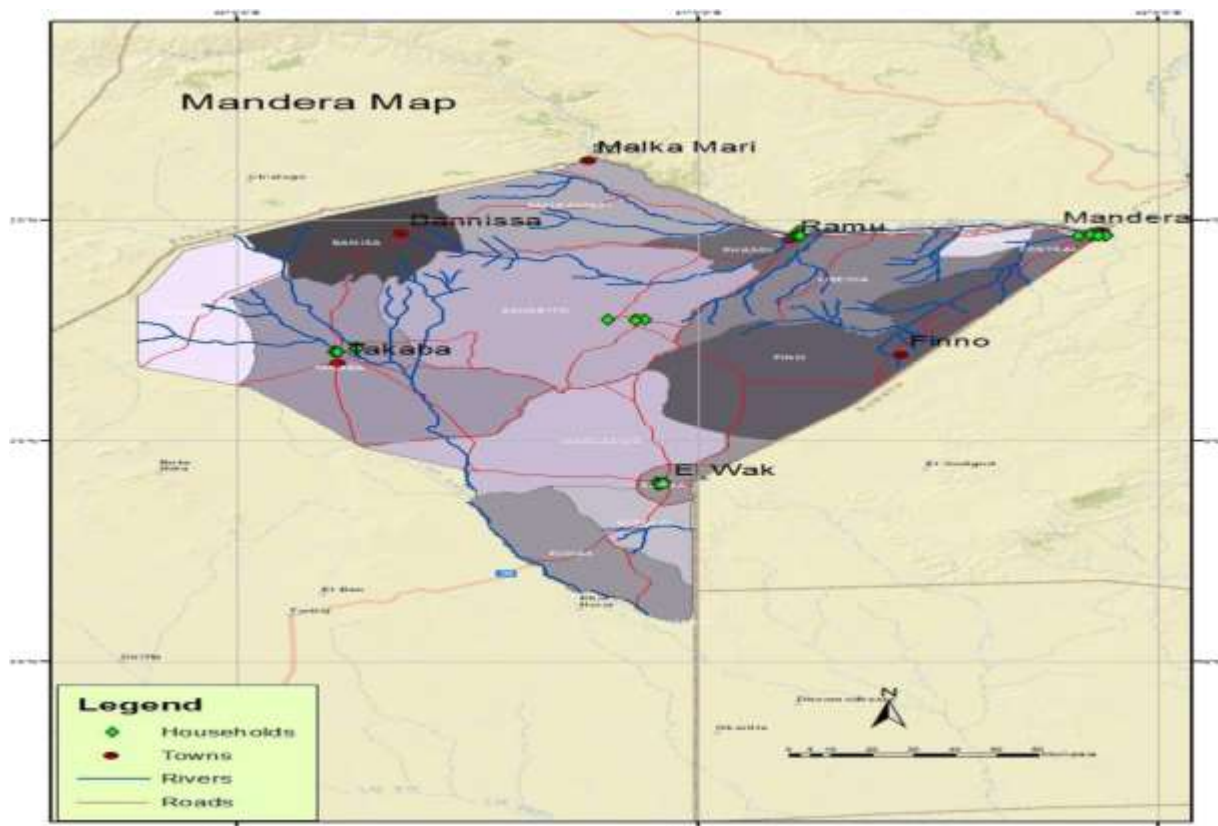
The study used a community based cross-sectional analytical design adopting both qualitative and quantitative techniques in data collection, analysis and presentation (Cresswell & Clark, 2010). Cross-sectional research design was appropriate because it is ideal for screening hypotheses since it requires a relatively shorter time and fewer resources to conduct and it can be useful in proving and/or disproving assumptions (Carlson & Morrison, 2009). The design sought to obtain information about social phenomenon

by asking individuals perception, attitude, behavior and social condition at one point in time. This design helped in understanding the role of livelihood diversification strategies adopted by pastoralists' households on their household stability.

2.2 Study Area

This study was carried out in Mandera West sub-county, Kenya. Mandera County is situated in the northeastern part of Kenya and covers an area of 26,474 km² (KNBS, 2013). It borders Ethiopia to the North and Somalia to the East. On the Western side, it borders Wajir County. The county has three main livelihood zones: a pastoral economy zone on the eastern side, an agro-pastoral economy zone on the western side and an irrigation zone on the northern end along the Daua River. Pastoralism is the main economic activity and is practiced by 60 % of the population. Over 95 % of households access some food through the market. Horticultural crops, especially watermelons and bananas, are produced under irrigation. Some maize is grown but is usually sold as fodder.

Mandera West Sub-county is divided into five wards namely Takaba South, Takaba, Lagsure, Dandu and Gither. According to the recent Kenyan census report, the population of the sub-county is (160,701 persons (KNBS, 2009). It lies between latitudes 2 degrees 17' north, and longitude 39 degrees 47' and 41 degrees 4.8 east. The altitude ranges from 400m above the sea level. Rainfall is erratic and highly unpredictable at any given season due to poor environmental conditions that sparingly supports crop agriculture. Most of the seasons are dry and there is limited intensive land area as vegetation cover is shrubs and grassland (Mandera County Integrated development plan, 2013). The recurring droughts in the region have made most households' food insecure as they lack the means to purchase food once they lose most of their livestock (Mandera County Integrated Development Plan 2013 - 2017).



2.3 Target Population

The accessible number of households in three selected wards according to census (KNBS, 2009) is as shown in the table below;

Table 1: Target population of the study

Ward	Estimate population
Takaba South	4316
Dandu	4228
Gither	3903
Total	12,447

2.4 Sample Size

Stratified random sampling was used to select ten women and ten men from each of the three Wards totaling to 90 respondents. Afterwards, purposive sampling was used to select 10 respondents of either gender from each of the wards. In each ward three FDGs were therefore contacted – one for men, one for the women and one for mixed community leaders each of ten members.

2.4.1 Sampling of the Household Heads

The desired sample size was calculated using the Cochran (1963) formula as cited by Fisher et al., (1998).

$$n = \frac{Z^2 p q}{e^2}$$

Where:

n = desired sample size

Z = standard normal deviation at 95% confidence level (1.96)

p = proportion of target population; since the pastoral population of Mandera West sub-county is about 92.5% of the total population, 0.925 will be utilized in the equation.

q = 1 – p

e = desired level of precision (0.05)

Therefore;

$$n = \frac{(1.962)^2 (0.9) (1-0.9)}{(0.05)^2} = 140$$

To account for attrition non-response, 10% (14) was added to 140; as such the total sample size was 154 households' heads.

2.5 Data Collection Techniques

Face to Face Interviews: Two weeks before the actual study, the researcher visited the three wards on different days and randomly selected the required number of households from each of the wards. He then personally booked appointments with the household heads on specific days according to the wards since research was done on separate days and weeks in each of the wards. During the period of booking appointments, the researcher explained the purpose and the significance of the study to all the respondents. On the study day, the respondents were made aware of their rights under ethical considerations and written consent sought from each of the respondents. All selected household heads were interviewed face to face by the researcher with the help of his research assistants during a one-time house-to-house visit. The interviews were guided by the structured questionnaire. Return visits were made for those who were not available on the appointed days.

Key Informant Interviews: The researcher contacted the key informants on the phone and booked appointments on the day convenient to them but within the study period. All the KIIs were done in the key informants' respective offices. The information provided by administrative staffs at the two levels was triangulated with quantitative findings. Each KII was conducted for about 30 to 50 minutes. Data was collected through tape recording and note taking by the researcher during the interview.

Focused Group Discussion: The researcher identified the first two groups of male and female FGDs by random sampling per gender. Then with the help of the area chief identified 30 community leaders in each of the wards. Booking of the appointment was done by word of mouth and phone call for community leaders who were not at home at the time of appointment booking. The FGDs were contacted at the chiefs' offices across the wards on three different days for each of the FGD. The discussion lasted for about 40 to 60 minutes. Data was collected by the researcher through voice recording, note taking and moderation of the FGDs.

Secondary Sources: The study made use of secondary literature to find out the number of livestock in the study area. The data was specifically used to gather data on the all the types and number of livestock kept in each of the wards within the study area. The main sources included KNBS (2009) and Multilevel Consultancy (2014) data. This data helped the researcher to make comparisons with data obtained from the households.

Research Team and Training of Research Assistants: The researcher was supported by three trained research assistants who were recruited from Mandera West Sub-county and were holders of a minimum Kenya Certificate of Secondary Education (KCSE) and had adequate knowledge about the geography and cultural practices of the study area. The research assistants underwent a three-day training to familiarize themselves with the research objectives, purpose, tools and ethics.

2.6 Data Analysis and Presentation

Statistical Package for Social Sciences (SPSS) version 21.0 was used for quantitative data entry and analysis. Descriptive statistics namely frequencies, percentages and means were calculated for variables such as household assets and demographic characteristics of households such as sex, marital status, household size, occupation, monthly income and education level. Presentation of data was done through bar charts, pie charts and frequency tables. Chi -square was used to establish any association between categorical variables for instance between household asset base and household stability. Chi square was chosen for its robustness with respect to distribution of the data (Jiang & Yuan, 2017). According to Chenouri and Small (2012) Chi Square can test association between variables, identify differences between observed and expected values and it is

commonly used in studies dealing with demographics, Likert scales, and other discrete data. It is also extremely easy to calculate and interpret and can be used on nominal data. A p-value of less than 0.05 was used as criteria for statistical significance at 95% confidence interval.

3.0 RESULTS AND DISCUSSION

Basing on the specific objectives of the study, results and discussions will be discussed chronological below; the influence of social-demographic characteristics on pastoralist household's stability, Identity of types of livelihood diversification strategies adopted by pastoralist households, the relationship between pastoralist's household's assets before and after diversification and household stability, the challenges influencing choice of non-traditional livelihood diversification strategies adopted by pastoralist households towards household stability and the relationship between livelihood diversification strategies and household stability in Mandera West Sub-County.

3.1 Influence of social-demographic Characteristics on Pastoralist Household's Stability

The first objective sought to determine the influence of social-demographic characteristics on pastoralist household's stability in Mandera West Sub-County. The results of this objective showed that socio-demographic characteristics of household heads had an influence on the pastoralists; household stability;

Household Income: Households with higher income were more likely to diversify into non-traditional activities than their counterparts with lower household income. The study showed that most of the households with higher income diversified their livestock, were more involved in trade and more likely to be employed. The reverse is true for those with lower income level. Watete et al., (2016) noted that the resource base is inadequate to support livestock numbers needed to sustain a purely pastoral system, and so the need to avail alternative livelihood options to individuals who drop out of the pastoral production system is necessary and urgent. And hence, the adoption of livelihood diversification in the study area could be driven by the low-income level faced by the households.

Gender of the Household Head: The study revealed that there were disparities in livelihood diversification strategies across gender with men having higher likelihood of diversifying into non-traditional activities than women. This was due to the fact that most women have not been empowered in the study area since patriarchal system of life is practiced. Single women households were found to have lower likelihood of diversifying into other strategies. The reason could also be that only household heads were interviewed. The study area was a patriarchal community in which males form the majority heads in most rural households. Also, traditionally most decisions affecting the economic and social stability of households was a preserve for males in rural households. Women are mostly heads in families where the male is absent either due to divorce, separation or death. Hence giving minimum chances for women becoming household heads. This could be an explanation for the very high variability in representation between male and female respondents in the current study.

The findings of this study agree with Hussein and Nelson, (2016) study that found out that, involvement in, and therefore reaping of benefits from, non-farm employment was skewed in favour of men, and against women. Hussein and Nelson argued that in Africa many women were engaged in the lowest levels of micro enterprise: household-based income generating activities. There are no substantial barriers to entry into this type of activity in terms of skills and capital, but they yield very low incomes (not to diminish their importance in supplementing the household budget). In the same study, they observed that in Mali, the

participation rate of women in non-farm employment was 16% as opposed to 84% for men. This according to the study indicated that men had more opportunities to pursue this type of diversification.

Watete et al., (2016) studied options outside livestock economy focusing on diversification among households of northern Kenya. The study found out that diversification was influenced by gender of the household head. Male-headed households tended to diversify more than female-headed households. From the study, both male- and female-headed households participated in all income-generating activities at different levels. There was a significant difference in the sex of household heads who were engaged in milk trade ($p = 0.043$).

Ncube (2012) recorded that gender relationships constrained or promoted access to some household assets or the mobility of certain gender and age groups. This meant that the degree of involvement in diversification activities and the unequal distribution of their benefits varied between genders. Debela et al., (2012) also showed that that in Uganda, men had a greater degree of occupational livelihood diversification than women. Within the 'poor' and 'average' well-being groupings, women were mainly engaged in agriculturally-related activities, crop and small livestock production, cottage industries and some farm labouring. The men within these groupings were identified as the most active diversifiers, both in the range of livelihood activities, and the number practiced by individuals.

In a study done by Riithi (2011) to assess the determinants of choice of alternative livelihood diversification strategies in Solio resettlement scheme in Kenya, results showed that women were disadvantaged in accessing high remunerative livelihood strategies such as business, livestock keeping, supply of agricultural and non-agricultural labour. The differences by gender for these strategies were 28.3, 9.8 and 21.3 respectively and were statistically significant ($p = 0.000$, $p = 0.002$ and $p = 0.000$). Male-headed households therefore participated more in these livelihood strategies. Among the interviewed households, 27.6% got remittances from family members who lived and worked outside the scheme. The gender difference was 18.0 and statistically significant ($p = 0.000$). Male-headed households therefore participated more in this strategy. It therefore meant that efforts needed to be put in place so as to enable women access opportunities in the non-farm sector.

Age of the household Head: The study established that livelihood diversification strategies were more likely to be undertaken by middle aged (35 – 45 years) household heads than the young (below 25 years) and the aged (above 45 years). In a study done by Iiyama et al. (2008) among the variables describing household characteristics, household heads of regular off-farm income were the youngest (35 years old), followed by those of casual off-farm income, while those of traditional animals were the oldest (61 years old). These findings corroborate those of Iiyama et al. (2008) who found out that household heads of regular off-farm income were the youngest (35 years old), followed by those of casual off-farm income, while those of traditional animals were the oldest (61 years old) and Khatun and Roy (2012) who also found out that younger household heads had more diversified livelihoods than older household heads and hence age was positively related to the number of livelihood diversification strategies adopted by households in west Bengal. However, the findings disagree with Riithi, (2015) who found out that young household heads had less diversified livelihoods than older households meaning that the younger households were more stable.

These findings disagree with Watete et al., (2016) who observed that age was not a significant associated factor in uptake of off-farm activities as opposed to agro-pastoral livelihoods. They found out that an increase of one unit in age of the household head increased the likelihood of a household being pastoral by 2 % ($p = 0.008$) as opposed to being off-farm. However, there is an agreement that off-farm activities were more pursued by younger people than older people among these findings and that of Watete et al., (2016).

Highest Level of Education of Household Head; Education level of household head was found to have positive influence on livelihood diversification strategies. Education level was generally low in the study area. This could be because of their nomadic pastoralism livelihood which makes them move from place to place in search of water and pasture. This limits their access to conventional/formal education. However, the study established that households with higher levels of education diversified more than their counterparts with lower education levels.

Educational attainment has been found to determine engagement in remunerative non-farm activities. In their study, Watete et al., (2016) found out that household heads that had spent more years in formal learning institutions tended to be involved in more off-farm income generating activities. Higher literacy levels among the heads therefore enabled pastoral households to diversify out of pastoralism. The number of different sources of income-generating activities practiced by a household was correlated with the number of formal schooling years of the household head. Their study found out that a unit increase in the number of schooling years increased the chances of having high household undertaking an off-farm stability by 100% ($p = 0.000$) instead of pastoralism and reduced the likelihood of the household being agro-pastoral by 19 % ($p < 0.001$), meaning that increased literacy levels was associated with uptake of off-farm activities. Household heads engaged in pastoralism had low literacy levels compared to their counterparts pursuing agro-pastoralism or off-farm activities. They further observed that Heads of households pursuing off-farm strategies were relatively younger compared to their counterparts pursuing pastoralism and agro-pastoralism. They also had more years of formal education. Pastoral households owned more livestock and had to walk for longer distances to obtain water.

Karugia et al., (2006) carried out a study to evaluate the determinants of off-farm income in western Kenya. The objective of the study was to assess the determinants of household per-capita income and determinants of off-farm earnings. The study employed a censored Tobit model to correct for selectivity bias due to exclusion of households with no off-farm activities. The study found that education and age of the household head positively influenced the amount of off-farm earnings. Education was important in accessing off-farm opportunities while age of the household head positively influenced the amount of off-farm earnings perhaps reflecting the influence of assets accumulated over time on current incomes. This study sought to establish the influence of the socio-economic characteristics of household head on household stability.

3.2 Pastoralists' livelihood diversification strategies

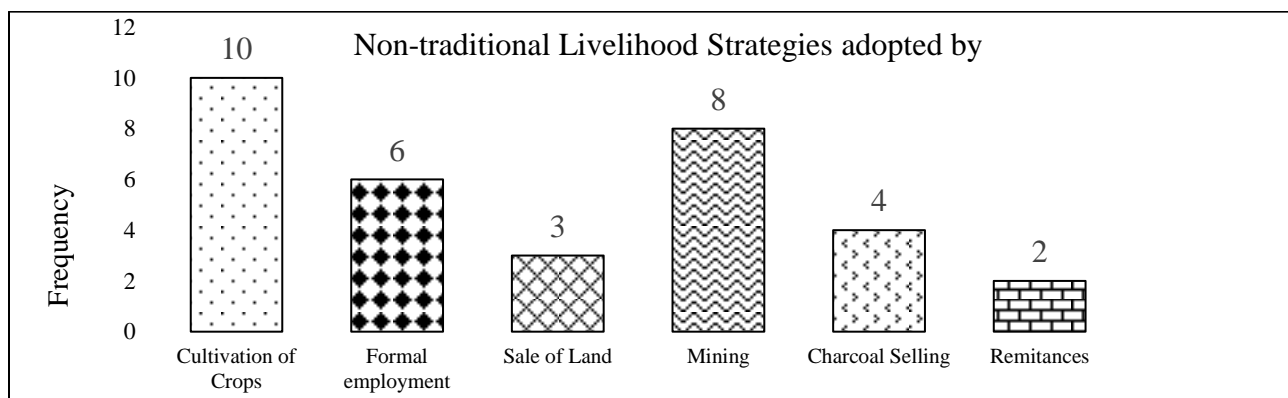


Figure 1: Non-traditional Livelihood Strategies

According to objective two of the study, over 80% of the residents of Mandera West Sub County diversified their activities. However, there were differences in likelihood to diversify livelihood activities across wards. The difference in the percentage of those who were involved in other livelihood activities between the three wards could be as a result of the fact that Takaba South ward is more urbanized and hence offers more opportunities for diversification than those in Dandu and Gither wards. For instance, there is a higher livelihood diversification rate of sale of firewood and sale of water using animals like donkey in Dandu and Gither wards respectively. These livelihood strategies are common in rural areas which suggest that Takaba South in some urbanized and hence the residents tend to diversify their livelihoods on strategies not typically common in rural setting.

These findings agreed with those obtained by the Kenya National Bureau of Statistics (KNBS) and Society for International Development (SID) (2013) which affirmed that in Mandera County, 7% of the residents with no formal education were working for pay, 5% of those with a primary level of education and 14% for those with a secondary level of education or above. This totaled to 26 percent as the percentage of residents who were employed as a source of livelihood. These livelihoods are discussed below in details. All residents in the study area kept livestock only that diversification varied within individual respondents and among wards. This could be because the area is arid and therefore livestock seemed the most reliable livelihood among the households. Coppock et al. (2015) found that respondents reported that out of the livestock they kept, 35.83% were cattle, 30.83% were camels while sheep constituted 12.5%. the study further revealed that goats made up 19.17% of the livestock kept while donkeys contributed 1.7 of the livestock by the Borana.

It can thus be observed that more households preferred diversifying livestock to other non-traditional ones hence reducing cattle and increasing camels which are considered more drought resistant as compared to cattle, sheep and goats. By keeping a number of livestock types, the residents of Mandera West sub-county are able to sustain their livelihood during severe droughts. Other non-traditional activities practiced by the resident were cropping (11.7%), trade (24.67%) and remittance (14.29%).

From the foregoing results, it is noted that all residents of Mandera West sub-county in sampled areas kept livestock as their main activity. However, different types of livestock were kept including cattle, sheep, goats, camels, chicken and donkeys. All livestock are kept as a technique of diversifying their source of income. Further, it is evident that there are a number of alternative strategies that were employed by the residents in the study area. These strategies included cultivating crops, formal employment, sale of land, rental houses, selling of charcoal, mining, trade and remittances. It is therefore observed that all the three instruments questionnaire, key informant interview and the focused group discussions collected data that was in agreement.

In a study done by Watete et al., (2016), findings showed that all households in the North Eastern received income from a variety of sources. According to the study, at least 30 % of off-farm households received income from eight possible sources including salary, wages, charcoal/firewood and business. For pastoral households, at least 30 % of them received income from five sources: livestock sales, milk sales, sale of other livestock products, charcoal/firewood and crops. They observed that Off-farm households earned the bulk of their income from salaries, livestock products, firewood/charcoal and crops, totaling to an average of KShs 76,000 per year. At the same time, pastoral households earned the bulk of their income from sale of livestock and livestock products, firewood/charcoal and crops, earning an average of KShs 70,000 per year. Agro-pastoral households received the least income of KShs 15,000 (USD 167) per year, mainly from crops and livestock products. Even though this study did not delve into the amount of income from each livelihood strategy, there are major agreements on the type of livelihood strategies practiced in the regions for instance

the studies agrees that the major sources of income for most households across all the wealth categories were livestock sales, firewood/charcoal and sale of other livestock products (apart from milk). For wealthier households, receipt of wages was also a major source of income.

Reasons for diversifying were drought, lack of employment and unsustainable traditional livelihood strategies. These findings corroborate the findings by Hussein and Nelson (2016) who found out that poor and variable rainfall, including the constant threat of drought, combined with demographic problems high child mortality, low adult life expectancy and limited ability to reproduce labour increased uncertainty and challenges for Bambara farmers in southern Mali. They pointed out that this situation obliged cultivators to change the way they farm, adopt different varieties of crops, change their production plans and cultivate an array of different production choices (or portfolios of activities).

On the other hand, when studying forms and determinants of rural livelihoods diversification in Ogun State, Nigeria, Fabusoro et al., (2010) observed that family size affected the ability of a household to supply labour to the nonfarm sector. Larger families and those with multiple conjugal units supplied more labour to the non-farm sector as sufficient family members remain at home or on the farm to meet the labour needs for subsistence. They further noted that education stimulated entrepreneurial activity and enhanced productivity. Similarly, the study found out that farm income, non-farm income and remittances were significant factors in the extent of diversification and that diversification of livelihoods was common among rural people, rather than being spatially regulated.

According to Kipainoi, (2013), challenges can be summarized as socio-economic, technological, infrastructural, physical constraints as well as inadequate institutional arrangements for diversification. On the other hand, Riithi, (2015) observed that the household heads had a less than 8 years of formal education on average hence, many of them did not have access to education. The literacy levels were lower for female household heads and this could negatively have affected their ability to secure better employment in the non-farm sector. This, he attributed to the fact that educated people had skills that were relevant in areas outside of farm work. The second challenge was that there was poor access to social amenities and services in the scheme. Other challenges included insufficient start-up capital, poor infrastructure, and lack of appropriate skills, absence of credit sources and collateral problems, limited market demand, taxes, and fear of loss of land and shortage or increasing price of inputs.

3.3 Relationship between Pastoralist's Household's Assets before and after Diversification and Household Stability

Table 2: Household Assets Before and After Diversification

Assets	Before		After	
	F	%	F	%
Radio	89	58	108	70
Television	11	7	49	32
Mobile phone	90	58	115	75
<i>Panga</i>	127	82	150	97
Bed	86	56	132	86
Water tank	17	11	47	34
Beehives	11	7	24	16
Car	7	5	18	12
Oxen plough	1	1	4	3
Land	111	72	138	90

*Multiple responses allowed, Key: F = Frequency.

The third objective of the study was to establish the relationship between pastoralists households before and after diversification and household stability. There was a significant relationship between household assets strategies diversification adopted by pastoralists household and household stability ($t = 28.00$, $df = 4$, $p=0.001$). The null hypothesis “There is no significant association between household assets strategies diversification adopted by pastoralists household and household stability in Mandera West-Sub- County” is therefore rejected.

The study found out that there was an improvement in quantity of assets across the three wards after adoption of livelihood diversification strategies. Riithi (2015) found out that livestock keeping especially cattle, sheep and goats were enhanced by the fact that most of the land was not opened up for crop farming and therefore there was abundant pasture in the open fields. However, he noted that despite this, there were barriers to entry into this livelihood strategy. These included the income levels of most of the households did not allow them to have enough capital to purchase livestock especially among female-headed households. This is because they had lower incomes than male-headed households. The findings of this study agrees with Ncube (2012) who found out that livestock ownership was positively and significantly associated with income diversification, even controlling for level of income.

Escobar (2001) noted that rural households adopt livelihood diversification strategies in an attempt to generate livelihoods and enterprises that can cope with and recover from stress and shocks, and in this way, maintain and enhance their capabilities and assets both for the present and the future. It has been posited that diversification is an accumulation strategy which can lead to improvement in incomes and assets. A study done by Assan (2014) in Ghana on livelihood diversification and sustainability of rural non-farm enterprises to find out if livelihood diversification result in accumulation of wealth or it only enhances survival and peripheral living conditions. The study observed that diversification had not had much impact on the low resource control processes of their household, especially when there is little left to be used to expand their assets and reduce levels of indebtedness. The study also revealed that acquisition and maintenance of assets through diversification was very low as indicated by majority (93) of the sampled households. This was because the need to meet other household needs, largely for consumption purposes, made it difficult to acquire electronic and other physical assets.

A study conducted by Basnet (2014) on rural livelihood diversification strategies in Nepal found out that heads of household pursuing purely agriculture had, on average, 1.5 years of schooling, agriculture plus self in non-farm had 2.2 years, agriculture plus wage in non-farm had 2.4 years, agriculture plus both self and wage in non-farm had 2.6 years, and purely non-farm had 5.2 years. This indicates that diversification into non-farm activities is a function of education. A similar relationship is seen between livelihood diversification and average years of schooling of the adult household members. Households with a larger land size completely depend on agriculture or have agriculture as one of the most important activities in their livelihood portfolio. But the households with small landholdings (0.03 hectare of wetland and 0.10 hectare of dry land) abandon agriculture and pursue purely non-farm.

On the other hand, Iiyama et al. (2008) findings revealed that human capital asset endowments (knowledge and skills) of households were major factors differentiating the livelihood strategies they pursued, and how successfully they pursued them, from both an income and soil management perspective. The study also observed that households involved in regular off-farm income activities were more likely to employ soil management measures. Regular off-farm income activities helped to provide capital and to mitigate challenges when adopting market-oriented on-farm activities, as households could cope with challenges

inherent in commercial agriculture better than when they depended only on farm activities. In turn, high-return on-farm activities provide households with incentives to invest in maintaining soil fertility and structure.

Fabusoro et al. (2010) revealed that the significance of income as a factor in livelihood diversification suggests the importance of financial assets in enhancing the capability of a household in participating in a non-farm livelihood while Riithi (2011) observed that access to assets, resources and opportunities as well as level of education may be the reasons why male-headed households had higher off-farm income compared to female-headed households, because the results found that male household heads were more educated than female household heads. The high contribution of off-farm income to farm income in the resettlement scheme was due to the constraints facing agriculture especially crop farming as identified earlier.

3.4 Challenges to Choose of Non-Traditional Livelihood Diversification Strategies

The fourth objective of this study was to determine challenges influencing the choice of livelihood strategies among pastoral households.

The study established that inadequate rainfall, lack of water, drought and famine and death of livestock were the challenges with the highest impact on the choice of livelihood strategies adopted by pastoral households. These findings were in line with the findings concerning drought/famine in the area where 89% and 11% recorded great extent and to some extent on their effect on the choice of livelihood diversification in the study area. Iiyama et al. (2008) asserted that regular off-farm income activities help to provide capital and to mitigate challenges when adopting market-oriented on-farm activities, as households can cope with challenges inherent in commercial agriculture better than when they depend only on farm activities. Riithi (2011) found out that livestock rearing was constrained by the absence of surface water within the resettlement scheme, as each village had one watering point at the borehole. This may have led to spread of contagious diseases (such as foot and mouth, lumpy skin disease, contagious bovine pleuropneumonia in cattle, and contagious caprine pleuropneumonia, contagious ecthyma in goats) if an outbreak were to occur. The absence of any government veterinarian in the study area, and lack of a cattle dip also made livestock production a risky venture.

Table 3: Challenges pastoralists encountered when pursuing non-traditional Livelihood Strategies

Livelihood Strategy	Reason for Inability	Freq	%
Crop farming	Unreliable rainfall, insufficient water for irrigation	154	100
Herds Diversification	Droughts leading to death of animals, lack of money for restocking, livestock diseases, lack or poor market prices	142	92
Employment	Fewer employment and diversification opportunities	100	65
Trade	Lack of capital, inaccessibility and remoteness of the area	69	45
Wage	Lack of jobs, poor education background	95	62
Assets	Dwindling asset base due to drought and over reliance on pastoralism	40	26
Income Earning Activities	Lack of knowledge and knowhow, lack of opportunities.	25	16
Selling Charcoal	Lack of market, insufficient trees	132	86

*Multiple responses allowed

According to Fabusoro et al. (2010), diversification is a household survival strategy for risk reduction, overcoming income instability caused by seasonality and improving food security. They observed that diversification in farm household employment through the extension of both on and off farm non-agricultural activities is one way of enhancing the income and security of farm families at a time of uncertainty and financial stress in farming. Examine the livelihood diversification strategies pursued by pastoral households, to measure livelihood diversification status as well as identifying factors determining the livelihood diversification in the context of achieving sustainable livelihood security in the area under investigation.

3.5 Livelihood Diversification Strategies Practiced by Pastoralist Households

The fifth objective (fourth hypothesis) of this study sought relation between livelihood diversification strategies adopted by pastoralist households and household stability. There was a significant relationship between livelihood diversification strategies adopted by pastoralist households and household stability ($\chi^2 = 18.0001$, $df = 4$, $p = 0.008$). The null hypothesis “There is no significant association between types of strategies diversification adopted by pastoralists and household stability in Mandera West Sub-County” is therefore rejected.

Stifle (2010) found positive correlation between household diversification and household welfare stability. A relevant study among Kazak pastoralist of Northern Xinjiang in China, found that livelihood diversification erodes the adaptive capacity of pastoralists itself and does not improve the welfare of pastoralists households (Little *et al.*, 2009). Similar studies have also indicated that some forms of diversification can increase challenges of vulnerability and can drive pastoralists out of their livelihood. Such challenges are drought, famine, population growth, and increase source of cash, loss of resources, insecurity and migration (Fratkin, 2013). However, other studies have indicated that shift in herd specification and use of fodder production improves the household welfare of the pastoralist’s households (Mortiz, 2012).

Orr and Mwale (2001) investigated smallholder livelihood strategies in Southern Malawi. Evidence from the rapid rural appraisal suggested that poor. Improvement was linked to market liberalization through higher income from crops and microenterprise. Démurger, Fournier and Yang (2010) analyzed factors that drive rural households and individuals in their income-source diversification choices in Northern China. The study findings indicated that the production restructuring from grain crops to cash crops and the labor shift from cropping to non-agricultural activities had both significantly contributed to rural income increase and income stability. From the study it emerged that by providing additional income sources independent of the agricultural cycle, off-farm activities increased both the level and the stability of household income.

However, Gautam and Andersen (2016) assessed the role of livelihood diversification in household well-being in Humla, Nepal. The results showed a uniform pattern of diversification in terms of the number of activities undertaken for livelihoods but a highly varying degree of resultant well-being across households. Analysis showed that well-being was not associated with diversification *per se* but rather on a households’ involvement in ‘high return sectors’ such as trade or salaried job. This study therefore aimed to explore the relationship between livelihood diversification strategies and household stability to add to the literature.

The study shows that there was a higher likelihood of diversifying into business (52.6%) than crop growing (35.1%). However, livestock keeping seemed to attract most household heads for diversification. A total of 154 respondents admitted to have adopted this strategy, of which majority of them (44.8%) were in moderate level of household stability. Basically, household heads in the low household stability were more likely to adopt traditional diversification strategies compared to their counterparts in high household stability. When it comes to trade, those in high household stability were more likely to adopt business as a diversification strategy (52.6%) compared to those in low household stability, whose major diversification strategy was sale

of traditional practices (65.6%). Chi-square results ($\chi^2 = 18.001$; $df = 4$; $p = 0.008$) showed that the observed livelihood diversification strategies was significant at 0.05 probability of error. Thus, the hypothesis that there was no statistically significant relationship between livelihood strategies and household stability is hereby rejected.

Table 4: Relationship between Livelihood Diversification Strategies and Household stability

Livelihood Strategies	Household Stability			Total
	Low	Moderate	High	
Livestock keeping	32 (20.77%)	69 (44.8%)	53 (34.4%)	154 (100%)
crop growing	29 (18.8%)	71 (46.1%)	54 (35.1%)	154 (100.0%)
Business/trade	32 (20.8%)	41 (26.6%)	81 (52.6%)	154 (100.0)
Traditional practices	91 (59.1%)	41 (26.6%)	22 (14.3%)	154 (100.0%)
Rely on remittances	21 (13.6%)	101 (65.6%)	32 (20.9%)	154 (100.0%)

$\chi^2 = 18.001$, $df = 4$, $p = 0.008$

4.0 CONCLUSION AND RECOMMENDATION

4.1 Conclusion

Livelihood diversification constructs an increasing diverse portfolio and capabilities of assets and activities required to support life. These portfolio and capabilities are dependent on asset capital disposable to households. These assets are skills, knowledge, ability to labour and good health important to the ability to pursue different livelihood strategies categorized as human capital. Other assets are physical comprising of basic infrastructure and production equipment; social capital (social resources upon which people draw in pursuit of livelihoods); financial capital and natural capital.. The study hypotheses were tested and hence rejected or accepted. Among the accepted were; Socio-demographic characteristics of the residents influenced household stability and factors identified were household income ($\chi^2 = 27.103$, $p = 0.000$), gender, ($\chi^2 = 11.07$, $p = 0.043$) age ($\chi^2 = 20.084$, $p = 0.003$) level of education ($\chi^2 = 32.314$, $p = 0.000$), there were various diversification strategies adopted by the households including: livestock keeping, cropping as well as trade and the study established that inadequate rainfall, lack of water, drought and famine and death of livestock were the challenges with the highest impact on the choice of livelihood strategies adopted by pastoral households stability whereas rejected were; there was a significant relationship between household assets strategies diversification adopted by pastoralists household and household stability ($\chi^2 = 28.001$, $\alpha = 0.05$, $p = 0.001$). The null hypothesis “There is no significant association between household assets strategies diversification adopted by pastoralists household and household stability in Mandera West-Sub- County” and there was a significant relationship between diversification of livelihood strategies and household stability ($\chi^2 = 18.001$, $\alpha = 0.001$, $p = 0.008$) and the null hypothesis “There is no relationship between diversification of livelihood strategies and household stability in Mandera West-Sub County”.

4.2 Recommendation

A multi-sectorial approach in the verge for looking into the role of socio-demographic and livelihood strategy diversification on pastoralists' household stability in Mandera county, Kenya as follows; first, the National Government, County Government, civil society and NGOs should partner to sensitize the residents for adoption of more economic livelihood diversification strategies especially in off-farm activities in order to minimize the effects of shocks of drought and inadequate grazing. There is need to ensure that most of the National Drought management Authority should put in place measures on mitigation strategies to be intensified in the study area through sensitization to reduce threats to livelihoods in the study area. This could be done through provision of water especially the use of the underground water that can serve as an alternative to limited overland flow in the area. livelihood strategies practiced by the residents are sustainable. Secondly, Thirdly, Provision of ready market for traditional products like honey, cattle and camels can help address the issue of unprofitability of the activities. This can be done by improving the transport network in the study area by the county and national governments. Fourthly, the County and national governments can initiate programs that ensure that when droughts set in all the animals are purchased early enough to avoid losses through death. After the drought restocking could be the best bet to cushion the residents from poverty related issues. Lastly, Transport and communication network should be improved in the area to boost trade in which most of the residents can diversify to.

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