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Assessment of Options for Meeting Food Security in Mandera County Kenya

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Abstract
Purpose; This study analyses factors affecting access to food for pastoralists living in Mandera County, Kenya. The County is an arid region on the North East most part of Kenya that borders Ethiopia and Somalia to the North and East respectively and face serious challenges of access to food. The community predominantly practice pastoral nomadism. Pastoralism in the Horn region presents unique challenges with accessing food and this calls for special approaches to ensure regular and sustainable access to food.Materials and Methods; The study employed a combination of methods that included secondary data collection from the government and other institutions in the region, literature review, use of household questionnaire, key informant interviews, focus group discussions as well as field observations. Results and Discussions; Food sources in Mandera were found to be based on pastoral nomadism way of life, a practice graviously affected by weather factors and therefore fragile and unreliable. Others factors affecting access to food were identified as high poverty levels, income sources, population growth, insecurity, relief food, poor infrastructure and telecommunication, limited access to credit and extension, crop production factors, food consumption preferences and low levels of education, The community has adopted a number of coping mechanisms. Some of these mechanisms target short term shocks such as prolonged droughts but have adverse effects on access to food in the long term. Conclusions; Factors affecting food security should be managed properly and in a sustainable way to ensure access to food is predictable and reliable. Access to food should address those fundamental factors and this should be a priority for Mandela County. This should be done through establishing strong and long term strategies for enhancing access to food.
Keywords: Food security, pastoral-nomadism, food production, aridity

1.0 Introduction

Mandera County is one of the 47 counties in Kenya and is located on the furthest North Eastern part of the country (Fig 1). It borders Somalia to the East and Ethiopia to the North with the Daua River forming the border between Kenya and Ethiopia. Mandera County is one of the arid counties with erratic mean annual rainfall of 255mm (ALRMP, 2005) which is far less than the potential evapo-transpiration of over 2000mm (GOK, 1968). It lies in agroecological zone VI (Sombroek et al 1980). The county is prone to unpredictable climate changes, leading to either severe droughts or heavy rains. The County is rated as one of the hottest in Kenya with mean temperatures of 28 degrees Celsius. The altitude lies within the range of 230 -970 metres above mean sea level (ALRMP, 2005). The communities in Mandera County are homogeneously Somali tribe consisting of five main clans of Garre, Murule, Degodia, Marehan and minority clans lumped together as Corner Tribes (UNDP, 2010). Mandera is one of the poorest counties, ranked at 46/47 with a poverty rate of 89.1%, 43.2% higher than the national poverty rate. Malnutrition prevalence is 2nd highest in country at 25.3% and 24% of children under the age of 5 years are at risk of malnutrition (KIRA, 2014). The community is predominantly Muslim and practice polygamy according to the Islam teaching. There are three livelihood zones; pastoral in the east, agro pastoral in the west where opportunistic rain-fed farming is practiced and irrigated farming in the north along the Daua river. Intensive irrigated farming takes place both on the Kenyan and Ethiopian side. Food insecurity in Mandera County is widespread and there are several factors that contribute to the current shortage. This study is an evaluation of food security in the county and it critically looks at the various factors that affect access to food.

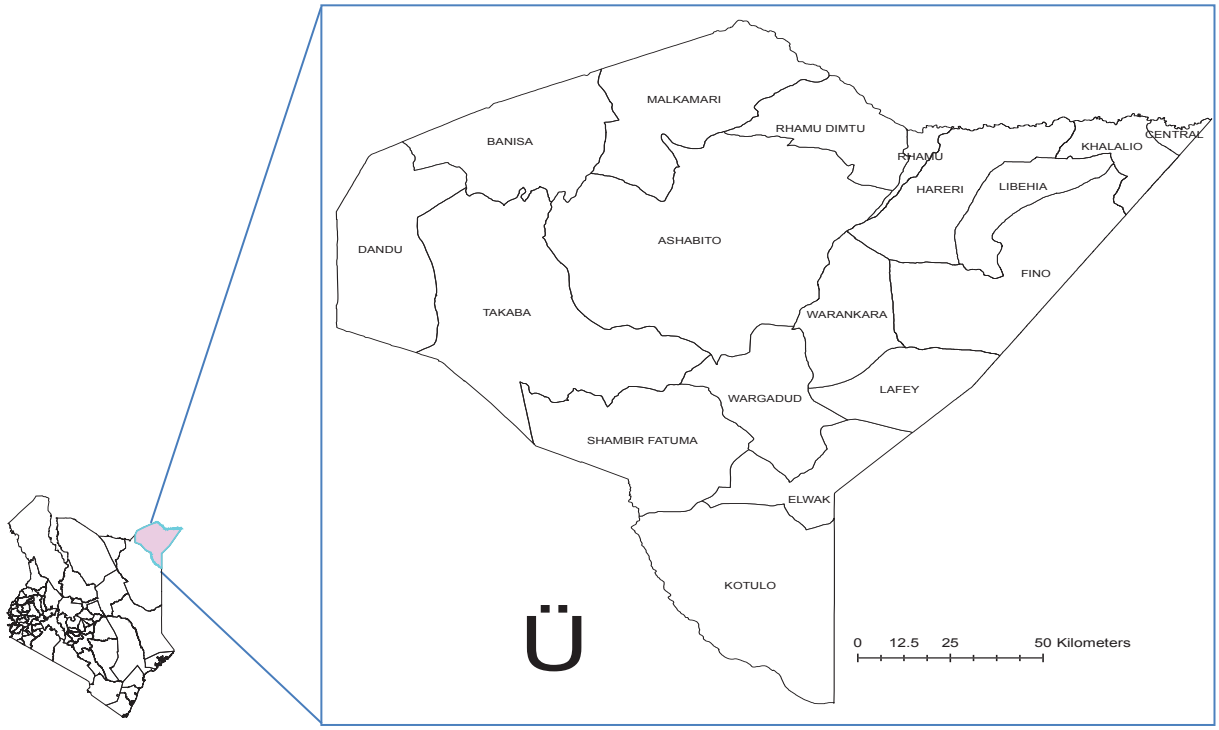


Fig. 1. Map of Mandera County

2.0 How the study was conducted

The study was conducted through field visits in the different livelihood zones along and surrounding the irrigated farming zone of the Daua river. Household questionnaires were administered to 104 respondents of which 22 were women and 77 were men. In addition, 12 focus group discussions comprising of an average of 15 participants were conducted focusing on the different livelihood groups that included pastoralists, crop farmers, mixed farming farmers, irrigated farming farmers and rain-fed farmers. Secondary data, providing information and data on demography was obtained from the county and sub county headquarters. Seventeen 17 Key informant interviews (KII) were conducted on individuals comprising of officials from the line ministries and NGOs working in area. The study also used literature review of relevant Government and NGO reports which were reviewed to determine what had been documented on food security in Mandera.

3.0 Results and Discussion

3.1 Sources of food in Mandera County

Mandera County sources of food are fragile and unreliable. Livestock is the main economic pillar and all activities as well as access to food revolve around livestock (fig. 3.1). Milk is consumed in large quantities but its availability is seasonal due to seasonality of livestock feed. Milk availability for family use is also affected by nomadism as the milking cows and goats can be far away from the families. This was the case for 54% of the farmers during the interview. Furthermore, during periods of prolonged drought, milk production may cease completely leaving the farmers highly vulnerable to food shortage. Livestock are rarely slaughtered for food even during drought periods. The farmers hold on to hope the animals weakened by the drought will make quick recovery as soon as a small amount of rainfall falls. Consequently, during periods of severe droughts, huge livestock losses occur and the farmers become extremely vulnerable. Furthermore, selling weak livestock attract very little income making the farmers to hold on the livestock with the hope of a recovery. Whenever the need arises, livestock can be sold to avail money that can be used to purchase food. Selling livestock to buy other foods was rampant. 72% of the farmers reported to have sold livestock three months preceding the interview. Food in the market was found to be cheap (table 3.1). The poor prices were attributed to two factors; relief food and food imports from Somalia. Food imports from Somalia can be cheap because Mandera is a trans-border county with Somalia which is a lawless country with high likelihood of food imports that escape taxation. Relief food contributes to poor food prices as it often finds its way into the market and is sold cheaply. Crop production contributes to food security indirectly as the crop, mainly maize is sold as fodder to make income that can then be used to purchase more livestock to restock what has been lost during shocks such as droughts. Fodder is bought by pastoralists for feeding their livestock thus contributing to income that can be used to purchase other food items. It also contribute to livestock production.

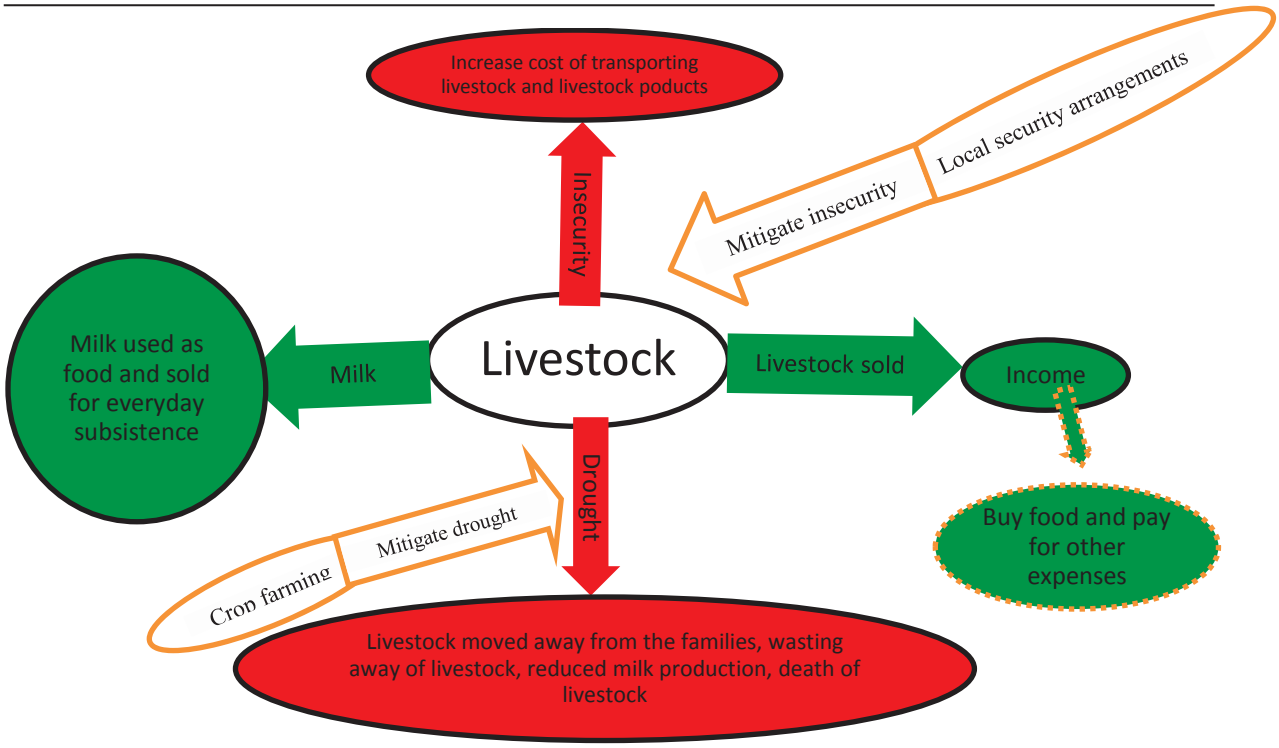


Fig. 3.1 Livestock and access to food in Mandera County: green paths are positive while red paths are negative contributing to food access or lack of food access respectively.

Table 3.1. Comparison of food prices in Mandera and Nairobi

Food type	Unit	Price in Mandera (ksh)	Price in Nairobi (kg)
Maize	2 kg tin	20	75
Beans	2 kg tin	50	160
Vegetables	1 kg bunch	50	40
Pawpaw	500g	200	50

3.1.1 Factors affecting access to food in Mandera County

Mandera County suffers chronic food shortages attributed to both natural and human induced factors. These factors include; climate, high poverty levels, high population growth rate, insecurity, relief food, infrastructure and telecommunication, income, access to credit and extension services, pastoral-nomadism way of life, crop production factors, food consumption preferences and level of education

I. Climate

Poor rainfall and high temperatures are the main climatic factors affecting food security in Mandera County. The long term mean annual rainfall (from 1961 - 2011) was 285.57mm which is bi-modal thus falling in two rainy seasons. The long rains of March to May was found to be higher with a mean of 134mm per annum compared to the short rains of September to December with a mean of 115mm per year. However the means of the two rainy seasons were found to be statistically similar using the Z-test at at P-Value 0.05. The standard deviation for the short rains and the long rains were high at 82.4mm and 66.2mm but their variance was statistically similar ($F=1.548271$; F critical = 1.612429; $\alpha = 0.05$). The rainfall data showed extreme events where rainfall amounts well above the average were received during the long rains of 1981 (413.8mm) and 1993 (406.2mm) and short rains of 1997 (850mm). The mean and standard deviation calculations as well as the trend analysis ignored these extreme events. Fig 1.2 shows a general decline in rainfall amounts for the long rains over the decades which has serious implications to food access. By contrast, the short rains show marginal increase in rainfall amount over the decades. This implies farming practices in future will be required to adjust to the changes to mitigate any adverse effects that may accompany these changes.

Temperature data obtained showed the average maximum, average minimum and average annual temperatures in degree centigrade were about 44, 15; and 30 respectively. This results to very high evapotranspiration of 2677mm per annum (GOK, 1968) that is way above the rainfall amount received, thus affecting biomass production in Mandera. This implies growth of forage crops in the grazing fields are seasonal happening only during the rainy periods while during drought periods there is hardly anything for the livestock to graze. The highest monthly temperatures occur from December to March (Table 1). The table shows potential

evapotranspiration is higher than rainfall during all the months of the year including the two rainy seasons of March to May and October to December. Thus vegetation regrowth is dependent on very little amount of rainfall and the availability of extensive grazing fields. The vegetation that grows after a shower remain standing for several weeks until the pastoralists come with their livestock to graze. Where water is not available, such standing forage cannot be utilized and pastoralists avoid such places. Any interference with the standing forage along the migratory paths such as grazing by a different migratory group leads to serious conflicts often resulting to loss of lives. Traditionally, communities have respected pastoral routes used by other communities but this is not always the case.

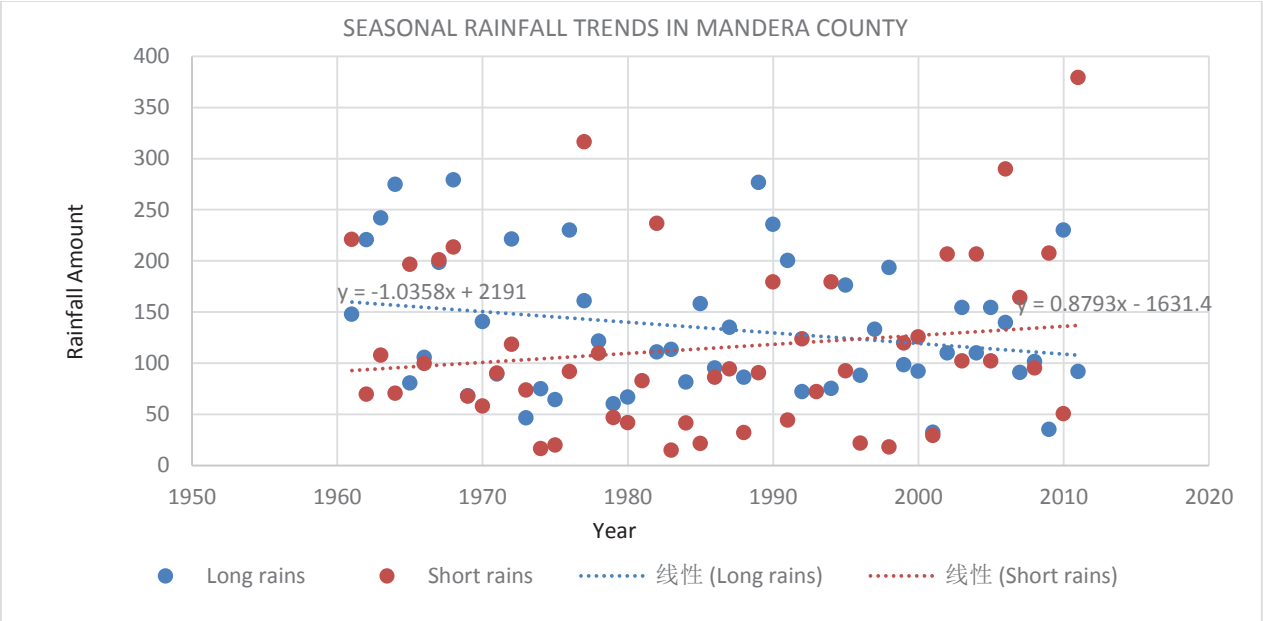


Fig 3.2. Seasonal rainfall trends in Mandera County

Table 3.2. Long term weather parameters (GOK, 2010)

Month	J	F	M	A	M	J	J	A	S	O	N	D
Av. High Temp ^{o}C	44	46	47	46	44	42	41	42	44	44	44	44
Av. Low temp ^{o}C	15	15	16	15	15	14	14	14	15	15	15	15
Precipitation mm	1	7	18	83	35	2	1	1	2	44	48	5
Pot. Evapotr. mm	233	234	257	210	213	222	223	234	238	205	193	215

II. Socio – economic factors affecting food security

i. Population

Mandera County Population was 1,025,756 persons according to the 2009 KPHC with 559,943 males and 465,813 females (Racida, 2010). The county has inter-censual growth rate of 3.96% which is higher than the national population growth rate (2.9%). The average household size is 8.9 persons. The high population growth rate and the large household sizes puts pressure on access to food. Children below 5 years age group form a smaller percentage (17%) compared to children of the age group 6 - 10 years (22%). Delivery records showed 86.4% of births take place at home with most of this births being assisted by Traditional Birth Attendants (TBA) (GOK, 2010). This is an indication of inaccessibility of health facilities for expectant and nursing mothers. Such mothers also fails to receive advice on food and hygiene which affect their decisions on food choices. This may also result to high infant mortality rates. Men form a larger percentage than women. In other parts of the country and the world, women are usually more than men and the 0-5 years age group higher than 6- 10 years age group in communities posting a positive growth rate. This trend - the men being more than women and the under 5s more than the 6 – 10 years - was confirmed by the office of the County Development and Planning officer where the County population data showed the same trends. In other pastoral counties such as Marsabit and Isiolo, the census data show men to be more than women (KIRA, 2014, KNBS, 2010). This findings raise the question of why population trends diverge from national and even global trends as well as how polygamy exists in a region where there are more men than women and their implications to food security. Children mortality rates are higher in Mandera County compared to other parts of the country. Infant Mortality rate (IMR) which show deaths/1000 (i.e. probability that a new born dies before attaining its first birth day) was 67.4. The Under Five Mortality Rate (U5MR) which show deaths/1000 (i.e. the probability that a newborn dies before celebrating 5th birth day) was 80 (GOK, 2010). The average National figures for the same are 55.10 and 72.80 respectively[1].

[1]www.unicef.org

The higher death rates were attributed to poor access to food, nutrition, poor sanitation practices as well as inaccessibility of health facilities.

Sixty five (67%) of the population is aged between 0-19 which is composed of infants and the school going-age. This age groups has little contribution towards decision making and food production. This indicates that there is high dependency ratio among the County population though that of the aged is low. It also shows the role of men in guaranteeing food security is substantial as they are the majority as well as household heads. In addition, the role of women in taking care of young children implies they are not able to contribute substantially to food production.

NB: After the 2009 census report, leaders raised concerns about the authenticity of the results for North Eastern province where Mandera county is found. In Mandera, the population had quadrupled in a decade from 1999 which was about six times the population growth rate for the rest of Kenya[1].

Plate 3.1.Maize and cowpeas being sold as fodder alongside other foodstuffs in the market. The smallest bundle sells for Ksh.50

ii. *High Poverty levels / income sources*

According to KHPC the percentage of the county population that is absolutely poor is 89.1% (KNBS, 2010). The wealth base of the County is mainly in form of livestock, small scale farming and commercial activities based in urban centers. The Somalis are largely pastoralists and owning livestock is greatly valued. They rarely sell or slaughter their livestock. Drought is the main contributor to destocking and the pastoralists suffer cycles of destocking through deaths and restocking through livestock deliveries during droughts and rainy seasons respectively. Overall, there is a gradual decay in livestock numbers over the years. Families that lose all their livestock through deaths restock through purchases or gifts from their neighbors and relatives. Milk was considered the most important source of income by 86% of the households. However, pastoralists' way of life and poor transport infrastructure affected movement of milk which affected income from milk. The high temperatures and lack of value addition for milk in Mandera County result to a lot of wastage which lowers the resulting income.

Focus Group Discussions conducted in April 2015 with the communities revealed that part of the reasons farmers practice crop farming is to assist with restocking and livestock feeds. The fodder in form of cowpeas and maize plants is sold in the markets alongside other foodstuffs (plate 3.1).

The income obtained is used to buy preferred food and livestock for restocking. Along the Daua River, it is more profitable to sell green maize as fodder as opposed to maize in form of grain. This means the maize crop is harvested before attaining maturity which reduces overall biomass production. Maize is never considered as human food. This implies food security can only be based on livestock as farmers in Mandera don't really value food crop production. Thus food security efforts should focus more on communities' preferences and ways of life as this is likely to receive more adoption compared to foreign approaches that have in the past focused on foreign ideas from other parts of the country such as growing crops.

Mandera farmers' average income amounts are low (Table 3.3). The average per capita income ranges from US$115 – US$ 294 per annum which is below the 1US$ benchmark per capita per day below which an individual is extremely vulnerable (Ilorin, 2016). Table 3.3 compares income from crop and livestock and shows income from crop to be higher in some cases. Income from crop reduces with increased distance from Mandera town while that from livestock increases with increased distance from Mandera town. This was attributed to high cost of transport of crop produce to the market due to poor roads. The success of enhanced income from farming is highly dependent on an efficient transport system. Income from livestock is restricted to milk sales. Occasionally when the circumstances demand (such as sickness, food shortage and education), livestock can be sold. This clearly shows the farmers give prominence to crop production for commercial purposes as it aids in increasing livestock numbers through preventing livestock sales as well as providing fodder in the form of crop remains and cultivated fodder crops.

Fifty three (53.4%) of crop farmers interviewed farm for commercial purposes. A market survey identified crops such as bananas, lemons, pawpaw, oranges, mangoes, avocado as well as fodder crops in form of cowpeas, sorghum and maize being important cash crops. The survey showed a small size pawpaw fruit (about

[1]http://www.nation.co.ke/news/Population-numbers-for-the-northeast/-/1056/2747584/-/134h5pyz/-/index.html

500g) selling for Ksh. 100 during lean seasons. These prices are however extremely low in the villages where the same size pawpaw was selling at Ksh.20. The county government needs to come up with modalities to safeguard farm gate prices to mitigate poverty and food security among crop farmers.

Marketing of harvested grains is not profitable due to easy access to relief food in the county (table 3.1).

All the farmers interviewed along the Daua river view livestock keeping as an important source of income. 78.4% of farmers interviewed reported livestock as an important income source while 73.7% viewed crop production as an important source of income. Due to poverty and cyclic droughts, not every farmer has enough livestock to make enough income. Respondents also reported livestock mortality to be high due to diseases. Average incomes for farmers within the identified farming units along the river are presented in Table 3.3.

Table 3.3: Average yearly income for a farmer from both crop and livestock in various farming units along the Daua river.

Farming cluster	Distance from Mandera	Income per year in Ksh				
		From Crop	From Livestock	Total	Per capita (*8.99persons per HH)	
Mandera	0	200,000	30,000	230,000	25584	US$ 294
Bur Abor	18	150,000	60,000	210,000	23359	US$ 268
Khalalio	25	150,000	80,000	230,000	25584	US$ 294
Aresa	34	120,000	90,000	210,000	23359	US$ 268
Hareri	46	100,000	90,000	190,000	21135	US$ 243
Qumbiso	53	60,000	30,000	90,000	10011	US$ 115
Sala	63	90,000	90,000	180,000	20022	US$ 230
Rhamu	73	50,000	100,000	150,000	16685	US$ 192
Yabicho		40,000	90,000	130,000	14461	US$ 166
Kalicha		45,000	80,000	125,000	13904	US$ 160
R Dimtu		60,000	100,000	160,000	17798	US$ 205

Only 17.3% of those interviwed did business for income. Businesses identified during the survey included transport of goods, selling of clothes, foodstuffs and other non-food items such as soaps and detergents, utensils etc.

Only 13 respondents (12%) viewed cash labour as an important source of income majority (62%) of whom hailed from one village of Aresa. It was established that casual wages were relatively higher in Mandera than other parts of the country. The daily wage of Ksh. 500 (5US$) is higher than what is paid in other parts of the country. This was attributed to presence of NGOs that pay higher wages during cash for work (CFW) and cash for assets (CFA) activities thus setting high standards. Another reason could be the culture of livestock keeping and pastoralism which implies working in the farms is not a cultural practice. Thus access to labour for working in the farms is limited and is a major drawback to crop food production, now and in future. The high wages paid for casual labour had attracted labourers from other parts of the country and the recent killing of workers from other parts of the country[1] will act as a deterrent to laborers which will further escalate the problem of access to labour. The problem of inaccessibility of casual labor is an important factor for food production and access to food in Mandera County. Decisions towards enhanced crop food production need to put this into consideration. This can be achieved through training draught animals for labour provision in small scale farming. Another remedy will be to assist entrepreneurs acquire tractors which the farmers can hire. Use of conservation agriculture (CA) which demands less labour in conjunction with improved use of inputs such as fertilizers could help greatly as more could be reaped from less labour. If the problem of labor can be addressed, the region can achieve more crop production which can go towards feeding the livestock for enhanced income and livestock products.

iii. *Insecurity*

All respondents reported insecurity is a major contributor to food insecurity. Mandera County borders the volatile Somalia to the East. Somalia is a source of small arms and militia to the county. The region has suffered serious incidences of insecurity. The wars are always triggered by revenge activities among the different clans from within and outside the region. Once a group is defeated, grudges emerge. These grudges are never forgotten nor forgiven and they trail on forever. Critical moments of revenge are particularly around the national elections that take place every five years. The ensuing insecurity result to death of people and loss of property and livelihood. Other effects and impacts as observed by respondents are hindrance to development (83%), disruption of education (75%), health reach (33% loss of infrastructure (15%) free movement hindrance (13%). Over ninety percent (92%) of the respondents felt that these problems can be alleviated if the government reduces development marginalization and, addressed issues of under development and monitoring of government

[1] http://www.nation.co.ke/news/Al-Shabaab-Attack-Mandera-Quarry-Workers/-/1056/2779012/-/5hbp0qz/-/index.html

services.

Insecurity affect livestock movement routes, labour, farming activities, transport of food and other social activities thus interfering with access to food. It is also the trigger for relief activities which have been blamed for disrupting local coping mechanisms for dealing with shocks that cause food insecurity. In addition, the region fails to attract the necessary skills for the different developments which may improve access to food such as infrastructure development and irrigation engineers.

iv. *Relief food*

Secondary data and field interviews showed Mandera County to be a regular recipient of relief food, a factor that has lowered the communities' development of home grown coping mechanisms as observed by 54% of the respondents. Relief food affects competitive pricing of locally grown food as it easily finds its way to markets and sells at throw away prices. 49% of responses show that farmers who have tried to grow food crops for sale got disappointed as their food is either sold at prices that are lower than the production price or is lost altogether due to lack of market. It is partly for this reason that farmers prefer to harvest the pre mature crop and sell as fodder as this option give them more income. 60% of respondents observe laxity being associated with the notion that even in lack of foods there will be free food provided by the government and well-wishers.

Relief food is partly to blame for the increasing poverty levels in Mandera County. Farmers need to develop their own coping mechanisms other than reliance on relief food especially in the face of global warming and climate change. If not handled properly, relief food will have catastrophic effects as it is unsustainable. The County government opinion on relief food was to have the farmers produce fruits which do very well in the county and are not affected by relief food availability and import grains from other counties in the country whenever the need arises. Banning of relief food altogether may cause starvation to the poor and is not considered a good option. The county plans on creating income from fruit farming which can be sold to other counties.

v. Infrastructure and telecommunication

Observably, the main modes of transport for food and people in Mandera county are roads, oxen, camels and donkey carts. The most prominent mode is the donkey cart, this was vouched by the 72% of the respondents. Limited use of road transport was attributed to poor roads network. The usage of the donkey cart includes taking foods from urban to the villages and vice versa. 69.1% reported to often use the *matatu* (road transport with vans) transport means, while 25.8% use *matatu* transport sometimes. 5.2% never use *matatu* transport at all. Unlike other parts of the country where motor cycles and bicycles are a common mode of transport, in Mandera they are not used. The county has neither rail network nor sea/lake ports and has limited access to air transport. During rainy seasons the roads get extensively destroyed (Plate 3.2a) hindering road transport. The seasonal rivers that flood during the rainy seasons completely block road transport sometimes for several days. The state of the road network made the transport services expensive leading to a rising cost of doing business and limiting movement of food. The poor transport expenses have rendered almost all resources immobile, greatly reducing the economic potential of the county. The milk industry is worst hit as there is more milk production at the time when transport is most unreliable leading to massive losses of milk. 80% of the county was not covered by any transport networks apart from animal tracks that serve as roads during emergencies (Mandera County, 2013).

Plate 3.2.(a) Road culverts destroyed by ranging floods during the rainy season along the Mandera Rhamu road and (b). A truck near Mandera transporting everything that need transporting from the village such as livestock, milk (in mainly yellow containers), fodder, livestock and human beings. (Photo; April 2015) by Keziah Ngugi)

The poor transport makes it difficult to transport horticultural produce such as fruits and vegetables to markets leading to heavy post-harvest losses and loss of investment which discourage farmers from further investments.

Safaricom, Airtel and Orange networks are available in Mandera and Rhamu. Of the three, only the

Orange network is available in the rural places of the county but the connectivity is also poor. 72% of the respondents rate a reliable telecommunication network as important as it can facilitate cheap communication and enhance movement of goods and services to the villages. A common denominator in all the responses on communication is that its inadequacy has contributed to food insecurity.

vi. *Access to Credit and Extension*

Fifty percent (57%) of the people interviewed complains that extension services which are supposed to be provided by the government and development support agencies are largely not reliable. The few available government extension workers are only seen when there was a donor to facilitate their extension works. However, 40% of the farmers were quick to report that most of what they have learnt is because of the presence of the Ministry of Agriculture in the area whom they consult. Farmers access credit from among themselves. 15% indicate that they get this from friends, 5% from neighbors and the largest proportion (80%) being from relatives. Notably, all the farmers are ignorant of access to available government credit facilities in the form of youth and women funds. They even don't know of existence of the facilities. A reason for this could be the fact that all the farmers interviewed lack capacity to utilize resources for entrepreneurship purposes. This explains why the Kenya Commercial and the Equity banks that operational in Mandera town are not approached by farmers for support that could be directed to activities of food security. In the villages visited, the residents had never approached the banks for support. Utilization of existing credit facilities require skills in entrepreneurship. This is greatly hampered by the low education standards. Trainings in focused vocational trainings in entrepreneurship are recommended to enhance uptake of credit which can improve access to food. Currently there is need to enhance extension services especially towards the food sector as farmers were found to be receptive to trainings. This may target enhanced crop food production, especially fodder crops, crop diversification, improved livestock practices to enhance food production within the county.

vii. Pastoral Nomadism

The type of livestock kept by farmers in Mandera include camels, cattle, shaots and chicken. Livestock type, average held per household, the range and the median are presented in table 3.4.

Table 3.4: Heads of livestock per household (average, range and median)

Livestock	Average number	range	median
Cattle	7	0-42	5
Goats	20	0-150	15
Sheep	8	0-67	5
Camel	2	0-30	0

Source: Respondent questionnaire survey data

Camels are highly valued as a fully grown fetch up to Ksh. 120,000 (Compared to Ksh. 30,000 for fully grown cattle). This implies camel can give a great contribution to income which assist in accessing food. However few of the farmers keep camels. The reasons most farmers (63%) don't keep camels was given as inaccessibility due to high cost for farmers who may wish to restock. Another reason was the species vulnerability to vectors and the fact that they are browsers (16%) which makes camel keeping an occupation by those practicing pure pastoralism.

Cattle were highly valued for milk which is an important economic good as most of the milk is sold for income. Each cow produces about 3 litres of milk on average during the wet seasons and about $1\frac{1}{2}$ liters during dry seasons. During periods of severe drought, milk production may cease completely. 93% of community members expressed preference for goat milk for home consumption compared to cow's milk which they reported was more healthy than cows' milk.

According to the County Director of Livestock, for one to be considered rich, they should own the following livestock numbers; 100 Shoats or 40 head of Cattle or 30 heads of Camels.

Chicken keeping is not a popular economic activity in Mandera and only 15% were found to be keeping chicken. According to the household survey conducted, there were no cultural or religious barriers that prohibit keeping or eating of chicken and its products.

Residents living along the Daua river greatly value keeping of donkeys. Donkeys are kept for transport for both human and goods such as water, fodder, construction materials, farm inputs, farm produce, firewood, and charcoal. Eighty five (85%) of area residents keep between 1-8 donkeys. Those without donkeys use human labor or they are assisted by their neighbours. The assessment revealed farmers with a high number of one type of livestock are the same ones with a higher number of the other livestock types. Households with high livestock numbers suffer less food shortages compared to those with fewer livestock.

Table 3.4 show livestock ownership based on the Tropical Livestock units (TLU) (Camel 1.2, cattle 0.66, goat 0.1, sheep 0.09). Based on ILRI (http://www.ilri.cgiar.org), an individual requires 3.5-4 TLU at the minimum for survival. Based on the household size and considering 4 TLU, each household should have 36 TLU and only about 4% (shaded area) of the population had more than 36 TLU. Thus based on livestock numbers and the survey carried out, 97% were poor with limited access to food.

Table 3.4: Livestock wealth based on Tropical Livestock Units (TLU). Source, household survey

TLU	0 - 4	5 - 8	9 - 12	13 - 16	17 - 20	21 - 24	25 - 28	29 - 32	33 - 36	37 - 40	45 - 48	61 - 64	81 - 84
%age farmers	41	27	12	7	3	4	1	1	1	1	1	1	1

viii. *Crop Production Factors*

Crop farming is practised under rain fed agriculture and irrigation along River Daua which flows for nine months in a year. Identified settlement clusters practicing crop production along River Daua include BP 1, Hareri, Khalalio, Yabicho, Sala, Rhamu Dimtu in Mandera East and Mandera North Districts. In Libehia and Arabia Divisions of Lafey sub county, farmers practice rain fed agriculture. Farmers in these areas depend on the rain for crop production because these areas are far away from the waters of River Daua. The main crops grown include sorghum, cowpeas and simsim. This latter form of agricultural production is adversely affected by recurrent droughts and during the long rains by floods that usually occur in November and December.

The main crops grown under irrigation include maize, beans, bananas, cowpeas, mangoes, tomatoes, kales, onions and water melons. These crops are used both for subsistence and commercial purposes. Most of the maize and cowpeas crops are brought to the market prematurely to be sold as fodder, thus resulting to minimal grain harvest. Farmers along the Daua river identified floods as the biggest threat to irrigated farming as occasional floods cause crop, farm tools and machinery losses as well as damages to irrigation infrastructure and equipment. Table 3.5 below provides the estimated acreage farmed under irrigation and or rain fed agriculture (GOK, 2010)

Table 3.5: Land utilization for crop production along the Daua river.

Average farm size (small scale)	0.5 ha
Average farm size (large scale)	5 ha
Potential arable land	6,195 ha
Rain fed potential	148,422 ha
Rain fed exploited	516 ha
Irrigation land potential	1,519 ha
Irrigable land exploited	839 ha
Number of farm families	14,170
Total number of farms	2170 farms

On a scale of 1-4, 91.6% of the farmers ranked crop farming from 3 (important) to 4 (very important). This clearly shows that the farmers utilizing the River Daua value crop production. This implies that with the right irrigation infrastructure, there are pastoralists willing to engage in crop production which can greatly reduce food insecurity. Their main reason for crop farming was reported as to stabilize livestock keeping through provision of feeds and restocking as well as selling for income but not for home consumption. Proper management of relief food in Mandera County can greatly enhance crop food production through ensuring relief food reach only those in need and does not form part of the food sold in the markets as this causes a slump in the price of food in the market.

The whole strip of land along the river is currently occupied. The acreage under food crops is managed on small scale basis. 60.4% of the respondents work on up to 2 acres and 85.6% have up to 5 acres (Table 3.6). The highest acreage recorded was 20 and 30 acres by one farmer for each size. The reason for the small acreage is because only the land along the Daua river is currently irrigated. With more investment in irrigation infrastructure, more land can be put under irrigation as the river carries large quantities of water.

Table 3.6: Acreage under cultivation along the Daua river

Acreage range	≤ 2	≤ 5	≤ 10	≥ 10
%age of farmers	60.4	85.6	95.5	100

ix. Food consumption preferences;

The Somali people prefer eating rice, pasta and meat. Vegetables are rare. Milk forms an important part of their diet. They also consider goat milk superior to cattle milk. They will sell cow milk and retain goat milk for family consumption. Livestock are rarely slaughtered for food at the household level. Along the Daua River, food crops grown do not consider local food consumption preferences. Almost all the food consumed in Mandera County is imported from other parts of the country or imported, a factor that greatly consumes household income and lower their ability to purchase food. The most preferred foodstuff by non-pastoral communities in Kenya is maize which is also the crop found growing in most farms. This implies other communities buy maize whenever their farms fail to yield enough for their family consumption and in good seasons they produce excess which is either sold or kept for future use. This is not the case in Mandera as the farms are grown with maize which the local community did not consume. Extension services should bear this in mind and focus on promoting growing of food crops that the farmers can consume as this will improve on home grown solutions to food shortage.

x. Level of education

Fifty six (56%) of the responses believe that education standards affect food security decisions at the level of household, government and other institutions. The interviews conducted in the project area showed that over 80%

of the fathers and over 90% of the mothers have not attained any formal education at all. All the parents reported they have sent their children to primary schools since the implementation of the free compulsory education which started in the year 2002. The survey revealed over 80% of the children received at least primary education and out of these, 26% of the first and second born children went on to secondary schools. On average 10% of all first and second born children received tertiary education. Currently, according to Mandera County education records from the Ministry of Education, 85% of learners from primary schools transit to secondary schools and out of this figure, 65% transit to tertiary level education. Only about 2% attain University level education. The 2008 – 2009 Kenya Demographic and Health Survey indicated that, in Mandera County only 22% of women and 59% of men have received any education at all (KNBS, 2010).

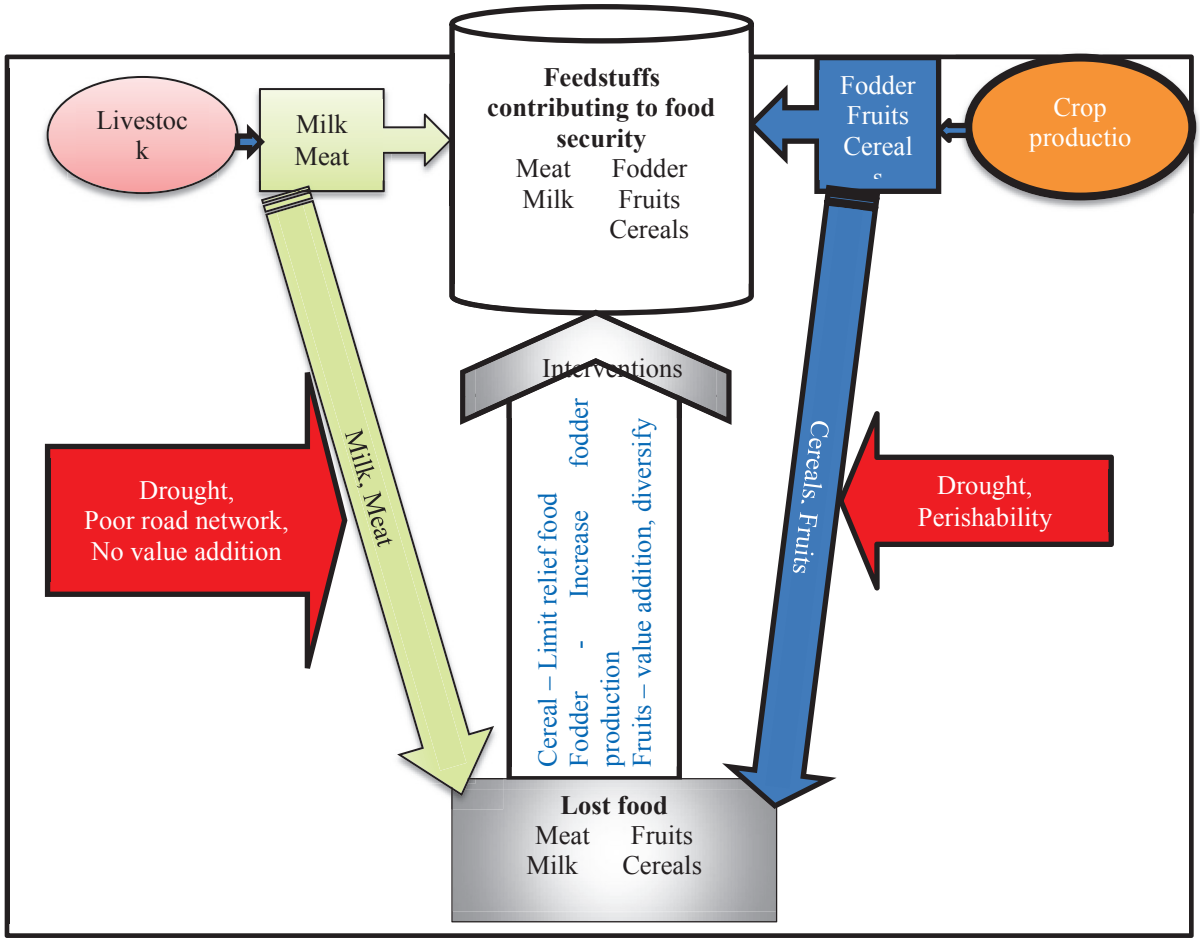
Teacher absenteeism in Mandera County is among the highest in Kenya[1]. There was lack of student supervision as both primary and secondary students could be spotted freely roaming around in school uniform in most of the villages. In addition to teacher absenteeism, other factors that contribute to poor attainment of education in Mandera County is lack of adequate and efficient learning institutions and poverty. Most parents are too poor and cannot afford to pay for both secondary and tertiary level education. Sources of labour analysis revealed children to be major contributors to family labor for herding livestock as well as crop production which have negative implications to education. Using children for family labor may solve short term problems but has long term adverse consequences on poverty and food security

It is reported that the issuing of available bursaries is badly affected by clan affiliations. Most community members suggested issuing of bursaries should only be done by outsiders (Kenyans from other parts of the country) who will not have a reason to favor one clan over another. The farmers lamented introduction of the devolved government which is likely to have serious setbacks on education support to children from poor backgrounds by government as clan-ism, as opposed to the need for help will be observed while issuing bursaries. Learning opportunities for the children especially those from poor backgrounds should be handled with a lot of transparency, openness and accountability, or better still and based on suggestions of those interviewed, the role should be left to the Central Government and not the County Government as the Central government is likely to be headed by a person from outside the region thus clan-less.

4.0 Which way Mandera to achieving food security

The journey to achieving food security in Mandera County require a mitigation of the main drawbacks identified. These are poor weather, poor infrastructure, relief food, insecurity and low levels of education. The chart below is a summary of food dynamics in Mandera County showing the proposed areas of intervention. Losses should be mitigated through investments, policies and institutional arrangements that will ensure Mandera County achieve food security in the face of the existing challenges. The required infrastructures for mitigating the identified problems are discussed below.

[1] http://manderacounty.wordpress.com/2013/04/16/mandera-county-education-system-are-as-corrupt-as-they-come/



Model for increasing food security in Mandera County

Government has a duty of increasing access to water, transport network, increasing education status and proper management of relief food. In addition, and to cater for cultural and labour dynamics, the government can engage farmers interested in carrying out commercial farming on contract basis. The contract farmers can be provided with adequate resources that will facilitate food production. This contract farming will also serve the purpose of building the culture of crop farming among pastoralists in Mandera County.

County government role in building food security

Increasing access to water; deliberate efforts should be directed towards improving access to water through damming of the flood water and also the floods from the Daua river. If access to water is increased, most of problems of food insecurity will be solved. The water will need to be dammed where the natural factors of land allow but these water should be piped to the different points of utilization. These points of utilization could be settlement villages, livestock watering points, orchards, irrigated farms and institutions.

Improving transport network and security; The problem of poor infrastructure is glaring and closely linked to insecurity. Skilled workers to build infrastructure may be unwilling to move to areas where insecurity incidents occur. The county government will have to ensure adequate security is a priority as this will attract professionals and skilled people. Where there is insecurity, the opposite happen, skilled people move away from the region and those skilled people from outside stay away which result to brain drain from the region. In Mandera this has been the case as those considered elite do not live in the region.

Proper management of relief food; Relief food should be there for the needy and only during disasters and lean seasons but not for all occasions. However, if the county government would like to maintain the status quo and have relief food at all times, it should first purchase from the local producers and at competitive prices to encourage farmers to engage more in food crop production. The county government has a duty of ensuring local skill for enhanced food production is built for the sake of current and future generations.

Improving education status and level of skill; As a cross cutting issue, education should be enhanced. The number of children going all the way to acquiring tertiary education and acquiring skills in various sectors need to be enhanced. This should be easy to achieve through the current devolved government.

Contract Farming; Contract farmers who can invest in farm mechanization can help mitigate the problem of labour shortage. This can be in the regions where there is the possibility of carrying out irrigated farming or forage plantation farming. The option of conservation agriculture should be explored in Mandera.

Increasing livestock survival; The inhabitants of Mandera County practice pastoral nomadism way of life. This is not likely to change in the near future. Efforts towards improving the survival of the livestock can greatly improve access to food in the county. Rain fed and irrigated forage production should be prioritized. High producing fodder crops need to be encouraged accompanied by forage conservation. This will ensure there is access to livestock feed even during severe drought periods. Low lying fields can be planted with high yielding forage crops and protected from grazing to improve overall biomass production. In other areas, planting of fodder shrubs adapted to the local conditions for the browsing livestock need to be enhanced. Introducing watering points in areas without water can facilitate utilization of pasture through broadening pastoral routes.

Improving access to labour; Access to labor is prohibited by insecurity and culture. Following the recent killings of laborers in the county, the situation can only get worse. The community can take advantage of the draught animals which can be trained to be used as a source of labor. The topography in Mandera County support use of farm machinery for cultivation and other farm operations and the county government need to consider investing in this or encourage private investment towards increasing access to farm machinery. This may have an added advantage of encouraging plantation farming as opposed to small holder ownership.

Milk value addition; The high livestock numbers give copious amount of milk especially during and shortly after a rainy season. Processing of the milk, especially powder milk need to be given priority to mitigate losses and improve household income. Strategies to move milk from the vast fields to the processing points need to be developed. This can be in form of improved transport infrastructure and development of milk movement paths that enhance quick delivery of the milk.

Conservation agriculture (CA); CA can greatly enhance food production in Mandera County. Aridity and labour problems can be mitigated through conservation agriculture. Land where forage crops and other cereals can be grown should be identified and planted with identified crops through CA.

Fruit farming; Lack of labour and food uptake preferences can further be addressed through growing fruits in plantations. This need to be accompanied with the right infrastructure for processing fruits or quick transport to other parts of the country and also for export

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