

KNOWLEDGE *for* WEALTH CREATION

A Kenyan Perspective

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Published by the University of Nairobi Press



UNIVERSITY OF NAIROBI

First published 2019
By University of Nairobi Press
Jomo Kenyatta Memorial Library
University of Nairobi, University Way, Nairobi
P.O. Box 30197-00100, Nairobi
Email: nup@uonbi.ac.ke
Website: [//uonpress.uonbi.ac.ke](http://uonpress.uonbi.ac.ke)

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Title: Knowledge For Wealth Creation: A Kenyan Perspective / edited by Judith Mbula Bahemuka, Joshua Kivuva and George Michuki.

ISBN-13: 978-9966-792-68-6

Cover Photos

Foreground: UON Fountain of Knowledge

Background: Elimika participants from various counties

Cover Design & Layout:

Triad Media Limited

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www.triadmedia.co.ke

CHAPTER THREE

Food Security in Kenya: Evidence From Five Counties

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3.1 INTRODUCTION

The Constitution of Kenya, 2010, guarantees several rights and freedoms (Government of Kenya, 2010). Article 43 of the Constitution, on economic and social rights, bestows on citizens the right to proper housing, education, medical care, social security and food security. The right to food is also contained in the International Covenant on Economic, Social and Cultural Rights (ICESCR). Article 11 of the ICESCR (1976) recognizes that access to food is a universal human right and requires states to improve methods of production, conservation and distribution of food. It thus unequivocally recognizes the right to food as a fundamental right.

In Kenya, the agricultural sector plays a critical role in enabling citizens enjoy these rights. Apart from being the channel for ensuring that the right to food is achieved, the sector directly contributes about 24 percent of the GDP, and a further 26 percent indirectly through its linkages with manufacturing, distribution and service-related sectors (Government of Kenya GoK, 2010). Agriculture also supplies the manufacturing sector with raw materials, generates tax revenue for government and contributes about 60 percent of the nation's export earnings. The sector employs over 40 percent of the total population and over 70 percent of the rural population (GoK, 2007). It is also viewed as the vehicle through which the country can sustainably achieve an economic growth rate of 10 percent, which would reduce the national poverty levels to 25 percent, down from almost 36 percent in 2015/6 (World Bank, 2018) and achieve food and nutritional security by the year 2030.

Agriculture plays an important role in community livelihoods, natural resource use, economic development and the country's economic system, as a whole. The Constitution places the responsibility of resource use, sound and coherent policy formulation, enactment and implementation of policy on government, which

ensures that citizens fully enjoy their rights, while at the same time guaranteeing their wellbeing. Additionally, the Constitution articulates the rights of access to natural resources and their sustainability, taking cognizance of the significance of agriculture and its reliance on the availability of land, and considering that the latter is a key natural resource on which many other economic activities depend.

Given the multi-dimensionality or interdependency of human rights and sustainable development (Cornwall & Nyamu-Musembi, 2004), it is difficult to discuss citizens' participation in governance, leadership and human rights in a developing country such as Kenya, without addressing livelihood activities, especially those linked to agriculture. Indeed, the previous chapter by Mitullah has theorized this clear link between human rights, governance and sustainable livelihoods. It is against this background that the agricultural sector plays a key role in national economic growth and development of the 47 Counties created with the promulgation of the Constitution of Kenya 2010.

Many government policies, development plans and strategies such as the National Climate Change Action Plan (NCCAP) and the Agricultural Sector Development Strategy (ASDS), recognize the strong connection between agriculture and other sectors of the economy. As such, there are efforts to bolster the agricultural sector. One such effort is the devolution of government operations/ services, including agriculture to the counties.

Devolved governance structures are an integral part of the Constitution and promise great prospects for the realization and enjoyment of the rights of citizens as they have a direct impact on national and regional access to resources, their distribution and utilization. Through the devolved system, resources are channeled down to people through their respective county governments. It is presumed that the county governments understand and know their needs better and are expected to effectively support measures that would promote increased agricultural productivity in their regions and thus improve the quality of life of the citizens living therein.

However, rights are not without their own opportunities and challenges. Despite the potential of these efforts, the concept of devolved government is still relatively new in Kenya and it will take time for the concept to be internalized, before county governments can run smoothly. Active and informed public participation is a critical prerequisite to the effective implementation of a devolution system and, therefore, the identification of knowledge gaps, accompanied by capacity building, should be continuously undertaken as a way of ensuring that citizens enjoy their rights. Therefore, increasing awareness and understanding of these rights and freedoms influences how citizens exercise their rights and participate in development, political and leadership activities and further, how they demand for accountability.

This chapter focuses on the agricultural sector where prospects for achieving food and nutritional security appear high. It describes the measures, which, if put in place, can help in achieving the right to food for citizens. It draws data from the “Construction of Knowledge Societies” (*Elimika*) study carried out in Homa Bay, Kwale, Makueni, Turkana and Nairobi counties to examine food and nutrition security in the counties. The objectives of the study were to: (a) Gauge current levels of understanding of good governance, leadership and human rights among local community members, groups and organizations; (b) Identify knowledge gaps and intervention (training) areas for the strengthening of communities’ understanding of and demand for good governance, transparent and accountable leadership and respect for human rights; (c) Increase levels of awareness by communities and their informed participation in political, governance and leadership processes; (d) Improve communities’ awareness of the basic human rights that are guaranteed to them by the Constitution of Kenya, 2010. The overall discussion is much broader than the *Elimika* study results reveal and is based on information obtained from other sources including Kenya Government documentation and data bases. The discussion section attempts to project the potential of counties to harness available resources in order to achieve food and nutritional security. The authors have drawn on their national, regional, and international expertise and experience to synthesize how challenges and opportunities in counties impact on food security.

3.2 BACKGROUND OF THE STUDY AREA

This study was conducted in five counties: Homa Bay, Kwale, Makueni, Turkana and Nairobi. Except for Nairobi, majority of the respondents were small scale farmers, practicing mixed farming involving livestock and crop production. Among the rural counties, Homa Bay had the highest human population while Kwale had the least with 649,931 people (Table 3.1). In terms of land size, Turkana had the largest arable land measuring approximately 24,640 sq. km.

Table 3.1 Population, land size, rainfall and poverty rate in the study areas

County	Geographical location in Kenya	Population	Area (sq km)	Arable land (sq km)	Annual rainfall (mm)	Poverty levels (%)
Homa Bay	Western	963,794	4,267.1	1,996.2	700- 800	52.9
Kwale	Coastal	649,931	8,270.2	2729	400-1680	71.0
Makueni	Eastern	884,527	8,008.9	5042.69	800-1200	64.1
Turkana	North Western	860,000	77,000	24640	120-500	74.0
Nairobi	Nairobi	45000000	580,367	58000	Varies by area	45.9

Sources: Kang'ethe & Kimathi, 2013; County Government of Kwale, 2016; County Government of Homa Bay, 2013; Oduor et al., 2012.

Turkana and Kwale have the highest poverty level of 74 and 71 percent, respectively. This is followed by Makueni and Homa Bay in that order (Table 1). Studies indicate that there is high correlation between food security and poverty (Food and Agriculture Organization of the United Nations [FAO], 2010).

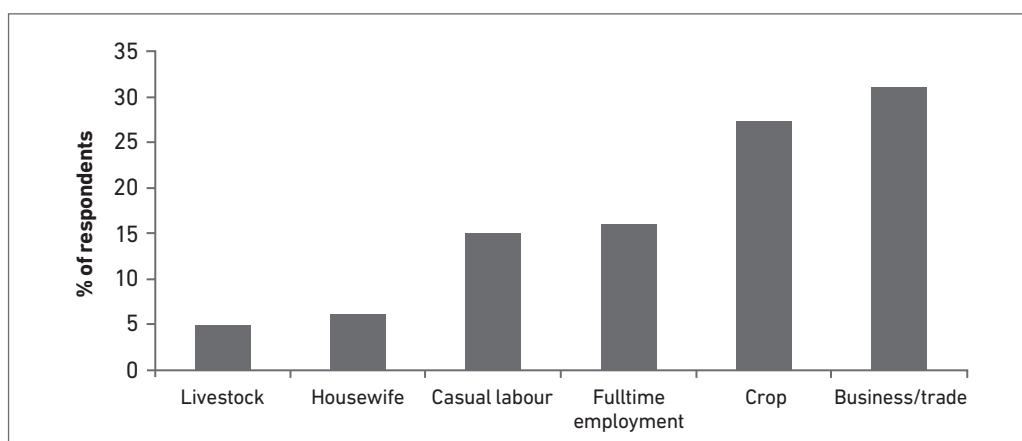
The amount of annual rainfall received varies both within and across the counties. All the counties have two or more ecological zones. For example, Turkana County classified as an Arid and Semi-Arid Land (ASAL), can be divided into four different ecological zones. Turkana receives an average of 120mm to 500mm of rainfall annually, while Kwale experiences the highest rainfall variability with a minimum of 400mm and maximum of 1680mm annually. Makueni and Homa Bay with a minimum annual precipitation of 800mm and 700mm, respectively, receive higher and less variable rainfall than Turkana (Table 1). The population levels prevailing in the four rural based counties cannot be sustained by rain fed agriculture. The issue of water scarcity is therefore addressed in the later part of this chapter.

3.3 AGRICULTURE AND FOOD SECURITY IN THE FIVE COUNTIES

Agricultural production involves a range of crops and livestock which vary within the specific counties, given their expansiveness and diversity, in terms of ecology and land suitability. The major crops common across the counties include maize, beans and potatoes, more so considering that some counties share the same agro-ecological zones. Similarly, livestock keeping, including cattle, sheep, goats, and poultry is practiced in all the four counties. Apiculture is practiced in the dry zones of Makueni and Turkana counties. In some counties, especially those with large water resources such as Turkana and Homa Bay, fisheries are an important occupation not only for the local economies, but also contribute to the national economy. Often, majority of households practice subsistence farming and produce food for family consumption. Income from excess produce enables them to buy other food and non-food items. Agriculture, therefore, plays a vital role in the livelihoods of people in these counties, just as it does in other rural counties in Kenya.

The *Elimika* baseline study suggests that most of the population derive their livelihood from agriculture either directly (crop and livestock production, 32%) or indirectly as casual labor (15%) or trade (31%); most of the latter are agri-business in nature (Figure 3.1).

Figure 3.1 Occupation of respondents in the study area



Source: Elimika County Reports (2016)

Among the major economic activities that the respondents were undertaking, 78 percent were agriculture based. This emphasizes the important role of agriculture in these counties. Earnings from the labor force, in the various value chains are the most direct source of food for households.

More and more households are sourcing their food from the market. Table 3.2 indicates that, apart from Kwale County where 64 percent of the respondents produced their own food, majority relied on markets to source food. The figures suggest that the number of households depending on markets for their food needs rise with increasing urbanization. For example, in Nairobi County, 95 percent purchased their food and only 1 percent engaged in food production while in Homa Bay only 64 percent of the households purchased food.

Table 3.2 Common sources of food for households in the study area

County	Sourcing of food		
	Produce (%)	Purchase (%)	Relief food (%)
Homa Bay	34	64	2
Kwale	64	33.5	2.55
Makueni	55	45	0
Nairobi	1	95	4

Note: There was no data available for Turkana

Source: County baseline survey reports 2015

Therefore, it can be deduced that the greater the intensity of urbanization, the fewer the households engaging in agricultural activities. The households then become dependent on markets to source food. Relatively less urbanized areas saw households producing more of what they eat. It can also be said that households in

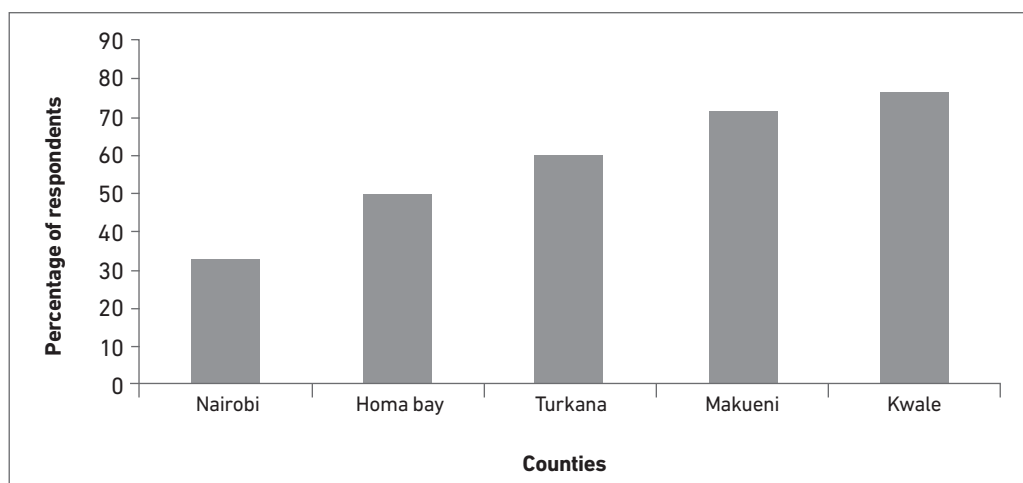
rural based counties depend on agriculture for livelihood. There was evidence that only few households were relying on relief food, estimated at only about 4, 3, 2 and 0 percent, in Nairobi, Kwale, Homa Bay and Makueni, respectively.

Food and nutrition security, is defined as “a situation in which all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food which meets their dietary needs and food preferences for an active and healthy life” (Kenya Food Security Steering Group, 2008). In the study areas, food insecurity was depicted by a high percentage of the population having no access to food in the right quantity and quality. This may be attributed to droughts, low production, and high prices occasioned by an unavailability or scarcity of food that make most households unable to afford food.

More than a third of the respondents claimed that they had experienced food shortage that is in terms of less quantities, low quality or consumption of less preferred food. Sizeable proportions of households in Kwale County reported high cases of food shortage at 76.5 percent, followed by Makueni at 70 percent. It is noted that 33 percent and 50 percent of households in Nairobi and Homa Bay, respectively, reported having experienced cases of food shortage (Figure 3.2).

Available data indicate decreasing levels of food shortage as more areas get urbanized, even with decreasing land size. This could be attributed to increased economic opportunities enabling households to diversify and thus become less vulnerable. However, given their dependency on markets to source food, often produced in other parts of the country or imported, the vulnerability of the population was real. Stronger or reliable market systems could help reduce urban food insecurity by stabilizing prices.

Figure 3.2 Percentage of respondents experiencing food shortage



Source: Elimika County reports (2016)

The severity of cases differed across the counties. In Turkana, despite less households reporting food shortages, the severity of the cases of food insecurity, in comparison with Makueni or Kwale, was somewhat more serious. For example, the food insecure households claimed that they would eat whatever is available, provided it is acceptable as food in their context with at least 46.5 percent of respondents indicating that they slept hungry at least once a week (Table 3.3). A similar number indicated that they often worry about not having enough food for their households.

Table 3.3 Percentage of households who slept hungry due to food scarcity in Turkana County

Incidence of sleeping hungry	Frequency %
Never	7.5
Rarely (once or twice a year)	11.1
Sometimes (once every month)	34.8
Often (on a weekly basis)	46.5

Source: Elimika County reports (2016)

Additionally, about 57.1 percent consume two meals a day either skipping breakfast or lunch while 18.7 percent relied on one meal per day. In Kwale, despite the highest number of households experiencing food shortage, only 5 percent relied on one meal a day, and about 18 percent took two meals a day. However, it is worth noting that the aspect of food quality and diversity, which is a good indicator of nutrition security, was not captured during data collection.

Food security assessment in urban areas such as Nairobi differed with areas that are predominately rural. Nairobi County is unique given the demography, economic activities and access and use of natural resources. Only 3 percent of residents were found to own land, with majority having small parcels averaging 0.0295 ha. Majority of residents reside in rented premises, often temporarily. Historical land injustices, land grabbing and the influx of unskilled and semi-skilled job seekers from rural areas exacerbate the issues of land access/ ownership.

FOOD SECURITY PROSPECTS FOR NAIROBI COUNTY

Nairobi County presents a unique case given the demography, economic activities and access and use of natural resources. Based on the Kenya National Bureau of Statics study in 2013, the data indicated that up to 85 percent of households experienced different forms of hunger, the most common being not able to eat the preferred foods because of lack of resources (85.1%); not eating food of their preference due to lack of resources to obtain other types of food (77%); worrying that one would not have enough food; and eating smaller meals in a day because of

lack of resources to obtain enough (65.4%). Household food security is influenced by three major factors: education, household size and the marital status of the household head. (*Elimika Nairobi County Report 2016*).

The county food production compared to population demand is insignificant with close to 95 percent of all the food consumed being produced in different counties. Only 1 percent of the food consumed is produced in the county. This is one of the factors contributing to food insecurity in Nairobi County. It is worth noting that generally food is available in the markets but the prices tend to keep people off especially very poor households. To cope, households employ various strategies including:

- (i) Reliance on less preferred or less expensive food,
- (ii) Borrowing, begging for food or purchasing it on credit,
- (iii) Reducing the quantity of food or number of meals eaten in a day and
- (iv) Adults skipping meals altogether to let their children eat.

Access to and ownership of land has a lot of influence on investment and type of economic activities. In Nairobi, only 3 percent of residents were found to own land, with majority having small parcels averaging 0.0295 ha. Majority of the residents reside in rented places often temporarily. Historical land injustices, land grabbing and influx of unskilled and semi-skilled job seekers from the rural areas exacerbate the issues of land access/ ownership.

Urban Agriculture (UA) is a conduit through which food security can be achieved/ enhanced in an otherwise densely populated and urban areas like Nairobi. However to achieve this, the development of legislation on land and natural resource management is mandatory. According to the new constitution, counties are mandated to establish County Land Management Board (CLMB) that are expected to develop Land Use Plans (LUP), the basis for regulating land use. For a long time, agriculture was not a recognized land use in Nairobi even though there were few individuals practicing urban farming. In 2015, the county assembly passed the Nairobi County Urban Agriculture Promotion and Regulation Bill which itemized agricultural activities including aquaculture, crop production, livestock, agro-forestry and apiculture.

Augmenting legislative efforts with capacity building on agricultural technologies suitable for urban areas, provision of extension services and increasing access to cheap capital and quality inputs will go a long way in boosting UA in Nairobi.

Source: Elimika Nairobi County Report (2016)

In response to food shortages, households employed different coping mechanisms. These mechanisms depended on the household's conditions and represented by number of meals, or type or quantities consumed during this period. Apart from a few respondents across counties who relied on relief food as mentioned earlier, households employed various mechanisms including consuming less preferred food (whatever is available) or less expensive ones (most common). In other households,

adults either skip meals or reduced the quantities consumed per meal but ensured that children did not go without food. Households with livestock sold stock to buy food. Other households borrowed food from neighbors while some bought food on credit. In some severe instances, especially in rural areas, households gathered wild fruits and vegetables or sent family members to beg or eat elsewhere. As a last resort, households were forced to sell their land in order to buy food.

Data from other sources indicate that the Counties practiced both large- scale and small- scale crop production. Some emerging crops that were initially not produced in these counties are increasingly becoming important. Maize, a staple food in the country, was produced by almost all farmers in Homa Bay, Kwale, Makueni and Turkana. However, based on different soil and climatic conditions, some crops were more predominant in some counties than others. Table 3.4 indicates the main crops grown in the study counties.

Table 3.4 Main crops grown in Homa Bay, Kwale, Makueni and Turkana counties

Crop type/ County	Homa Bay	Kwale	Makueni	Turkana
Major crops				
	Maize	Maize	Maize	Maize
	Beans	Cassava	Green grams	Sorghum
	Pineapples	Beans	Pigeon peas	Green grams
	Groundnuts	Peas	Sorghum	Millet
	Potatoes	Green grams		Cowpeas
	Sorghum	Sugarcane		
	Tobacco	Cashew nuts		
	Sunflower	Cotton		
Fruits				
		Mangoes	Mangoes	Mangoes
		Coconut	Oranges	Bananas
			Pawpaw	Oranges
Emerging crops				
	Cabbage	Sesame	Cotton	Cassava
	Kales			Sunflower
	Carrots			Aloe Vera
	Tomatoes			Grain Amaranth
	Mangoes			Sweet potatoes
	Banana			

Source: Oduor *et al.*, 2012; County strategic plans for Homa Bay, Kwale, Makueni.

In Kwale, apart from maize, cassava, beans, peas, and green grams, the county produces semi- commercial crops such as coconuts and mangoes, with cashew nuts, sugarcane, cotton, sesame , and tobacco being the main cash crops (Government of Kenya, 2011).

Sesame is a new crop that has been embraced by farmers. Sugarcane is grown in the large irrigated areas of Kinondo, Gonjora, Kidzumbani and Mwisho wa Shamba in Msambweni Sub County. Compared to other counties, Makueni has a strong commercial, horticultural production sector, especially in the hilly parts of Kilungu and Mbooni West sub-counties. Fruits, namely mangoes, oranges and pawpaw are produced in the lowland areas such as Kathonzweni and Mbooni East. Cotton, fruit farming, and livestock keeping are practiced in the sub-counties of Nzau and Makueni.

In Turkana, crop productivity is relatively low because of unfavorable weather conditions and poor adoption of best agronomic practices. For example, the average maize production per hectare is about 18 (90kg bag) bags and ranges between 28-36 bags. Mango production, at 2.5MT/ ha/year, is also low compared to a potential of 5.3MT/ ha/ year (Oduor et al., 2012). Farmers in Turkana are embracing new crops such as cassava, sunflower, mangoes, aloe Vera, sweet potatoes and grain amaranth, in their farming systems. The County has the largest potential arable land in absolute terms, but receives the least amount of rainfall, which affects productivity. Turkana County has around 22 irrigation schemes. The national and county governments target to irrigate 70,000 acres of land in Turkana by 2017 exploiting water from Rivers Turkwel and Kerio (Daily Nation Counties: June 17, 2014). This will enable the production of crops such as maize, sorghum, millet, cowpeas, oranges, tomatoes and capsicum.

In Homa Bay, the main food crops grown include maize, beans, pineapples, ground nuts and sweet potatoes. Large-scale farming of crops such as maize, sorghum, beans, sugarcane and agro-forestry was practiced, mostly in the less densely populated areas of Ndhiwa, Suba and Mbita sub-counties, where large herds and flocks of livestock were also kept. According to the Economic Review of Agriculture (2015), for Homa Bay County, crops such as cabbage, carrots and bananas, that were until recently not commonly cultivated in the county, are increasingly being grown by farmers.

Among the four counties, excluding Nairobi, Turkana had the highest number of livestock; this is not surprising since the Turkana are agro-pastoralists. Apart from cattle, sheep and goats, the Turkana also keep a large number of donkeys (558,189) and camels (832,462). The donkeys are sold to other regions but have potential value for export to China because of the relatively high value of donkey meat in that country. On the other hand, in Makueni, Homa Bay and Kwale, the production of indigenous chicken is common, while this is less practiced in Turkana, where chicken production is only just being introduced.

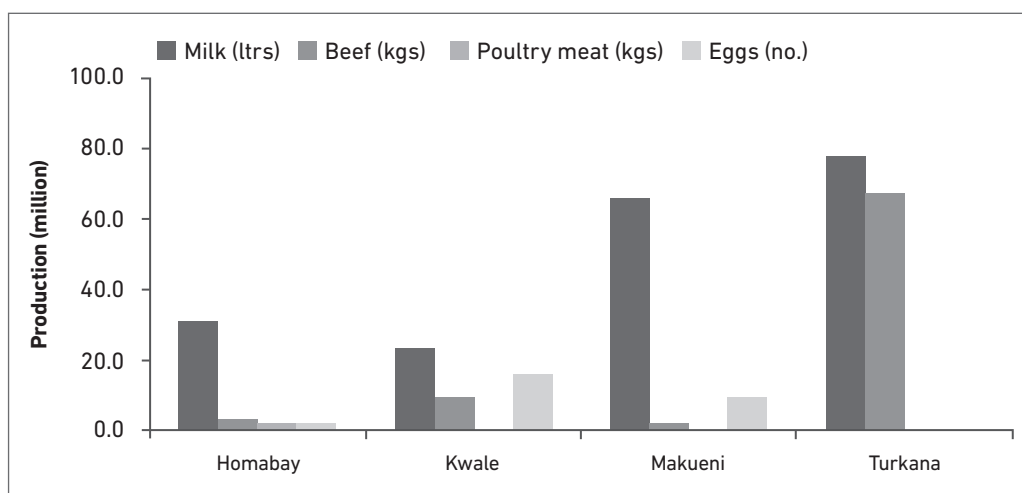
Table 3.5 Livestock populations in the study areas

Livestock type	Homa Bay	Kwale	Makueni	Turkana	National
Cattle	373,543	255,143	271,039	1,534,612	17,467,774
Sheep	118,947	83,133	99,512	3,517,151	17,129,606
Goats	259,175	349,755	733,385	5,994,861	27,740,153
Camels	23	613	22	832,462	2,971,111
Donkeys	18,789	2,532	32,084	558,187	1,832,519
Pigs	5,166	529	1,503	570	334,689
Indigenous Chicken	1,094,776	433,827	762,778	165,349	25,756,487
Chicken Commercial	55,801	98,220	46,027	15,444	6,071,042
Bee Hives	3,405	4,482	85,305	32,581	1,842,496

Source: Kenya National Bureau of Statistics, National Population Census, 2009

In terms of livestock production, Turkana County leads the other three counties in both milk and beef production. However, though the livestock numbers are large in Turkana County, their productivity is still relatively low. Makueni produces large amounts of milk (i.e. 65.7m liters/year), while Homa Bay only produces 30m liters of milk/year (Figure 3.3). The data for the study reported in Figure 3.3 is in agreement with that of *Elimika* Phase 1 study.

Figure 3.3 The population of livestock in study counties



Source: Agriculture Sector Development Support Programme 2015 (www.asdsp.co.ke)

Even though the dairy industry in Kenya is the most developed in the Eastern and Central Africa region, valued at US\$ 1.9 billion and accounts for 8 percent of the GDP, data from the Agricultural Sector Development Program 2015 indicates that the dairy subsector is less developed in the study counties. In Homa Bay, for instance in Suba, Ndhiwa, Homa Bay Town and Karachuonyo sub-counties, dairy goats are

being promoted by Heifer International and the Southern Nyanza Community Development Project. In Kwale County, livestock is kept for both food and income generation and contributes around 25 percent of the county income and about 20 percent of livelihoods in the drier zones of the county.

In Makueni, dairy production is concentrated in Kilungu and Mbooni West sub-counties, where climatic conditions are favorable and market access is growing. In Turkana County, where farmers are highly dependent on livestock, the prominent value chains being promoted by the county government include goat meat and milk, cattle meat and milk, camel meat and milk, hides and skins, fish, gum Arabic, and poultry.

In their development plans, the counties, except Nairobi, have identified livestock, particularly indigenous breeds, as priority areas for investment and improvement. Therefore, as the country and counties focus on poverty alleviation, employment generation and food security in the rural areas, livestock production provides a means through which food and nutrition security and poverty alleviation can be achieved.

However, it is important to note that there was no detailed data from *Elimika* or other sources to allow rigorous assessments of the livestock industry in the counties and to carry out in-depth comparisons between the counties.

Fisheries is an important (sub) sector in three counties. Homa Bay borders Lake Victoria, Turkana borders Lake Turkana, and Kwale borders the Indian Ocean coastline. Only Makueni and Nairobi Counties do not have large water bodies. In Homa Bay, fishing is an important activity which engages about 18,300 people and 3,600 families. The main types of fish harvested in Lake Victoria include Nile perch, Tilapia and Clarias (Omena). According to Homa Bay County Development Plan for 2013-2023, in 2010, the county had a catch of 12,000 tonnes valued at KES 9 billion. In 2012, it had 76,710 tonnes of fish, worth KES 7 billion. Of these, Nile perch contributed KES 5 billion and Clarias (Omena) contributed KES 1.7 billion. Homa Bay has 151 landing beaches managed by 133 beach management units (BMUs). Of these BMUs, 61 are in Mbita, 33 in Suba, 30 in Rachuonyo North and four in Homa Bay. Apart from Lake Victoria, there are several commercial fish ponds where fish, comprising mainly tilapia and cat-fish is farmed.

Lake Turkana is home to 48 known fish species, twelve of which are commercially exploited. They include Nile perch, Tilapia, Cat and Tiger fish. It is estimated that about 6,000 MT of the fish harvested supports about 11,000 fishermen, fish traders and transporters annually. Kwale County is endowed with a long Coastline stretching from Shimoni, Vanga, Msambweni and Diani to Tiwi areas, with about 40 landing sites. The main types of fish found are Rabbit Fish, Scavengers, Jack Fish

and King Fish. According to the county government records, there are 338 fish ponds and with a Fish Farming Enterprise and Productivity Programme in place, the number of ponds is expected to rise, increasing fish production in the county.

3.4 MANAGEMENT OF NATURAL RESOURCES

Water, forestry, fisheries, wild life and special ecosystems are critical sectors which support agriculture. These resources have significant roles in poverty reduction and employment creation. The sectors improve people's livelihoods through equitable distribution and sustainable management of land, forestry and wildlife resources.

Homa Bay County has 1227 km² of fresh water bodies with Lake Victoria being the main one. Kwale County has huge underground water catchment areas at Tiwi, Msambweni, Diani, Duruma, Uмба and Mwena, apart from bordering the Indian ocean. Makueni County has Athi and Thwake rivers, which are the only semi-permanent rivers serving the entire community. The rest of its water resources are manmade from shallow wells and dams. In Turkana County, Lake Turkana is the main water resource.

Forest conservation measures should be undertaken in order to preserve gazetted and non- gazetted forests from being overexploited or being encroached upon by adjacent settlements. All the four rural counties seek to increase the acreage under forest to 10 percent, in line with Kenya Vision

2030 and commitments to international best practices. The rural counties practice agro-forestry and other forms of sustainable agriculture, which contribute to better utilization of indigenous as well as exotic trees. Trees on farms, rangelands and woodlots are an important source of income, medicine, wood fuel and fruits. They not only act as biological pest control agents, but also improve soil fertility. For example, Homa Bay County has tourist attractions such as the Ruma National Park, the Winam Gulf of Lake Victoria, Rusinga and Mfangano Islands, Kanjira archaeological site, Volcanic Lake Simbi Nyaima in Karachuonyo, Asego and Homa Hills. Gazetted forests include Wire and Koderia.

In Kwale, the Kwale Forest Land Restoration model has been rated as a best practice, for protected area policy and programmes in the coastal counties of Kenya. The Kaya Kinondo sacred forest which serves as a sacred place of worship for the Miji Kenda, is a good example of the social value of forests, and a nature preserve. In Makueni, the county government has committed allocating substantial land for forestry. Participation in the conservation of Mbooni Dry Land Hill top forest is a good example that could be emulated by other counties. The recognition and

registration of private forest as extension of county forest cover, would provide an incentive to farmers and the private sector to increase the proportion of forest cover on their land. Turkana County has introduced the growing of prosopis (*Prosopis cineraria*), a new green crop in Kenya. In addition, the rehabilitation of degraded woodland and the ban of charcoal burning to save shrubs by the county government are commendable efforts.

Degradation of upstream catchments, mainly due to human population growth, triggered agricultural expansion in the counties and is already impacting water availability. Destruction of forests and wetlands in the counties, and the resultant biodiversity loss is also a key environmental challenge and concern. Population growth, agricultural expansion, over-dependence on wood fuels, and low levels of forestation have accelerated deforestation in the counties. The loss of forests and wetlands can have consequences for ecosystems and food security. Most of Kenya's population depends on wood fuels for cooking. It is estimated that at least 97 percent of households in Homa Bay use firewood or charcoal for cooking and heating. As the human population rises, associated increases in demand for farming and residential land will undoubtedly accelerate deforestation and exacerbate the effects of climate change in these counties. Forests are critical in the conservation of both fresh and blue water reserves, which, in turn, support millions of other species. Homa Bay County has a total land mass of 4,267.1km² of which 1,227 km² is covered by Lake Victoria's water, while Kwale, which is on the fringes of the Indian Ocean, and Lake Turkana in Turkana County are important natural resources. All these resources exhibit symptoms of degradation and pollution. For example, the persistent problem of the Hyacinth and declining fish species in Lake Victoria is associated partly with industrial waste being off loaded into the lake. In Turkana, the Lake Turkana is diminishing in size and is thus supporting less and less aquatic life.

3.5 EFFORTS TO BOOST FOOD SECURITY

The Constitution of Kenya, Article 43, recognizes economic and social rights for all citizens. These include the right to health care services, adequate housing, sanitation, adequate food of acceptable quality, clean and safe water and appropriate social security for vulnerable groups in the society. The role of the agriculture sector in achieving the right to food and its contribution to other industries and employment influences the attainment of other basic rights and hence the need to prioritize agriculture. In order to improve agricultural production, interlinked factors must also be addressed, including factors of production such as land and other natural resources. This is based on the realization that food security can be

achieved through improved productivity, production and diversity, in a sustainable manner that demands environmental conservation. In this regard, counties, through their development plans, have established priority legislation that advances the realization of social and economic rights through revision of land tenure and ownership systems, input provisions, training and capacity building as well as conservation of natural resources.

An important aspect for boosting food security is the devolved system of governance. Devolution enables resources to be brought closer to the citizens and promotes localized prioritization of projects and stronger stakeholder participation. Counties have invested in extension programmes, but a lot still needs to be done including linking research to extension programmes. The mentioned efforts cut across natural resource management, crop and livestock production, agro-industries and governance.

Kenya has a comprehensive National Agricultural Research Systems (NARS) policy developed in 2012 and meant to transform Kenya's agricultural research systems making them more dynamic, innovative, responsive and well-coordinated. NARS seeks to shift the focus from institutions development towards problem solving and impact driven research agenda; fast track national adoption of available technologies and knowledge; enhance capacity to access, borrow and adopt knowledge and appropriate technologies available world-wide; increase recognition of the important role played by the Private Sector and Intermediary Organizations (NGOs, CBOs); and adopt a business-like management style. It is expected that counties will take advantage of the reform process prompted by the policy.

County governments are making efforts to ensure adjudication of land, which is a key resource for agricultural production. Homa Bay County, for instance, has focused on the regularization of the land tenure system and ensuring that all land parcels have title deeds. Turkana County suffers from human rights issues, gender empowerment and insecurity. However, it aims to become a model of efficient management of natural resources, where residents have equitable access to development assets including land, water, and other renewable resources. In Makueni, only 19.8 percent of land owners have title deeds. There is also high incidence of landlessness in Kibwezi West and East Constituencies, which have 25 settlement schemes and about 5,000 squatters.

Kwale County's agricultural growth suffers most from inequalities related to land resources. Top in the county's agenda is adjudicating the relevant land for distribution to local communities. The county, therefore, needs to develop a database of squatters and landless persons, establish settlement schemes for deserving

community members, issue title deeds to beneficiaries of settlement schemes, and effect gender balance in the beneficiaries of land resources.

Counties will benefit a lot from the on-going national land adjudication and registration process which must be accelerated to encourage investment and reduce conflicts. This should lead to efficient land adjudication process, solving land and boundary disputes, digitizing land records and issuing of title deeds.

The five counties except Nairobi reported that frequent crop failure and poor crop harvest is the result of unreliable rainfall. Accordingly, rain-fed agriculture can no longer sustain the current magnitude of the population in the counties. Similarly, livestock deaths due to drought, also affects these four counties. Water is an important input in agricultural production, and therefore, investment in water harvesting and irrigation is one sure way of ensuring sustainable food and nutritional security.

There are several irrigation projects and irrigated agricultural potential in four of the five counties. These present opportunities not only for increased cereal and horticultural crop production, but also irrigated fodder and crop residues that would support increased livestock production.

Homa Bay County for instance, has potential for 8,966 hectares of irrigated agriculture, yet only 13.3 percent of the land is presently under irrigation. Major horticultural crops grown under irrigation include kales, tomatoes, onions, capsicum and water melon. The major irrigation scheme in the county is the Oluch-Kimira irrigation scheme in Rachuonyo North, a government funded project established to combat frequent crop failures, and the resulting food insecurity in the area.

In Kwale, river basin irrigation and other water-based projects are dependent on the Ramisi, Marere, Pemba, Mkurumuji, Umba, Mwachema and the Mwachi river drainage systems. According to the county's plans, these systems have been prioritized for irrigation purposes. Kwale also has huge underground water catchment areas at Tiwi, Msambweni, Diani, Duruma, Umba and Mwena. There are also private and public irrigation projects associated with these river catchment areas.

The Athi and Thwake rivers are the only permanent and semi-permanent rivers in Makueni. Nonetheless, there are about a dozen water management community projects that include dams, irrigation schemes and boreholes. Most of the population depends on surface and sub-surface dams for water, which often do not hold sufficient water. The county government is increasingly investing in water conservation programs as well as sinking boreholes to support improved crop and livestock production.

There are about 22 irrigation schemes in Turkana, of which only 13 are functional (Oduor et al., 2012). The county relies primarily on rain-fed agriculture. Given the inadequacy and unreliability of rainfall, the county government is investing heavily in rainwater harvesting.

3.6 CHALLENGES

There are several challenges confronting the attainment of food security in Kenya which cut across the five counties. Planning and predictability of agricultural activities have been adversely affected by climate change. Climate change effect is making the rainfall patterns to be more unreliable, in terms of timing and intensity, and over-reliance on rain-fed agriculture exposes producers to negative impacts of climate. Fluctuations in rainfall and temperatures result in increased incidence of new pests and diseases leading to low crop yields and post-harvest losses. With respect to livestock production, climate change reduces water volumes while extreme high temperatures during the dry seasons dry wells, streams and rivers.

Inadequate resourcing of the agricultural sector is also a challenge. Although agriculture has been devolved, the provision of financial and human resources is far from adequate. Counties lack qualified extension personnel and the few staff available are under-resourced, hence are unable to reach farmers with extension services. The result is an ineffective extension service for farmers. This poor support, coupled with poor roads and poor rural infrastructure, make farmers in these counties less competitive.

Converting agricultural land to other competing land uses implies that less land is available for agricultural production. These land use changes have been exacerbated by high population growth that, in turn, leads to increased land fragmentation and loss of agricultural productivity. The resulting food supply deficits places an upward pressure on food prices and inflation. Rising population pressure on agricultural land also promotes environmentally unsustainable production practices such as cultivation on steep slopes and encroachment into forests and wetlands, in some counties.

Production and productivity are affected by the quality of farm inputs used. Based on the baseline report, few farmers use certified inputs, which often results in lower and often declining yields. In Kwale for example, survey data indicated that only 26.7 percent of the surveyed households reported using certified fertilizer, 38 percent reported use of certified pesticides, while 43.3 percent used certified seeds. The source of the inputs, included recycled seeds from the previous crop (43.4%) while local shops and Agrovet outlets accounted for approximately 31.6 percent and

13.8 percent, respectively. Some farmers received seeds from the cereals board or borrowed from their neighbors and friends. In Makueni, only 42, 27 and 31 percent used certified seeds, fertilizers and pesticides, respectively.

The low use and recycling of farm inputs (seeds) was also common in all rural counties. In this regard, county governments can play a critical role in ensuring that farmers have access to quality inputs in order to improve their production. However, in some counties, these facilities are yet to reach a wide number of farmers. For instance, although key informants in Makueni confirmed that the county supplied inputs, only 11 percent of the respondents had received them. In Kwale 51.5 percent

were not aware of the services and facilities available to them from the government while in Homa Bay County respondents were yet to feel the impact of the county government's initiatives.

County governments have facilitated the construction of fruit processing in Makueni, development of fish landing points in Turkana, Homa Bay and Kwale. Construction of maize mills, feed as well as potato processing, have been initiated in Homa Bay

It is clear that there is either low awareness on the efforts that county governments are making or that the facilities provided are inadequate to ensure farmers get inputs. This calls for a proper and efficient input distribution system to benefit more farmers. A good avenue towards realizing an effective input distribution and utilization system is to provide incentives to the private sector and

stockists to bring supplies closer to the farmers. Traders and farmers should be trained on proper use of inputs.

Equally important is the question of knowledge and skills needed, which is often a constraint to the efficient and effective utilization of inputs provided. Only a few study respondents had been trained, mainly on crop production including training on crop varieties, crop and livestock husbandry, and postharvest handling. This however varied across the counties. Respondents from Nairobi had the greatest number of training sessions. This could be due to their proximity to the capital, which has many learning institutions and government agencies. Up to 27.8, 21 and 12 percent of respondents from Kwale, Makueni and Homa Bay, respectively, had undergone some form of training. The training is often conducted by government agencies through extension staff. Interestingly, in Homa Bay, majority (82%) of the training was carried out by NGOs.

Other challenges that relate to food insecurity in the country include:

Theft of grain and stock: This is a reference to the perennial and debilitating activities such as grain and stock thefts that disrupt food production and distribution causing recurrent episodes of starvation, requiring huge support and intervention by the government and development partners. Cattle rustling is rampant in Turkana County, but is also known to affect the other counties. Theft of grain from the field and in storage is increasing countrywide.

Low use of the 200-mile Exclusive Economic Zone (EEZ): Hitherto Kenya has not been fully equipped to exploit its 200-mile exclusive economic zone which is responsible for the small-scale exploitation of fisheries and other marine resources. This is partly due to lack of technology and shipping trawlers in Kwale County within the marine borders. It is hoped that this will soon change.

Low livestock productivity: Most livestock breed types kept in the four counties surveyed, except Nairobi, are indigenous, and their production levels are dismal. Although their productivity could be improved, there are no programs to ensure that future livestock populations are produced by the best males and female animals available. Implementing simple recording selection programs would improve the overall performance of these livestock. Mating of closely related individual animals should be avoided. Organized exchanges of breeding stock between communities should be encouraged. Unplanned breeding should be avoided. The productivity potential of smallholder dairy farmers is limited by unreliable access to productive and adapted dairy cow breed types that best suit their production systems. Counties do not have systems for the production or multiplication of such animals or breed improvement programs. Whilst many farmers keep cross-bred animals, they neither have the means of ascertaining the type of cross-bred animal they keep, nor do they have knowledge on whether an alternative cross-bred type would be more profitable for their system.

High cost of inputs and services: Inputs such as animal drugs, feeds and implements are costly, and are often of poor quality. Services such as artificial insemination is available, but the costs are high because farmers are not organized enough to benefit from collective action. Often, corruption and poor regulatory frameworks undermine farmer efforts. Poor infrastructure also contributes to the prevailing higher input and service costs. For example, where roads are poor, service providers such as artificial inseminators charge farmers more. In the four counties, few farmers keep improved dairy cattle, so the service per unit of Artificial Insemination (AI) service is relatively high. Increasing the number of such animals would guarantee lower costs per unit service.

Ineffective and adulterated inputs: Inappropriate farm supply especially veterinary, drugs, pesticides, animal feeds and equipment, reduce profit margins. Poor quality and inappropriately prescribed and administered drugs not only lead to increased short-term costs, but also make parasites and pathogens develop resistance to the drugs, rendering such drugs ineffective. Poor quality inputs breakdown soon after they have been procured which translates into frequent replacements. Mechanization and automation of production would go a long way in improving production and lowering costs. The paucity of mechanization makes livestock farming unpopular among the youth and women.

Insufficient access to quality and timely extension and market information and services: Extension services are generally inadequate and poor. Training of extension staff is lacking due to poor resourcing of training institutions, for example, farmer training institutions are few and the resources allocated inadequate. Even though information is more readily available on the internet, such materials are not packaged in forms that are easily understood and are hardly contextualized to local realities.

Focus on subsistence and not on commercial farming: In all counties except Nairobi, a majority of livestock farmers practice subsistence rather than commercial livestock farming. The paucity of an agribusiness orientation prevents farmers from embracing improved technologies and practices. The ultimate results are poor performance and low profitability. This mind-set ought to change through participatory capacity building as well as sensitization by Counties, Central Government and NGOs.

Inadequate access to financial services: Majority of the farming communities have little access to financial services, and even when they do, such credit facilities are ill-structured and thus not suited to the nature of livestock production. For example, a farmer may access credit to purchase an improved dairy heifer, but there is no provision for an adequate grace period that allows repayment schedules to coincide with the cow's biological processes such as gestation, followed by lactation. The borrowers are often required to start paying before the heifer calves down, making it difficult for farmers to service the loan. This situation complicates the cash flow to an extent that the management of the animal is compromised. Invariably, farmers use the resources available to repay the loans instead of buying animal feed.

3.7 OPPORTUNITIES FOR BOOSTING FOOD SECURITY

Several opportunities for increased agricultural productivity, jobs, income and wellbeing of the people exist in each of the five counties. From the available data, all the four counties except Nairobi use less than 50 percent of their potential arable land

for agriculture. The available water resources allow for additional land utilization. Therefore, there is huge opportunity for expanding agricultural production either through rain-fed agriculture, irrigation or both. The large population of indigenous livestock can be improved through, for example, cross breeding. In addition, there is a lot of unexploited and some not fully exploited opportunities in indigenous crops, fruits and emerging livestock types that can boost production and earn farmers extra income. For example, ostrich, mushroom production, quail, butterflies, wild fruits, and pumpkin farming are some of the undertakings that can broaden the farmer's food basket.

Except for Makueni, the other counties have plenty of water, potentially available in the form of rivers and lakes, all of which are not yet fully exploited. Makueni County has embraced rain water harvesting and conservation of water in dams, and drilling wells and boreholes to boost water harvesting for domestic use and agricultural production.

In all the counties, the youth form the highest proportion of the human population and are a potential labor force. The youth can quickly embrace technologies such as information and mechanical technologies, and urban farming which could transform the agricultural industry to a more efficient level. Improved access to market information, collective action in form of well managed business focused farmers groups and cooperatives, and better access to inputs and market services would help enhance the competitiveness of farmers in the counties. However, enabling local and national government policies need to be formulated and implemented.

Dynamic technological changes are occurring, offering farmers and value chain actors unprecedented opportunities to access timely information (technical and market), while biotechnology is enabling farmers to access more productive and resilient crop varieties and animal breeds. The collective benefits of these technologies, if optimally harnessed, can transform agriculture in the counties.

For example, in livestock production, a combination of smart application of information and genomic technologies, the availability of vaccines against diseases such as East Coast Fever that was a barrier to the introduction and expansion of commercial dairy production, and adoption of accelerated reproductive technologies (that is, use of sexed semen and fixed time artificial insemination service in cattle) can help introduce and rapidly multiply more productive and locally adapted livestock breeds and make them easily accessible to farmers in the counties (that is, in three to four years). This would replace, through a more informed

manner, the less productive animals that are currently kept by the farmers. Use of hand-held machinery to replace animal draft power would help open more land, leading to timely planting. This would lead to higher productivity per unit land area and livestock unit and would make agriculture more attractive to youth and women. Therefore, counties should embrace technology in order to catch up with the traditional Kenya's breadbasket counties such as Trans Nzoia, where there is always surplus production.

County governments have facilitated the construction of fruit processing in Makueni, development of fish landing points in Turkana, Homa Bay and Kwale. Construction of maize mills, feed as well as potato processing, have been initiated in Homa Bay. Agro-processing and value addition industries in these counties are low and more investment is still needed. For example, Turkana County would strongly benefit from meat processing and leather tanneries, given the huge livestock population in the county.

There is a lot of potential in inter-county trade. In Kwale, for instance, in addition to Ukunda and Kinango markets, the county borders Mariakani and Kongowea market in Kilifi and Mombasa Counties, respectively. The main livestock markets in Kilifi include Mwangulu, Kinango, Mwakijembe, Samburu, Vigurungani, Taru, Malomani and Kasemeni, in the livestock farming zone, and Msambweni, in the mixed farming zone. Homa Bay is densely populated providing a ready market for many farm products. Turkana County is closer to Congo, Uganda, South Sudan and Ethiopia, which would provide an enormous opportunity if a facilitating physical infrastructure is put in place. Makueni is close to Nairobi where the demand for fruits is high with the potential for export.

Cooperatives have proven to be very useful in bringing farmers together and acting as channels for capacity building and extension programmes and farmer to farmer learning. Additionally, farmers have gained from the savings and loans provided by the cooperative societies in agricultural production. The cooperative movement is very strong in Makueni County, to the extent that almost every farmer is a member of a farmer's group. In the other counties, the practice is not very strong though farmers are starting to embrace cooperatives. County governments are also promoting farmers' group, for example, the Oluch-Kimira Farmers Development Group with leadership from Irrigation Water Users Associations in Homa Bay County. In Kwale, the county government is encouraging farmers to form groups to benefit from county facilities such as tractors, seeds and fertilizers.

The sustainability of agricultural production will depend on environmental sustainability. The five counties studied should start being more conscious of

climate change adaptation and mitigation, and this should be reflected in their development plans. This may have the effect of minimizing the impact of climatic shocks in the agricultural production systems, and by extension, enhancing economic development in the counties.

Collaboration between county governments and agricultural institutions is recommended to boost food security. The African Dryland Institute for Sustainability (ADIS) of the University of Nairobi, located at Kibwezi in Makueni County, for instance focuses on training, research, extension and sustainable management of natural resources. ADIS, is developing technologies for sustainable livelihoods and informing policy to promote transformative education fostering community empowerment in the dry lands. The Institute offers opportunities for resilience building and economic growth in the dry lands.

3.8 CONCLUSION

The study sought to establish the knowledge gaps in people's understanding of the Constitution of Kenya 2010 and devolution system and how that influences citizen participation in development agenda. This particular chapter focused on devolution and its impact on the agricultural sector, given its contribution to livelihoods, employment, national development, and food security. The chapter was necessitated by the fact that agriculture is still the core sector for livelihoods, employment and contribution to national development growth. Additionally, the majority of population residing in rural based counties and underdeveloped areas in Nairobi County experience food insecurity.

There is evidence of improved service delivery especially in health care, infrastructure, educational facilities and access to water attributed to devolved systems despite the short comings experienced, as expected in the early phases of devolution. In agriculture, counties have taken advantage of the system to focus on initiatives aimed at achieving food security. Agricultural production and management of natural resources for example are areas the county governments are demonstrating the strength and benefits of devolution. For example, improvement of livestock production through artificial insemination technology in Kwale and, promotion of diversification of agricultural activities in Turkana. Investing in water harvesting technologies in Makueni County, and the development of maize processing plant, value addition, and improvement in market access to farmers in Homa Bay, are some of the initiatives that can be attributed to devolution in these counties.

The devolved system of governance indicates a lot of potential and provides an effective means of achieving food security at county and national levels by improving

resource allocation, prioritization and management. Active and knowledgeable citizen participation is an integral part of the strategy. Knowledgeable citizens can engage and contribute in decision making on resource allocation, management and monitoring. This will result in mainstreamed and integrated sectoral service provision for better development, employment creation and stronger agricultural development. In terms of natural resource endowment, except for Nairobi, which is experiencing land shortage, the remaining counties have relatively large tracks of land which can be efficiently used to boost production. Realization of food security will perhaps lead county governments to collaborate with national government and streamline agricultural policies and incline their efforts towards better citizen engagement particularly in farm inputs, capacity building, resources management, market management and agricultural diversification.

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