

Effects of Socio-Economic Factors on Food Security Situation in Kenyan Dry lands Ecosystem

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ABSTRACT— *This paper is based on a study carried out in 2011 to examine the effects of socio-economic factors on food security situation in the Kenyan dry lands ecosystem using Tseikuru division as case study. Using a wide palette of data collected from 100 households and analytical approaches, the thrust of the study outcomes reveal that Tseikuru Division is a food insecure area. This, to a large extent, is a function of human factors, which include but not limited to; the prevailing marketing system, farming practices, household income and expenditures, traditional cultural values and availability of essential services. Additionally, the prevalent food insecurity mitigation measures adopted by the inhabitants coupled with poor agricultural practises especially in soil and water conservation have also considerably impacted on the prevailing food security situation in the area, and other dry land areas of Kenya. Tackling food shortages and insufficiency in Kenya's dry lands therefore requires addressing not only physical and/or natural factors but also focusing on socio-economic factors.*

Keywords--- Food Security, Socio-economic Factors, Dry land ecosystem

1. INTRODUCTION

Food is a basic human need. The right to food is fundamental and without it many other human rights cannot be enjoyed (Josanthony, 1999). However, the accessibility and availability of food in the desired quantity and quality throughout a given year remains a dream for many people around the world (Sen, 1995). Instead, food insecurity is more common and is a defining characteristic of many developing countries and dry land ecosystems. People living in dryland ecosystem of sub-Saharan Africa and Kenya in particular, continue to struggle with hunger, frequent famines and associated consequences such as loss of lives, savings and wealth, sicknesses, and hopelessness.

Like many other sub-Saharan Africa countries, Kenya has faced frequent incidences of food deficit in recent times so much that hunger is evidently one of the greatest problems facing the country today. The frequency and magnitude of hunger in Kenya is a major impediment and is catastrophic to the national development agenda (FAO, 2005). According to the WFP (2009), it is estimated that 10 million Kenyans are food insecure. This number includes 3.2 million drought affected residents in the marginal agricultural areas, 850,000 school children who have been included in the expanded School Feeding Programme, 150,000 persons displaced by the post-election crisis that remain extremely food insecure, 3.5 million urban dwellers, and about and 2.2 million persons affected by HIV and AIDS, including orphans.

The prevalent high food and non-food prices, crop failure, livestock diseases, and conflict have compounded already precarious food insecurity, among the groups mentioned above (Joseph, 2004). This clearly shows that people in the Kenyan dry lands represent a sizeable portion of the potentially hungry and vulnerable people to food shortages. Tseikuru division in Mwingi district is a clear representation of dry land ecosystem Kenya facing serious food insecurity problem. Whilst various studies (Tiffen, 1994; Berry, 2003; Mbithi, 1998; and Hazzelip, 2002) have revealed that physical and natural factors (drought, soils, temperature, diseases, and pests) contribute significantly to food insecurity in the dry lands, there is growing recognition that many more factors affect the food security situation in these areas. These include socio-economic factors such as, poor agricultural practices, low levels of household incomes and expenditure patterns, and marketing practices. Subsequently, this paper has addressed the socio –economic factors affecting food security in the dry land ecosystems using Tseikuru division as a case study.

2. THE STUDY AREA

Tseikuru Division which lies between latitude 0° 03' and 1° 12' south and longitude 37° 47' degrees 38° 47' east is located in the lowlands of Mwingi District in Kenya and covers an area of 5,224.3 sq.km. The climate of Mwingi District is hot and dry for a greater part of the year with an average annual temperature of 24°C. Tseikuru Division is generally dry compared to some other parts of Mwingi District, particularly the highland areas of Migwani, Mumoni, Central and Mui Divisions which receive a relatively higher amount of rainfall. This Division, as well as Nguni, Ngomeni, and Nuu Divisions experience frequent drought which often leads to loss of livestock and food shortages. Two rainy seasons are experienced in Tseikuru Division; long rains between March and May and short rain between October and December (ROK, 2005). Rainfall ranges between 400mm and 800mm per annum but it is erratic. Soils are mostly sandy soils with low fertility and prone to erosion According to the 2009 Census data, the Population density of Tseikuru Division is 25 persons per sq.km. This makes it one of the least populated divisions in Mwingi District.

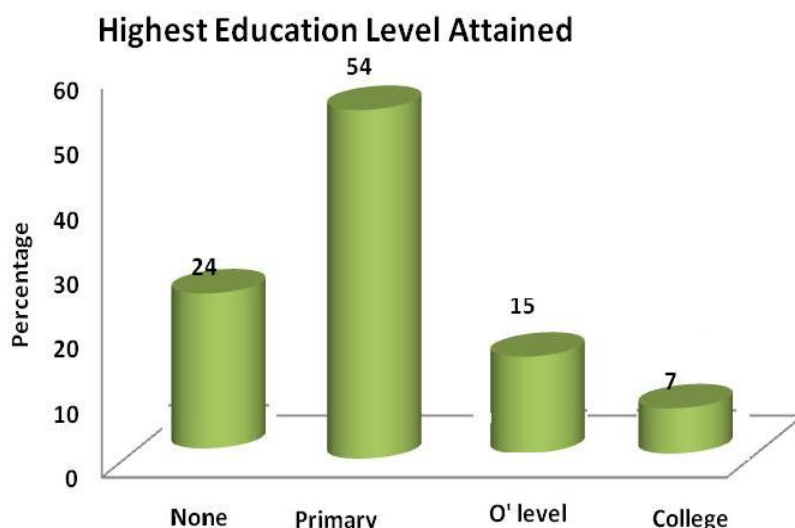
3. MATERIALS AND METHODS

The requisite data for this study was collected from both primary and secondary data sources in 2011 and individual households in Tseikuru Division constituted the unit of analysis. A sample of 100 household heads from a population of 6,402 households in the Division was obtained using both multi-stage and systematic random sampling approaches. In addition, purposive sampling was used to select 12 representatives of both government and non-governmental institutions working in the Division. Given that the requisite data was both qualitative and quantitative in nature, data processing and analysis made use of a diversity of skills which included qualitative and quantitative analysis techniques.

4. RESULTS AND DISCUSSION

4.1 Socio –economic factors affecting food security In Tseikuru Division and the mitigation measures

Data on the past experiences of the local people regarding food availability or otherwise is a clear indicator of the food security situation in the area. Majority (93%) of the 100 households interviewed indicated that they had experienced food shortages in the recent past. Of these, 66% were completely food insecure having experienced food shortages for most of the year. Notably 54% of these vulnerable households were female headed. Lack of land and other resources such as livestock, money and good shelter needed to facilitate farming activities were identified as the major contributing factors to food insecurity in the area. Other factors include low educational standards evidenced by 54% of the respondents having attained primary level of education, 24% without formal education and only 20% with either secondary or tertiary education as shown below. About 2% did not complete tertiary education and therefore could not be include in the categories discussed. This has contributed to overdependence on agriculture as the only source of income due to limited marketable skills for employment. Figure1: Respondents education attainment



Source: Field Survey Data 2011

limited access to land ownership and other valuable assets by women adds to list of factors contributing to food insecurity. The male gender is more advantaged in property control and better access to education; a bias that leads to problems such as unplanned selling of food, and less involvement in farming activities, which culminates to food

insecurity. Besides relying mainly on farming and livestock keeping for income, residents also depend on other income sources which include household labour, charcoal burning, small businesses, illicit brew, children support, pension payments and making bricks and ballast for construction. From these sources, the average household income shows that 82% of the households earned less than Kshs. 2,500 per month (30 US dollar per month) which translates to Kshs. 30,000 per annum (350 US dollars per annum); indicative of the high incidence of poverty and a low purchasing power for most of the households. The dependency on farming as the main source of income, coupled with low prices of farm products and livestock in the local markets are the main contributors to this scenario.

Allocation of household income expenditures is prioritized with food purchases leading (54%), followed by school expenditures (24%) and healthcare being the least (9%). Other home expenses were allocated 12% of the incomes. Most of the residents have to buy food from markets because after harvests they sell much of their farm outputs and livestock to fulfill the household needs. Purchase of agricultural inputs such as improved seeds and fertilizers accounted for a paltry 1% of the households' expenditure indicating that farmers invest less on improving food productivity. With an average household size of 6 members, most of the households can hardly meet and sustain their food needs especially during food shortage periods. Given this, different households have adopted varied coping strategies which include; adoption of short term dietary changes such as avoiding lunch meals and taking only supper and light breakfast, reducing or rationing household consumption to severe dietary changes such as going for an entire day without eating and altering intrahousehold distribution of food through consideration of the young and denial to the grown ups. Short term labour migration to more food secure neighbouring areas such as Meru, Chuka and Mbeere and mortgaging and selling of assets especially land and livestock, together with purchasing food from the market to supplement own production are also important coping strategies. However, this purchasing is limited owing to their low incomes, high prices and sometimes unavailability of required food items. The main food stuffs regularly brought to the markets include maize and pulses (e.g. beans) which are rarely produced in Tseikuru. Whilst a good proportion (69%) of the population relies on relief foods, at least 4% relies on wild foods such as *tamarindus indica* and seeds from baobab trees to supplement the little available food.

The frequent food shortages in Tseikuru Division can be explained by factors such as low food production influenced by less crop diversity, poor soil management, planting of wrong seeds and rainfall inadequacy among others, inability to afford food from the market, and low income per capita. Indeed, food insecurity in the area is not so much about scarcity but affordability of the foods given the low potential of the households to purchase enough from the market to meet their needs. Most of the food brought to markets from Meru, Tharaka, Thika, Mwingi, and other areas are usually expensive compared to the locally produced foods such as millet, sorghum, green grams and cow peas. During harvest spells in the months of February June and July, food is usually adequate and is sold by farmers at very low prices which tends to double or triple during famines or food shortage periods. Severe food shortages tend to occur a few months after harvests mostly between the month of August and January. According to the Mwingi District Strategic Development Plan (2005-2010), the district has a high prevalence of poverty estimated at 60 per cent with the poor residing in the driest divisions of Tseikuru, Kyuso, Ngomeni, Nguni and Nuu while Migwani, Central and Mui have the least poverty prevalence. Food insecurity in Mwingi District and Tseikuru Division in particular is perennial as can be said of other districts of Ukambani and semi - arid areas of Kenya more generally.

4.2 Influence of Agricultural Practises and Post – Harvest Handling on Food Security

Most of the households (83%) in the area are small scale farmers who practice both crop farming and livestock keeping. Low crop diversity contributes to food insecurity with traditional crops such as millet, sorghum, green grams, cowpeas and pigeon peas being the common crops. At least no new crops have been introduced in the area in recent years. Livestock breeds kept in the area are also traditional types. The prevalence of animal and crop pests and diseases tends to limit productivity of both crops and animals in the area. This is compounded by poverty, ignorance, lack of exposure and cultural conservativeness among the local people. Farmers in Tseikuru rarely use animal manure or industrial fertilizers on their farms with only (39%) using these farm inputs, albeit in small quantities. Livestock manure is readily available in the local area with manure from goats, sheep, cattle and chicken lying un-utilized in many homesteads. The few farms utilizing fertilizer or manure application tend to register high agricultural production compared to farms without such application. Interestingly, none of the households using manure or fertilizers on their farms were among the 66 households said to be food insecure. Out of these, 39 household heads had formal education at either primary, secondary or college level.

Nonetheless, there is effort to change these habits, through implementation of water and soil conservation projects in this area. Germany Agro Action is carrying out soil conservation awareness and capacity building in the area through "food for work" programme. As a result, a considerable number of farmers have dug benches and constructed terraces on their farms. Farms with such soil conservation measures were noted to have improved fertility and food productivity. This serves as evidence that these soil erosion prevention measures will improve food availability in this area. Despite

the fact that such activities will help to improve soil fertility and eventually farm productivity, the practice is not widespread and only few farmers appear to have taken the issue of soil conservation seriously.

Water harvesting and conservation has improved though not widespread at individual household level, in the area in recent years. Germany Agro Action has made a commendable efforts in promoting water conservation for domestic and livestock consumption by constructing earth dams and sand pans through ‘food for work’ programmes in the area. These structures serve as water reservoirs and sand pans in most seasonal rivers to raise the water table. This has improved water availability in the area hence saving peoples’ time in search for water and instead being utilized in other economic and household activities.

Poor food storage was found to be another factor aggravating food security situation in Tseikuru. Field observation indicated that after harvesting food, notably millet, sorghum, cow peas and green grams, the local farmers do not thresh it at once in large quantities. Instead they keep it in their small granaries and pick bit by bit threshing for sale or household consumption. This was noted as one mechanism of avoiding using up the harvest fast to the extent of encountering household food gaps just a few months after harvest. But the consequence of keeping food without any preservatives is that a lot of it is destroyed by weevils.

It was evident from field observations that 54% of the local households interviewed have no food stores, which is indicative of serious food storage problems. Whenever such households had good harvests, they are forced to process their food stuff fast and sell it at low prices to retain only small quantities which they are able to maintain. Such food management practices were observed to be contributing to food insecurity in the area.

4.3 State and influence of the local marketing system on food security

Almost all respondents argued that marketing system in Tseikuru Division is not well organized or controlled for the benefit of all. But it is seriously skewed in favour of the rich business people and other well off categories. The local farmers and average inhabitants of the division do not appear to get a good deal from the market, particularly due to poor pricing of their produce. For the average household, the marketing system in Tseikuru Division remains a main cause of food insecurity in their community.

There are several reasons discovered in this study to have created this situation. Firstly, most farmers sell a lot of their food during harvests at mostly low prices. Secondly, the same farmers buy foods from outside their area (those they do not grow e.g. beans and maize) at high prices. Thirdly, during the times of widespread food shortage, local households have to purchase food stuffs at exorbitant prices. Fourthly, a large part of the food sold by the local farmers in local markets is transported out of the Division which affects the aggregate food stocks available in the division to remedy short term food shortages and thereby keeping food prices at affordable level. The effect of all this is that the local farmers, and indeed the average households in the study area engage with the local markets and their main operators (middle men) from a disadvantaged position.

The findings indicated that (82%) of the interviewed respondents usually sell their farm produce in Tseikuru market centre which is the main market for all the 3 locations (Musavani, Tseikuru and Masyungwa) comprising the division. The main traders come from Nairobi city, Thika and Mwingi towns. Information obtained from the traders involved in the study revealed that traders from these areas do not carry out the actual food buying transactions but give money to local middle men who buy food stuff from local farmers at throw away prices and in the process earn fat commissions.

The study also noted that the food sellers (local farmers) have little or no bargaining power for the prices of their produce. Prices are usually determined by the middle men. After selling the food, some of it is transported and sold at twice or triple the buying price in the big urban centers either in Nairobi or other areas in the country. The remaining food which has been sold to the local traders is stored and later sold to the same farmers at very high prices. Due to lack of better sources of income, the local inhabitants have to sell a lot of their foods at throw away price to meet their other needs. This has devastated Tseikuru residents who appear bound to the production-market-expenditure cycle that is weighed on heavily by unfair market practices. Table 1 below shows the factors influencing the present marketing conditions.

Table 1: Factors Influencing Marketing Conditions

Influencing Factors	Frequency	Percentage
Poor road infrastructure	70	62.5
Low farmers bargaining power	80	71.4
middlemen influence on pricing	84	75.0
Less governmental involvement	67	60

Source; Field data 2010

4.4 Infrastructural Facilities and their Influence on Food Security

Poor road infrastructure and unfair marketing practices in Tseikuru Division were noted to have been contributing a lot to the un-affordability of food stuff in the local markets. The poor status of roads inhibits food distribution within and outside the division and therefore prices are controlled by the market forces. Many farmers depend on donkeys and bicycles as the main means of transportation. Poor transportation inhibits local farmers' ability to move their goods and services to places where prices could be better. Consequently 70% of the respondents claimed that they are forced to sell their produce at low prices to avoid carrying it back home whenever there are unfavourable prices in the market.

Water availability in sufficient quantity and quality was noted to be affecting food security in Tseikuru. The researcher through field observation found out that much time is spent by inhabitants on search for water. At most people in this Division travel for about 3-6 kilometers to fetch water with donkeys, a distance which on average takes about 3 hours. This translates to time consuming at the expense of farm activities and other house responsibilities like scaring of birds and wild animals which destroy crops, especially millet and sorghum. The overall effect is low own food production as enough time is not devoted to crop and livestock production and part of the potential food produce is destroyed while still in the fields.

4.5 Influence of Traditional Cultural Beliefs and Practices

There is much inclination to traditions and cultural values in Tseikuru Division which has been contributed by low formal education attainment among the inhabitants as shown in figure 1. majority of the inhabitants have either primary school education or have not attained any formal education at all. This is evidence that illiteracy is relatively high in this area hence contributed very much to underdevelopment. Due to low education level and influence, many farmers have been buying wrong seeds from markets. When planted and coincidentally having poor production, most farmers neglect new seeds and stick to their own varieties because they believe that the best seeds are those obtained direct after harvest from their own locality. Introduction of new seeds by agricultural agencies is not much welcomed. This has led to less crop diversity. Similarly, use of pesticides is not widespread among the farmers. They depend on old methods of smoking the green millet especially when invaded by caterpillars and spreading ashes on cowpeas to kill insects. Sticking to such practices has caused great losses of food whenever there are pests or disease outbreaks

Various cultural beliefs and practices appear to exert considerable influence on food security and education status in the area. These include beliefs and practices around property ownership rights, desirability of the local crop and animal varieties, food habits, drinking of illicit brews and poor control of pests and disease. Control of household property and wealth, including the farm produce was reported to be affecting food sufficiency among the local households. The local women were reported to possess no right of property ownership to the extent that land, children, and all household property are vested on men. When food is harvested 40 % of the respondents reported that ownership and direction of its usage is usually made by men and part of the harvested food end up being sold and wasted on unnecessary expenditures such as drinking of beer. This exposes households to food shortages and starvation. Traditional beliefs and practices were discovered to have also influenced food sufficiency in the study area in relation to desired family sizes.

Analysis of field data indicates that family planning may not be widely practiced by the local households as indicated by the medium to large household sizes in the study area. This is due to a prevailing belief and desirability for large families. This is indicative that the local households could be overburdened with food and other household requirements to meet the demand of large families. Majority of the households (54%) had more than five members. Bearing of children and raising large families is overwhelming for the local households and reduces their concentration on farming activities. It also puts up various other demands to households including time and money for health care needs, food, among others. Large families are indeed difficult to feed especially in the study area which is perennially food insecure.

4.6 Influence of Household Income and Expenditure Patterns on Food Security

Most of the residents (86%) in Tseikuru solemnly depend on farming and livestock keeping as the main source of their income. This results to low income per capita implying that their purchasing power is quite limited. They depend on crop and livestock to get money despite the fact that they sell at very low prices. In order to supplement this, these inhabitants have turned to small scale balast production, bricks making, burning of charcoal and illicit brewing.

Households with permanently employed persons in the study area who can supplement the farming income in fulfilment of basic needs were only 15%. Majority (85) of the households had none of their members permanently employed. This may also imply that the few who have permanent jobs experienced high dependency syndrome from other household members and the immediate relative especially during famines. Eighty percent of the interviewed household heads reported that when there is drought or influx of livestock in the market then these residents have no any

other choice other than selling their products at low prices to fulfill household needs. This also contributes to food shortage in Tseikuru area.

Household income was also reported to be inappropriately used to buy unnecessary items. Division administration officer and other administrators interviewed on this issue argued that some people changed their lifestyles drastically upon harvesting and selling their farm produce. This included change of diets i.e. from normal to expensive diets, buying of new and expensive clothes, and holding expensive social activities. Some people even move to the urban settings to spend such their short lived income. These lifestyles funded from sale of farm produce were reported to not only have aggravated the food insecurity situation of local households but also contributed to the spread of anti-social activities such as drinking of illicit beer, prostitution and spread of HIV/Aids especially in the trading centers within the study area.

The assumption that socio-economic factors do not exert a great influence on food security situation in Tseikuru Division could not be adopted in this study. The findings have shown clearly that these factors are greatly affecting food security in the dry land areas and food security will only improve if these factors are considered by the government and other institutional organizations dealing with this problem.

4.7 Effects of food insecurity mitigation measures on local environment

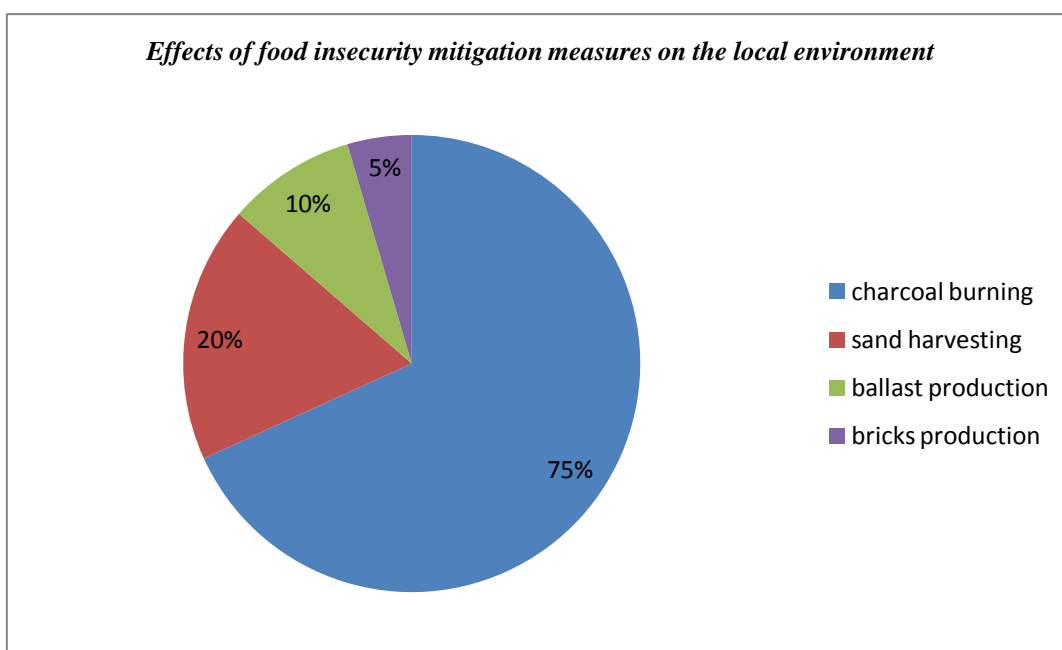
The study findings shows that, some of the strategies used to address food insecurity problem are less harmful to the environment, while others though boosting the household income have negative effects on the environment. They have contributed to land dereliction and desertification in Tseikuru Division due to severe soil erosion.

Seventy five percent of the respondents confirmed that charcoal burning has adversely affected Tseikuru environment especially in Ngongoni sub-location where there is widespread charcoal burning. Much deforestation is taking place and deterioration of crop productivity is now evident. Due to removal of the vegetation cover during charcoal burning process, much land has been left bare hence being exposed to severe soil erosion.

Another coping strategy noted to have effect on the environment was bricks making which is practiced in Nthiitu village near Tseikuru market. These bricks are commercially made for use in the construction of commercial buildings within the market. This activity has caused much land dereliction with many holes dug and left. This environment encourages mosquitoes breeding which also affect the surrounding population through spread of malaria disease which was affirmed by 25% of the respondents interviewed near the market centre within Tseikuru sub-location.

People are also engaged in sand harvesting from river Nziitu which is just a few meters from Tseikuru market to sell to constructors. This activity has been taking place over a long period of time since respondents reported that all buildings in this market have been built using sand from this seasonal river.

Figure 3: Effects of Food Insecurity Mitigation Measure on Environment in Tseukuru Division



During food shortage a lot of sand is harvested which is bought at very low price and kept for future usage. The researcher observed that the river bed had lost a lot of sand, having large out cropping bed rocks which initially were not seen. This has had great impact by lowering the water table of this river consequently causing water scarcity especially during drought seasons. Another problem observed during this study emanating from sand harvesting activity was high surface run off which carry a lot of soil from nearby farms to the river. Farms near this river have been severely eroded with much of this soil getting to river Nziitu. Figure 3 below illustrates the effects of these activities on the environment as reported in the findings.

5. CONCLUSIONS

This research established that the study area is a perennially food insecure zone as is typical of other dry land environments in Kenya. Frequent drought, food shortage and famines are a common defining characteristic of the area and often than not lead to widespread suffering and loss of savings, investments and livestock. The inhabitants of Tseikuru Division appear to have accepted this condition as part and parcel of their destiny and many view the problem as irresolvable so long as there is inadequate rainfall. Although environmental factors are perceived to play major role on food insecurity in dry land ecosystems, the findings from this paper shows that socio – economic factors have significant effects on household food insecurity status in Tseikuru division. The major socio – economic factors emerging significant in this study are low education level leading to unemployable skills, strong cultural beliefs and practices leading to low adoption rate in modern farming practices, unfavourable marketing system which has contributed to households selling their food stuff at low prices during bumper harvest and buying the same at high prices during famine, poor infrastructural facilities which hinder transportation of food and inputs, unsound agricultural practices which contributes to low yields, poor post harvest management leading to high rate of food waste, instable food stuff prices and limited sources of household income These factors were found to exert considerable influence in undermining the food status of food security at households level in Tseikuru division. However, not many of the local people have realized the connection of these factors with food security and therefore continue to lay blame on physical factors (rainfall, soil, pests, diseases, etc). These are some of the underlying issues the local people have to deal with in order to achieve better results in agricultural production in Tseikuru Division and other dry land areas.

Although households have devised various strategies to cope with food insecurity problem, some of these strategies appear to have negatively affected the local food security situation due to environmental degradation. Charcoal burning is a good example of locally practiced coping mechanisms that have implications for the environment and ultimately the area's future food security status. Other commonly applied coping strategies include bricks and small scale ballast production, fetching water and sand harvesting. These activities contribute to destruction of the land surface which in turn reduces land productivity. Moreover, illicit brewing has stagnated endeavors of improving food security in the area as it leads to unnecessary selling of household food stuff and also encourages idling. Therefore, the future for Tseikuru division and other dry land ecosystem lies in addressing the socio – economic factor affecting food insecurity and reducing mitigation measures negatively affecting environment and food security situation. The paper recommends more involvement of public and private institutions in addressing food insecurity problem in Tseikuru by focusing on the socio-economic issues in view of reducing vulnerability of households to food shortages

6. REFERENCES

1. Borton, J. &Shoham, J. (1991). Mapping vulnerability of Food Insecurity: Tentative guideline for WFP, Mimeo: London.
2. Campbell, D.J. (1997). Strategies for coping with drought in Sahel: Study of recent population movements the department of Maradi, Niger. Unpublished Ph.D Dissertation, Lark University, Niger.
3. FAO (2005). Committee on World Food Security: Conflict and Food Security. Nairobi: Food and Agricultural Organisation.
4. FAO (2008). Climate change adaptation and mitigation in Food and Agricultural Sector; High level conference on World Food Security. Back ground paper HLC/08/BAK11 FAO (<ftp://ftp.fao.org/docrep/fao/meeting/013/ai782e.pdf>)
5. Gabre-Madhin, (2001). Market Institutions, Transactions costs and Social capital in the Ethiopian markets: Research Report 124. International Food policy Research Washington DC.
6. IFPRI (2001). Sustainable Food Security for all by 2020 Report (2000): Addressing World Food shortage. Bonn: Germany. International Food and policy Research Institute.

7. IFPRI (2004). *Shaping Globalization for Poverty Alleviation and Food Security: Conflict and Food Insecurity*. Rome: International Food and Policy Research Institute.
8. Josantony, J. (1999), *Food: Christian perspective on Development Issues*. Genprint: Ireland.
9. Joseph, K. (2004). *Towards achieving food security in Kenya*: Ministry of agriculture. Nairobi, Kenya.
10. Lassa & Jonatan, (2006). *Malnutrition: Defining and fighting Hunger*. University of Virginia, USA (see <http://www.thejakartapost.com/news/2006/07/03/famine-drought-malnutrition-defining-and-fighting-hunger.html>)
11. Leslie, N. (2009). *Food Security in Kenya: Ethnic and Economic variables*. Cape Town, South Africa.
12. Mbithi, P. M. (1998). *Drought and Famine in Kenya: A case study of Eastern Province, Kenya*. M.A report Makerere University, Uganda
13. McCusker, *et al* (2009). *State policy and food Security in Kenya's arid and semi-arid lands (ASALS)* dissertation, University of Virginia, USA.
14. Mutua T.M (2010). *The impact of socio-economic and institutional factors on the food security situation in Kenyan dry lands: a case study of Tseikuru division of Mwingi district*. Unpublished M.A thesis, Department of Geography and Environmental Studies, University of Nairobi, Kenya
15. Nakulu, A. K. (2009). *Food security and coping mechanisms in marginal area: The case of west pokot, Kenya* African studies centre, Leiden: Netherlands.
16. Paul, B. (2005). *Policy analysis study: Improving marketing access for dry lands commodities*, Project .Nairobi, Kenya.
17. Sen, A. (1995). *Poverty and Famine: An essay on entitlement and Deprivation*. Oxford Press: Clarendon, New York.
18. Tiffen, M. Gichuki, F. (1994). *More people less erosion: Environmental recovery in Kenya*. Nairobi, Kenya.
19. USAID (2010). *Food Security in Kenya: Situation report*. Nairobi, Kenya. United States Agency International Development.
20. Wambua, B. N. (2008). *Food Insecurity in Semi-Arid Areas: An analysis of socio-economic and Institutional factors with reference to Makueni District, Kenya*. Ph.D Thesis, Department of Geography, University of Nairobi, Kenya
21. WFP (2009). *Food Security network: Kenya Food Security updates network*. Nairobi, Kenya. World Food Programme.