FOOD SECURITY ANALYSIS IN THE ARID LANDS OF ISIOLO IN EASTERN KENYA

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Abstract

Food security is a major global concern. Food insecurity has insidious effects on the health and development of young children and consequently, adults. The paper assesses the food security status and its key determinants for the rural households of the arid lands of Isiolo in Kenya. A three stage sampling technique was used for respondents (56) selection. Data collected were: demographics, livelihood strategies, food security and livelihood assets. Descriptive and inferential statistical methods and descriptive content analysis were used. Inferential statistics focused on ANOVA, PMC analysis, T-test and regression analysis. Overall food insecurity was at 75%, with 21% food insecure and 54% vulnerable households. The most food secure households were 2%, and 23% were moderately secure. Household food security was statistically significant ($p<.05$) with a mean score of ($M=2.423$, $SD=.507$). Three key determinants for food security were: natural [$t(56) =3.626$, $p=.000$], financial [$t(56) = 2.798$, $p<.05$] and human [$t(56) =3.181$, $p <.05$] capitals. Livelihood assets accounted for 28.9% ($R=0.537$, $R^2=0.289$) of the variation in household food security. Coping strategies for food insecurity were: feeding on unbalanced diet, reducing meals, eating low cost food and food relief. Policies that facilitate nutritious food to be within reach and affordable at all times, and investments in human capital are worth promoting for improved household food security.

Key words: Food Security, Household, Assets, Livelihood, Arid, Isiolo, Kenya.

1. INTRODUCTION

Food security is a major global concern. The Food & Agriculture Organization (FAO) and the Government of Kenya (GOK) define food security as a state when all people, at all time, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and preferences for an active and healthy life (FAO, 2001; GOK, 2012). While emphasizing the importance of food security, the Millennium declaration of the General Assembly of the United Nations (UN) identified the eradication of extreme poverty and hunger as a goal for all UN member states; of which significant strides have been made towards reduction of extreme poverty (World Report, 2012). The UN (2011) Millennium Development Goals (MDG) reported 16% stability in hunger in the developing world in 2005-2007, despite significant reductions in extreme poverty. According to FAO (2010), 1 billion people suffered starvation and malnutrition; hence, attaining MDG number 1 (to halve extreme poverty and hunger by 2015) by the world is still far.

Kenya is one of the countries in Eastern Africa threatened by food insecurity. The Famine Early Warning Systems Network (FEWS NET, 2012) reported over 10 million people to suffer from chronic food insecurity and poor nutrition in 2012 which is about one third of the 39 million people in Kenya reported to suffer from chronic food and nutrition insecurity (FEWS NET, 2013). This was demonstrated by the 2012 military recruitment exercise which experienced a shortage of recruits due to the negative impact of the endemic food shortages on the growth of youths in some of the arid and semi-arid lands (ASALs) in Kenya (Daily Nation Newspaper, 20th August, 2012). While this could be attributed to many factors; the most affected areas were those that suffer frequent food shortages and depend on food aid due to drought. Therefore, adverse climatic conditions inhibit food availability (World Food Programme, 2009). Adewuyi (2002) identified climatic factors, especially, climate change leading to adverse and erratic weather patterns to inhibit food security in Nigeria. Similarly, the main causes of household food insecurity in Uganda are inadequate rainfall, pests and diseases, and excessive rain (Morse *et al.*, 2009). Sseguya (2009) attributed decreased production per unit area of land in Uganda to erratic and adverse weather conditions. Therefore, living in a region characterized by average annual rainfall, humidity, cloud cover and high day temperature in rural Nigeria increases the likelihood of being food secure (Oni & Fashogbon, 2012). For example, rural Central, a high rainfall zone has consistently recorded the least food insecurity (31.4%) while the North Eastern and Lower Eastern Kenya recorded the highest food poverty of 66% and 45.2% respectively (GOK, 2006). Therefore, food security for a particular region varies by agro–climatic conditions.

Assets have also been identified as other factors that affect food security. For example, household income, household size, educational status of household head and quantity of food obtained from own production are key factors that affect household food security in a farming household in Nigeria (Babatunde *et al.*, 2007). Similarly, sex of the household head, educational level, age and income had a positive influence; whereas household size had a negative influence on household food security in Nigeria (Oluwatayo, 2008). In Zimbabwe, fertilizer application, cattle ownership and access to irrigation have positive effect on household food security, whereas, farm size and household size had a negative effect (Sikwela, 2008). Arguably, achieving food security is a necessary first step towards the more general development objectives

of improved human well–being, poverty alleviation, and sustainable economic growth (FAO, 2010).

However, the field of food security is still rife with many challenges ranging from conceptualization of food security issues at the household level, the development of effective and generally accepted indicators and the design of operational instruments with which to address these concerns (FAO, 2002). With adequate food intake today, one would still be considered to be food insecure if he/she has inadequate access to food on a periodic basis, risking deterioration in nutritional status (FAO, 2006). This emanates from food availability, accessibility, utilization and stability dimensions of food security theory. Whereas food availability refers to the physical existence of food from own production and markets, food accessibility is the capacity of households to acquire sufficient food to satisfy their nutritional needs (GOK, 2012; FAO, 2007). Households have stability of access when they have continuous access to the food source with minimal risks (FAO, 2006).

In Kenya, food security is understandably synonymous with the availability of maize (GOK, 2012). The nutrition outlook of the under 5 years reflects unfavorable trends in food security situation in the last 5 years. For instance, the prevalence of underweight and stunting in the under 5 years did not change substantially between 1998 and 2003, with Eastern Kenya recording 32.5% stunting and 12.9% severe stunting (FAO, 2005). The Central Bureau of Statistics (CBS), Ministry of Health (MOH) and Opinion Research Company (ORC) Macro (2004) reported 21.4% underweight and 4.2 severe underweight in Eastern Kenya. Similarly, the 1998 Kenya Demographic Health Survey (KDHS) reported 36.8% stunting and 13.2% severe stunting (Republic of Kenya, 1998). The CBC, National Council for Population and Development (NCDP) & Macro International Inc (1999) reported 25.7% underweight and 6.6% severe underweight.

While cumulative data are generally available at the national level, the nature and extent of rural household food security dynamics is not well documented and the contributing factors to the observed situation is not well understood. By determining how food securities of particular households vary with the changes in livelihood assets and agro–ecological zones, informed decisions can be made on best interventional measures. The paper assesses food security situation and its key determinants for the rural households from the arid lands of Isiolo in Eastern Kenya. The objectives are:

1) To determine households food security levels in the arid lands of Isiolo in Eastern Kenya.
2) To establish the main determinants for household food security in the arid lands of Isiolo Eastern Kenya.
3) To determine the coping strategies for rural households food insecurity.

The research questions are:

1) What are the households' food security levels in the arid lands of Isiolo in Eastern Kenya?
2) What are the main determinants for household food security in the arid lands of Isiolo in Eastern Kenya?
3) What are the coping strategies for rural households' food insecurity?

2. MATERIALS AND METHODS

2.1 Study Area

The study was conducted in the arid lands of Isiolo in Eastern Kenya, with an average annual rainfall of 580mm received between March–May (long rains) and November–December (short rains). The average temperature is 26.60 C and a growing period for crops is less than 75 days. It is located between longitudes 36^o 50' and 39^o 50' East and latitude 0^o 05' South and 20' North with an altitude of 1,104 meters above the sea level. The county has a total population of 143,294 people with a population density of 4 persons per km^2 and 22,583 households in an area of 25,700 Km^2 (GOK, 2009). While the population is predominantly Cushite (Oromo, Boran and Sakuye), there are Turkana, Samburu, Meru and Somali communities as well. The main livelihood zones are: agro–pastoralism, pastoralism, firewood and charcoal burning, formal employment and casual labour. However, extensive large scale nomadic pastoralism is the main land use and crop production is to a lesser extent.

2.2 Research Techniques and Sampling Methods

Both survey and interview designs were used and a three stage sampling technique. Stage one involved simple random selection of the agro–ecological zones and region for study where arid lands and Eastern Kenya was selected respectively. In stage two, the arid lands were divided into counties where Isiolo was randomly picked. An extreme sampling technique was used to identify two community group categories. In stage three, 4 common interest group sub-clusters were selected with enterprise orientation using maximum variation sampling technique. The respondent households (56) were randomly picked from the common interest groups based on the County sample share and willingness to participate in the study. The respective region's common interest group (CIG) membership strength relative to other regions determined its sample share. Thus, regions share (r_n) was derived as follows:

$$r_n = \left(\frac{r}{N} \right) n$$

Where:

r = Region total common interest membership (8,481)

n = Sample size for three case study areas (384).

N =Total common interest group membership population in the three case study areas (58,155);

2.3 Data Collection

Data were collected through literature review, structured questionnaire and an in-depth interview. The respondent households were accessed through agricultural advisory service providers and local administrators. A study questionnaire was distributed to 56 households followed by in–depth focused group interviews. The data collected were: household head highest education level, household size, age of household head, sex of household head, land ownership, land size, households monthly income, number and types of household social networks, types of access roads, kilometers travelled to markets, watering points and health facilities. Besides, on a Likert Scale [where: SD = Strongly Disagree, D = Disagree, A = Agree, SA = Strongly Agree],

56 households were questioned to find out their perception concerning mobilization of livelihood assets for food security activities and outcomes. An in-depth focused group interview was conducted with four groups to determine the factors that influence participation of household members in food security initiatives.

2.4 Data Analysis

Quantitative data were analyzed using descriptive and inferential statistics. For qualitative data, content analysis was used. Household demographic data was analysed in terms of sex, educational level, occupation and age bracket of the household head, household size and monthly income. Both descriptive and inferential statistics; and content analysis were used to analyze household food security. Descriptive statistics and content analysis was used to analyze the coping strategies for rural household food insecurity. A multiple linear regression was used to analyze the effects of the main determinants (livelihood assets) on household food security.

$$Y = \beta_o + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_{4+} \beta_5 X_5 + \varepsilon.$$

Where:

β_o = Constant
β = Regression coefficient for livelihood assets
Y= Dependent variable (Rural household food security)
X_1= Natural capital
X_2= Financial capital
X_3= Human capital
X_4=Social capital
X_5= Physical capital

All tests of significance was computed at $\alpha = 0.05$ and $\alpha = 0.01$. The Statistical Package for Social Sciences (SPSS) version 22 was used to analyze the data.

3. RESULTS AND DISCUSSIONS

3.1 Demographic Characterization of the Rural Households

The demographic data were: sex, age, educational level and household's size of the respondents. About 74% (41) and 26% (15) household heads were males and females respectively. Therefore, important decisions regarding food consumed by the households were in the male domain. The youthful (≤35 years) and middle (36–55 years) age household heads were 65% (36). This implies that about 65% (36) of the respondent were in a stage where people are capable of actively engaging in food security livelihood activities and outcomes.

About 75% (42) household heads were either illiterate or semi–illiterate having attained primary or no formal education. Only 25% (14) household heads had secondary and tertiary education. Therefore, majority of the household heads did not have adequate capacity to engage in food security issues that require formal education meant to improve household livelihood security and outcomes. Olaniyan & Okemakinde (2008) argue that formal education which is an investment in the human capital is highly instrumental and even necessary to improve the production capacity of a population. A worldwide survey on education and small farm production reveals a positive correlation between education attainment and farm efficiency in 31 out of 37 cases (Onphanhdala, 2009).The mean household size was 5 with a variability index of 2 persons. This

is higher than the mean household size in Kenyan (4.2 persons) as presented in the 2008/2009 Kenya Demographic and Health Survey (KDHS) report (GOK, 2010b).

3.2 Rural Households Food Security in the Arid Lands of Isiolo in Eastern Kenya

Table 1a shows four categories of food accessibility: 2% (1) households had access to the preferred food and 23% (13) had access but not always to the desired food in the last twelve months before the study. About 25% (14) households had enough food to eat. Although households may have had adequate food intake, they would still be considered to be food insecure with inadequate access on a periodic basis or within the foreseeable future. Table 1b shows only 4% (2) households to have had a continuous access to food, whereas 96% (54) were at risk of hunger in the last twelve months before the study. These results are supported by the households monthly income data and size where 51% (29) households had a monthly income of less than or equal to Kenya Shillings (KES) 10000 and with a mean household size of 5 persons could not sustain meaningful livelihood activities and outcomes, including food security.

Figure 1 presents further analysis on households' food security outlook as: 2% (1) food secured and 23% (13) moderately secured. The most vulnerable households susceptible to a future loss of capacity to maintain livelihood and food security over time were 54% (30). Overall food insecurity was 75%. The 2005/06 Kenya Integrated Household and Budget Survey (KIHBS) report food security to have been fluctuating at between 41% and 66% since1994 in all the regions, except the Central Kenya, with arid lands of Isiolo recording 77.4% adult equivalent food poverty (GOK, 2006).

Table 2 presents food security as statistically significant ($p<0.05$) with a mean score ($M = 2.423$, $SD=.50733$, $SE=.061$). The results are consistent with the Kenya food security brief by FEWS NET (2013) that acute and chronic food insecurity is highest among households in the arid and semi–arid lands (ASALs) and that households have low resilience to shocks as a result of repeated exposure to drought and continued depletion of assets. Besides, inadequate rainfall, pests and diseases, and excessive rain have been identified as the main causes of household food insecurity in Uganda (Morse *et al.,* 2009).

3.3 Determinants for Households Food Security in the Arid Lands of Isiolo in Eastern Kenya

Table 3 shows the overall significance of the regression model for household food security as ($F = 10.2$, $p<0.05$). The livelihood assets (natural, financial, human, physical and social capitals) for the model explained 28.9% ($R=0.537$, $R^2=0.289$) of the variation in household food security. However, the rest of the variation was attributed to both the insignificant and unstudied predictor variables. Table 4 presents the main predictors of household food security as: natural [$t(56) =3.626$, $p=.000$], financial [$t(56) = 2.798$, $p<.05$], human [$t(56) =3.181$, $p <.05$] and physical [$t(56) =1.404$, $p<.05$] capitals. An increase in natural, financial, human and physical capitals by one standard deviation resulted in an increase in household food security by .370, .323, .313 and .108 standard deviations respectively. The optimal level of household food security was: $Y= .053 + .501X_1 + .324X_2 + .288X_3 - .033X_4 + .125X_5 + \varepsilon$, (Y= food security, X_1= natural capital, X_2=financial capital, X_3=human capital, X_4 = social capital, X_5= physical capital). Natural capital made the strongest significant contribution (B=.501) to household food security, whereas, social capital had the least negative effect (B = -.033) when the other capitals were held constant.

This implies that as social capital for the rural households' increases, predicting household food security correctly decreases and vice versa. O'Connor (2000) views natural capital as the stock that yields the flow of natural resource, thus, the foundation of all human activities, including livelihood security activities. According to Brody (2001) and Venema (2004), shifting and settled cultivators manipulated and controlled the natural systems for their sustenance.

Table 5 shows land ownership (proxy indicator of natural capital) as significantly ($p<.005$) and negatively related to household food security. As land ownership increases by one standard deviation, food security decreases by .421 standard deviations. Size of land accessed (Sig. = .053) by a household was not a significant predictor of household food security. The probability that a household selected at random would be food secure was not statistically significant, [χ^2 (4, N = 56) = 128.640, Sig. = 0.061)]. However, a study by Faridi & Wadood (2010) demonstrates that total land owned by a household has a strong impact on food security of that particular household. These results can be explained by the land tenure system in the study area, where 54% (30) and 7% (4) households held family and communal land respectively. Therefore, the decision on land use is vested in the lager family and community, thus, affecting food security negatively. Additionally, communities in the arid lands of Isiolo by their very nature are pastoralists that migrate from place to place in search of pasture for their livestock. Therefore, Njuguna & Baya (2001) argue that individualization of land tenure may not be suitable in certain parts of Kenya, for example, the pastoralist areas due to ecological and socio-cultural factors.

Financial capital had a significant ($p< .05$), moderately weak positive relationship with household food security ($r =.454$, $p <.05$, $n=56$), $\alpha = 0.05$, with about 21% ($r^2= 0.2061$) of the variability in household food security score accounted for by the financial capital (Table 6). Table 7 presents food security mean scores as significantly [$F (4, 51) = 3.266$, $p=.015$.] different given household monthly income brackets [KES (<5000, 5000–10000, 10000–20000, 20000–30000, >30,000)], with an increase in household food security mean score given an increase in household monthly income (Table 8). Gundersen & Gruber (2001) in their study of household food security identified low average income, initial assets, and negative income shocks, lack of savings, and liquidity constraints which as reasons for household food insecurity. A five city case studies [Rosario (Argentina), Bogota (Colombia), Accra (Ghana), Kitwe (Zambia) and Colombo (Sri Lanka)] on the effects of global financial crisis on food security of low and middle income populations revealed that income is crucial for food security for people living in cities as purchasing was the main source of food for 95% of households studied (Prain, 2010).

Human capital contributed negligibly [0.55% ($r^2= 0.005476$)] to the variance in household food security score, with no significant difference [$F (2, 53) = 16.017$, $p=.102$] in household food security given the age brackets (< 35, 35–55, > 55 years) of the household heads (Table 9). Similarly, Table 10 presents no significant ($p>.05$) difference in food security mean score given the education level of the household heads [$F (12, 44) = 24.42$, P.V =.072]. However, Table 11 presents a statistically significant ($p<.05$) difference in household food security mean score [$F (3, 52) = 12.99$, $p=.007$] given the household size [1 versus 2–5 ($p<.05$, P.V = .025)], [1 versus 6–10 ($p<.05$, P.V = .000)] and [2–5 versus 6–10 ($p<.05$, P.V = .033)], with relatively higher food security mean scores for households with 6-10 members compared with those with 1 or 2–5 members (Table 12). Likewise, sex of the household head had a significant ($p <.05$) influence on household food security [$t (54) = - 1.809$, $p = .048$] (Table 13), with significantly higher food

security mean scores (M = 2.2355, SE =.02656) for male headed households than female headed households (M=2.0799, SE =.02144) (Table 14). Aidoo *et al*. (2013) study findings in Ghana presents the coefficient of age as not significant in explaining household food security. However, Faridi & Wadood (2010) study findings revealed a clear linkage between education and food security issues. For example, the chances of households being food secure increases by 99.9% and 177.1% if the household heads have attained 8 and 12 years of schooling in India respectively (Bashir *et al.*, 2012). Likewise, those with less than a high school education are more likely to report food insufficiency than respondents with a diploma grade or university education (Heflin *et al.*, 2007). A study by Sindhu *et al.* (2008) in India reveals an increase in household food insecurity (49%) with an increase of one family member. Similarly, Aidoo *et al*. (2013) found out that household size had a significantly ($p<.01$) negative relationship with food security, implying that the probability of household food security decreases with an increase in household size. However, the agriculture sector in Kenya provides more than 60% of informal employment in the rural areas (GOK, 2009) whose labour force is family based. Besides, the data reveals that about 91% households produced food for own consumption. Therefore, households with 6–10 membership stand a better chance when it comes to provision of labour into the family food security initiative relative to those with few members. Helflin *et al.* (2007) study findings reveal that women who are married or cohabitating are less likely to report food insufficiency than their unmarried counterparts.

Social capital was not significantly ($p>0.05$) related to household food security (Table 15). However, Table 16 presents social networks, a type of social capital as significantly ($p<.05$) and weakly correlated with household food security ($r=.378$, P.V= 0.022), $\alpha = 0.05$, with about 14% ($r^2= .1428$) of the variability in household food security scores attributed to social networks of the household head. This was supported by focussed group discussion findings where cattle rustling and theft of project equipment's (irrigation kits, beehives) among the different communities living in the study area stalled the food security projects. From these results, social capital requires a favourable social environment that promotes active participation, inclusion and frequent interaction that nurture shared principles, norms and purpose (Killerby, 2001). For this reason, people need to be assisted to make connections and sustain relationships where there are cultural differences and obstacles that promote division (Gilchrist, 2004). Besides, Van Bastelaer (2000) proposes that the implementation of formal credit programmes geared towards poverty eradication in rural areas should not only consider the existing social capital but also the social structure of the rural community.

Table 17 shows a weak positive correlation ($r =.139$, $p =.254$, $n = 56$), with no statistical significance ($p > 0.05$) between physical capital and household food security. Table 18 shows households travelling longer distances to market outlets ($\geq$ 2.9 kilometers), watering points ($\leq$ 1.4 Kilometers) and health facilities ($\leq$9.4 kilometers) to access food and health services. Approximately 74% (41) households had access to dry weather roads to enhance livelihood activities for food security. Therefore, poor road network and isolation of the study area affected movement of food and water from source to the households. According to Tembo & Simtowe (2009), the presence of infrastructure often determines if a village receives higher or lower prices. Markets in the arid and semi–arid lands tend to be isolated with poor infrastructure links to other markets, thus, affecting the ability of households to purchase food (FEWS NET, 2013).

Similarly, Food & Agriculture Organization (1997) report highlights marketing and transportation systems to inhibit the cost–effective movement of food from source to need. Simmonds (2006) identified location isolation as a key contributor to food insecurity in Malawi.

3.4 Coping Strategies for Food Insecurity in the Semi–arid Lands of Kitui in Kenya

Table 19 presents the most commonly used strategies for food insecurity as: feeding on unbalanced diet, reducing the number and quantity of meals and relying on low cost food. Whereas 94% (53) households fed on low quality food and ate less than they should, 89% (50) relied on low cost food. Reliance on food relief and social networks, charcoal burning, liquidation of productive assets to maintain current food consumption were other coping mechanisms for food insecurity. According to Mjonono *et al.* (2009), increased reliance on coping strategies is associated with lower food availability. Therefore, households adjust by eating less of their preferred foods or reducing total quantities consumed as food prices increase (FAO, 2008). The findings are consistent with the Government of Kenya (2011/2012) report which identified purchasing food on credit, charcoal burning, reduced number of meals, and reliance on food gifts from relatives as the coping strategies to food insecurity in Kenya.

4. CONCLUSIONS

There is persistence of food insecurity (75%) across the study area, with the most affected households being with low monthly income. Agriculture was the mainstay for 67% (38) rural households. Overall, livelihood assets accounted for 28.9% ($R=0.537$, $R^2=0.289$) of the variation in household food security. The main determinants for household food security were: natural [$t(56) =3.626$, $p=.000$], financial [$t(56) = 2.798$, $p<.05$] and human [$t(56) =3.181$, $p <.05$] capitals. An increase in natural, financial and human capitals by one standard deviation resulted in an increase in household food security by .370, .323 and .313 standard deviations respectively. Land ownership has a significantly ($p<.005$) negative effect on household food security, with a decrease in food security by .421 standard deviations as land ownership' increases by one standard deviation. An increase in household monthly income leads to an increase in household food security means score. Household size and sex of the household head are significant ($p < .05$) predictors of household food security in the study area. The main coping strategies for food insecurity were: feeding on unbalanced diet, reducing the number and quantity of meals and relying on low cost food and food relief.

5. RECOMMENDATIONS

Achieving food security is a necessary first step towards the more general development objectives of improved human well–being. Efforts for improving household food security through the development of determinants shown to have significant effect on food security should be pursued by both national and county governments, for example, an understanding of the ecological and social cultural factors is necessary in determining viable food security interventions. Appropriate economic policies that facilitate nutritious food to be within reach and affordable to all, at all times should be developed by the national and county governments. Policies encouraging investments in human capital are worth promoting as educated people are likely to make better choices and informed decisions on household size, types of foods to consume and land use systems. Besides, tailored food security interventions targeting the female

headed households should be pursued by the national and county governments to unlock the food insecurity bottle necks in those rural households.

These results demonstrate that attaining food security in the arid lands of Isiolo and probably Kenya requires the adoption of mixed strategies and policies along those capitals found to have a significant effect on food security.

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Appendix

Table 1: Percent (%) Access to Food by the Rural Households (N=56)

N=100	Category	% Access
Table 1a: Percent (%) Access to Food by the Rural Households	Often did not have enough to eat	21
	Sometimes did not have enough to eat	54
	Enough but not always the kinds of food we wanted to eat	23
	Enough of the kinds of food we wanted to eat	2
	Total	100
Table 1b: Percent (%) Stability of Access to Food	Often worried that their food would run out	40
	Sometimes worried that their food would run out	56
	Never worried that their food would run out	4
	Total	100

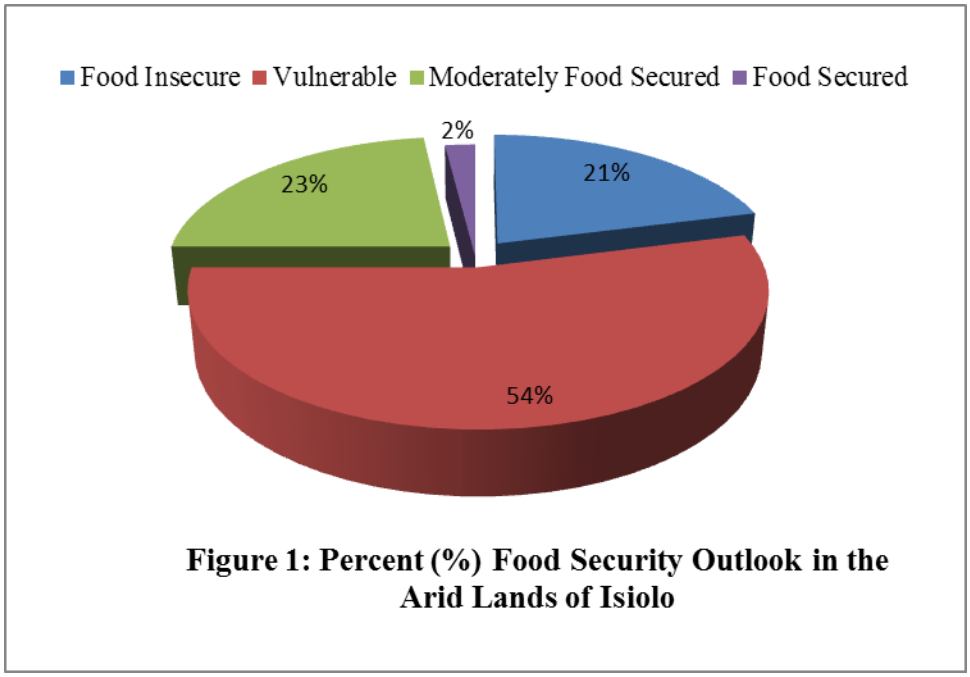

Figure 1: Percent (%) Food Security Outlook in the Arid Lands of Isiolo

Table 2: **Descriptive Statistics on Household Food Security**

N	Mean	SD	SE	95% Confidence Interval for Mean	
				Lower Bound	Upper Bound
56	2.423	.50733	.061	2.3006	2.5462

Table 3: Regression Analysis Model Summary Output

Model	R	R^2	Adj.R^2	SE Estimate	Change Statistics				
					R^2 Change	F Change	Df 1	Df 2	Sig. Change
1	.537[a]	.289	.288	.274	.001	10.2	5	51	.013

a. Predictors: (Constant) Natural, Financial, Human, Social & Physical Capitals

Table 4: Household Food Security Model Coefficients (N=56)

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for β	
	B	SE	β			Lower Bound	Upper Bound
(Constant)	.053	.320		.167	.868	-.583	.689
Physical capital	.125	.089	.108	1.404	.164	-.303	.052
Social capital	-.033	.078	.037	.420	.676	-.189	.123
Human capital	.288	.091	.313	3.181	.002	.108	.468
Financial capital	.324	.116	.323	2.798	.006	.094	.555
Natural capital	.501	.138	.370	3.626	.000	.226	.776

a. Dependent Variable: Household food security

Table 5: Variables in the Equation: Step 1

Predictor Variable	B	Wald	Df	Sig.	Exp (β)
Land Ownership	-.866	4.164	1	.041	.421
Land Size	-.963	3.861	1	.053	.381
Constant	1.279	3.867	1	.031	3.599

Table 6: Correlation Analysis Results for Financial Capital and Food Security (N=56)

		Financial Capital	Food Security
Financial Capital	Pearson Correlation	1	.454*
	Sig. (2-tailed)		.000
	N	56	56

Household Food Security	Pearson Correlation	.454*	1
	Sig. (2-tailed)	0.000	
	N	56	56

*. Correlation is significant at the 0.05 level (2-tailed)

Table 7: ANOVA Results of Household Food Security by Monthly Income Brackets

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	213.35	4	53.338	3.26	.015
Within Groups	833.09	51	16.335		
Total	1046.44	55			

Table 8: Analysis of Household Food Security by Monthly Income

Monthly Income (KES)	N	Mean	SD	SE	95% Confidence Interval for Mean	
					Lower Bound	Upper Bound
<5000	38	2.1024	.40733	.0661	1.9702	2.2346
5000 – 10 000	13	2.2982	.20107	.0558	2.1866	2.4097
10000 – 20000	3	2.4011	.42490	.2453	1.9105	2.8917
20000 – 30000	1	2.5140	.31320	.3320	2.2008	2.8272
>30000	1	2.6420	.21220	.2122	2.4298	2.8542

Dependent Variable: Household Food Security; KES = Kenya Shillings

Table 9: ANOVA Results for Household Food Security by Age Group

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	773.876	2	386.938	16.01	.102
Within Groups	1280.374	53	24.158		
Total	2054.25	55			

Table 10: ANOVA Results for Food Security by Educational Level of the Household Head

Education Level	Sum of Square	Df	Mean Square	F	Sig.
Between Groups	2012.06	12	167.67	24.42	.072
Within Groups	302.106	44	6.866		

Total	2314.17	56

Table 11: ANOVA Results for Household Food Security by Household Size

Household Size	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	634.98	3	211.66	12.9	.007
Within Groups	846.92	52	16.287		
Total	1481.90	55			

Table 12: Post Hoc Results for Household Food Security by Household Size

Household Size	Mean Difference	SE	Sig.
1 Versus 2-5	.321	.103	.025
1 Versus 6-10	.501	.114	.000
2-5 Versus 6-10	.331	.096	.033

Mean difference is significant at 0.05

Table 13: Independent Samples Test Results comparing Sex of the Household Head

		Levene's Test for Equality of Variances		t-test for Equality of Means				
		F	Sig.	T	Df	Sig. (2-tailed)	Mean Diff.	SE Diff.
Household Food Security	Equal Variances Assumed	2.802	.295	-1.80	54	.048	-.22479	.08009
	Equal Variances Not Assumed			-1.80	28.02	.020	-.22479	.05955

Table 14: Household Food Security Mean Score by Sex of the Household Head

Food Security	Sex	N	Mean	SE Mean
Household Food Security	Female	18	2.0799	.02144
	Male	38	2.2355	.02656

Table 15: Correlation Analysis Results for Social Capital and Household Food Security

		Social Capital (SC)	Household Food Security (HFS)
SC	Pearson Correlation	1	.078
	Sig. (2-tailed)		.522
	N	56	56
HFS	Pearson Correlation	.078	1
	Sig. (2-tailed)	.522	
	N	56	56

Correlation is significant at 0.05 level (2-tailed), SC = Social Capital, HFS = Household Food Security

Table 16: Bivariate Correlation Analysis on Food Security by Social Networks of the Household Head

N	Correlation Coefficient (r)	Sig.	r^2
56	.378*	.022	.1428

Table 17: Correlation Analysis Results for Physical Capital and Household Food Security

		Physical Capital (PC)	Household Food Security (HFS)
PC	Pearson Correlation	1	.139
	Sig. (2-tailed)		.254
	N	56	56
HFS	Pearson Correlation	.139	1
	Sig. (2-tailed)	.254	
	N	56	56

Correlation is significant at the 0.05 level (2-tailed), PC = Physical Capital, HFS = Household Food Security

Table 18: Mean Distance Travelled to Access Infrastructural Facilities (KMS)

Infrastructure	Sex	N	Mean	SD
Market Outlets	Female	18(32%)	2.9	9.1
	Male	38(68%)	4.1	18.4
Watering Point	Female	18(32%)	1.4	2.0
	Male	38(68%)	1.3	2.1
Health Facility	Female	18(32%)	9.4	10.5
	Male	38(68%)	8.9	8.2

KMS = Kilometres

Table 19: Percent (%) Coping Strategies for Food Insecurity

Strategy	N=56
Feed on unbalanced diet	94
Cut size of household members meals	87
Ate less than the size they should	94
Sometimes skipped meals	83
Skipped meals for a whole ay	51
Rely on low cost foods to feed children (≤18Yrs)	89
Feed children (≤18Yrs) on unbalanced diet	87
Children (≤18Yrs) ate less than they should	90
Cut size of meal meant for children (≤18Yrs)	72
Child/Children (≤18Yrs) skipping meals for a whole day	61