

## Demographic and socio-economic determinants of availability and access dimensions of household food security in Kitui County, Kenya

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### Abstract

**Background:** Reducing the number of hungry people in the world by 2030 is one of the main objectives of Sustainable Development Goals (SDGs). Household food insecurity remains a challenge worldwide with the number of undernourished people increasing daily. This has been attributed to many factors. In Kenya, the arid and semi-arid lands are worst hit by food insecurity. To improve the status of household food security, the determinants of household food security must be established and documented.

**Objectives:** To establish the demographic and socioeconomic determinants of household food security in Kitui County, one of the arid and semi-arid Counties of Kenya.

**Methods:** A cross-sectional design with a sample size of 167 households randomly selected was adopted. The respondents were household heads. Data collection instruments included a structured questionnaire and an observation checklist. Data was analyzed using SPSS software. Multiple linear regression was used to establish the demographic and socioeconomic determinants of household food security. Significance was set at  $P < 0.05$  at 95% CI.

**Results:** Only a quarter of the households (25.7%) were food secure. The main sources of food by the households were home production (37.9%), purchasing (34.6%) and food aid (27.5%). A high proportion of the households bought food for daily use and a look at the market prices was therefore important to determine its effect on food security. The demographic and socio-economic determinants which include; gender, marital status, education level and occupation of household head; livestock ownership were not significant determinants of household food insecurity ( $p > 0.05$ ). Accessibility to the market was challenged by distance to markets and lack of or expensive motorized transport. Majority of the household members walked to the market place. The households grew different crops and kept livestock both for food and as a source of income. Maize was the commonly grown crops. Drought resistant crops which include sorghum, millet and green grams were grown by few households. The Livestock reared were goat (67.1%) and chicken (77.8%). The study reported that lack of rain (92.2%) was the main cause of food shortage in the households. The household mean income from off-farm activities, livestock and livestock was  $69.59 \pm 89.9$  \$.

**Conclusion:** Demographic and socio-economic determinants are not significant in explaining food security in Mwingi County. The study recommends; relevant Government ministries and Non-governmental organizations to encourage diversification of drought resistant crops to improve the household food security in the study area. Similar study should be done on cultural and environmental factors which may be affecting food security in the county.

**Keywords:** demographic and socioeconomic determinants, household food security, arid and semi-arid lands

### 1. Introduction

Food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life [24]. Food security has become a very crucial aspect of the daily endeavors for many policy makers for decades. Over the past two decades, efforts have been made by the international community and various country governments to reduce food insecurity and hunger. However, the problem still persists with 11% of world population being undernourished [9]. One of the objectives of the Sustainable Development Goals (SDGs) is to reduce food insecurity, improve nutrition and promote sustainable agriculture by 2030 [8].

Food security encompasses four dimensions: Availability, access, utilization and stability. This paper focused on two dimensions namely availability and access. Food security

requires that the aggregate availability of physical supplies of food is sufficient through their own production, stock levels and net trade. An adequate supply of food at the national or international level does not in itself guarantee household level food security [13]. The access dimension comprises indicators of physical access of food and infrastructure such as railway and road density; economic access, represented by the domestic food price index; and the prevalence of undernourishment [8]. Other factors which affect household food access include demographic and socio-economic determinants which include household head gender, age, marital status, education, employment and income. Poor food access insecurity by the poor is not only a result of poor crop harvest but also due to high domestic prices, lower incomes and unemployment [12]. Access to income-generating activities is a major determinant of the ability of a household to purchase food. Generally, the allocation of household

resources to food production, wage labor or other business activities allows the household to access food, either directly through food production or indirectly through income generation <sup>[15]</sup>.

Food availability and access are influenced by the ability of individuals and households to produce their own food in sufficient quantity and to generate income to purchase food, the adequacy of infrastructure, effectiveness of food distribution systems and the affordability of food prices. Other household factors include access and control of productive resources (land, seed and water) and gender dynamics <sup>[17]</sup>.

The objective of this study was to establish the demographic and socio-economic determinants of availability and access dimensions of household food security in Kitui County, Kenya.

## 2. Materials and Methods

**Design:** A cross-sectional study was conducted in the arid and semi-arid Kitui County to investigate the socio-economic and demographic determinants of household food security. The arid Mwingi Sub County that was randomly selected out of 9 Sub Counties in Kitui County is characterized by a hot and dry climate most of the year. The rainfall ranges between 400mm and 800mm per year <sup>[20]</sup>. Due to the harsh climate, coupled with unreliable rainfall, the sub -county has for a long time been faced with constant drought, food insecurity and famine.

**Study Population:** The target population was households who had been in the Mwingi Sub County in the 4 months prior to data collection. The sample size of 167 households was randomly selected. The dependent variable was household food security (availability and access) and the independent

variables were demographic determinants (gender and marital status of household head) and socio-economic determinants namely total household income, occupation and education level of household head; and livestock ownership. A researcher administered questionnaire with both open and closed ended questions was used to collect data together with an observation check list. Data was checked, coded, cleaned and analyzed using the SPSS software Version 21. Household food security was calculated and determined as per the Food and Nutrition Technical Assistance (FANTA), (2006) guidelines <sup>[6]</sup>. Household Food Insecurity Access Scale (HFIAS) measurement tool was used and food insecurity was classified as mild, moderate and severe, if it met the condition as guided by HFIAS. Multiple linear regression was used to establish the relationship between socio-economic; socio-demographic and household food security. The P-value of <0.05 was used as the criterion for statistical significance.

## 3. Results

**3.1 Household Demographic and Socioeconomic Characteristics:** The household demographic and socioeconomic characteristics affect food security in terms of availability and accessibility. Table 1 presents results on household demographic and socioeconomic characteristics. The sample consisted of 167 households with a population of 849 members. The average household size was 5.2 individuals. The household dependence ratio was 1.3. Although not significantly different ( $p < 0.05$ ), there were slightly more females (51.7%) than males (48.3%). Children aged less than five years old made about a third of the household population (30.8%).

**Table 1:** Household Demographic and Socio-economic Characteristics.

Household characteristics	N	%
Sex Distributions of Household Members	N=849	
Male	410	48.3
Female	439	51.7
Age group of household members	N=849	
<5yrs	262	30.8
5-9	109	12.8
10-17	117	13.8
18-29	166	19.5
30-39	99	11.7
40-49	61	7.2
50+	35	4.1
Education level of household members aged $\geq 18$ years	n=354	
Primary	274	77.4
Secondary	54	15.2
Vocational	1	0.3
No formal education	24	6.8
College	4	1.1
Occupation of household members aged $\geq 18$ years		
Employed	30	8.5
Peasant farmer	43	12.1
Casuals	122	34.5
Charcoal/firewood dealer	7	2
Traders	9	2.5
No formal job	133	37.6
Household Income	N=167	
Household with income	155	92.8
Household without any income	12	7.2

Education level, occupation of household members aged 18 years was assessed and total household income was assessed. Majority of the members attained primary education while 6.8% did not have any formal education. About 37.6% did not have any formal job.

Total household income determines the purchasing power of food by the households. The households had a mean income of  $69.59 \pm 89.97$  \$ ranging from 1 to 560 \$. About 92.8% of the households had income while 7.2% did not have any

regular income (Table 1). The total household income was calculated from the summation of all sources of income which included off-farm income, livestock income and crop income.

### 3.2 Household Heads' Demographic Characteristics

The demographic characteristics; sex, age and marital status of the household head are important determinants of household food security. These are presented in Table 2.

**Table 2:** Household Heads' Demographic Characteristics.

Characteristics	N=167	%
Sex distribution of the household heads		
Male	138	82.6
Female	29	17.4
Age categories of household heads		
17-20	2	1.2
20-29	45	26.9
30-39	52	31.1
40-49	40	24.0
50-59	17	10.2
60-85	11	6.6
Marital status of household heads		
Married	138	82.6
Single	19	11.4
Divorced	1	0.6
Windowed	9	5.4

The male headed households formed more than three quarters of the study households (82.6%). This shows that men had dominated as household heads in the area.

The average age for the household head was 38.1 years which indicate a young and active group who can be involved in socio-economic activities to ensure availability and

accessibility of food to their households.

**3.3 Household Heads' Socio-economic characteristics:** The education level, occupation and income characteristics of the respondents who were the interviewed household heads are presented in Table 3.

**Table 3:** Household heads' Socio-economic Characteristics.

Respondents Socio-Economic Characteristics	N=167	%
Education level of household heads		
College	2	1.2
Secondary	25	15.0
Vocational	1	0.6
Primary	125	74.9
No formal education	14	8.4
Occupation of the household head		
Employed (salaried)	26	15.6
Casuals	98	58.7
Farmer	32	19.2
Trader	6	3.6
Charcoal/firewood sellers	5	3.0
Income categories (USD)		
5-20	70	41.9
>20-40	54	32.3
>40-60	30	17.9
>60-80	3	1.8
>80-100q	8	4.8
>100	2	1.2

Nearly all household heads were literate (91.6%) with only 8.4% reportedly without formal education. Slight more than half of the household heads (58.7%) of the household's heads were casual labourers. The mean income of household head

was 37.76 \$ (Table 3).

### 3.4 Household food security status

Only a quarter of the households was food secure (25.6%).

Figure 1 presents data on the household food security status.

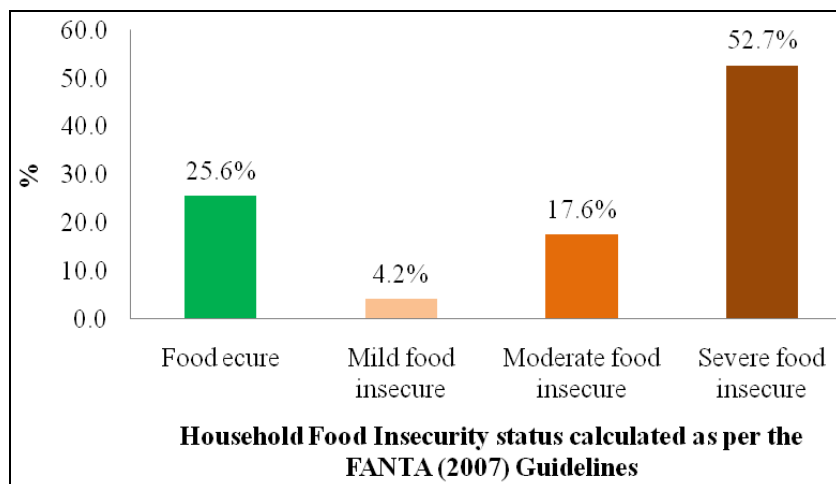


Fig 1: Prevalence of Household Food Insecurity.

The prevalence of food insecurity was high in the study area. Half of the households (52.7%) were severely food insecure while 17.6% and 4.2% of the households experienced moderate and mild food insecure.

**3.5 Food availability and accessibility in the Households**

**3.5.1 Household land ownership and food production.**

Land ownership and food production characteristics presented in Table 4 include availability of land, crop farming and livestock keeping. These affect food security at household level. Not all households owned land. The households who owned land used it for farming and majority practiced mixed crop farming (Table 4). The mean land ownership acreage was 2.58±1.87 acres or hectares

Table 4: Distribution of study households by land and livestock ownership; food production and causes of food shortage.

Variable	N=167	%
Household Land Size		
Households with land	165	98.2
Households without land	2	1.8
Crops grown by the Households		
Maize	165	98.8
Beans	105	62.9
Cowpaes	123	73.7
Greengrams	54	32.3
Sorghum	71	42.5
Millet	30	17.9
Type of livestock owned by the households		
Cow	20	12
Goat	112	67.1
Sheep	4	2.4
Oxen	19	11.4
Donkey	63	37.7
Chicken	130	77.8
Causes of food shortage		
Lack of rain	154	92.2
Lack of seeds	4	2.4
Small land size	8	4.8
Lack of fertilizers	1	0.6

Nearly all the households (98.8%) grew maize both for food and cash crop and source of income. Livestock ownership is a determinant of household food security status as these serve as traction of crop production. About 86.8% of the households kept different livestock; chicken (77.8%) and goats (67.1%). In the period 12 months before data collection, some livestock had been sold for income while others had died due to harsh

dry climatic conditions. The main cause of household food shortage was lack of rain.

**3.5.2 Crop and livestock production (food availability)**

Food availability is one of the major dimensions of food security that determine household food security. It was established through food production, livestock ownership and

food storage. Food production is an important factor which affects food availability and accessibility in a household. The households produced their food by practicing mixed farming

which included crop and livestock farming. The crops were grown either at different land portions or in the same land. This is presented in Table 5 below.

**Table 5:** Land Proportion and Food Production in the last 2 Seasons.

Food Crop	Land acreage	Amount harvested (KG)	Amount consumed (KG)	Amount sold (KG)	Amount given out (KG)	Amount in store (KG)
	Mean±SD	Mean±SD	Mean±SD	Mean±SD	Mean±SD	Mean±SD
Maize	2.04±1.35	141±120.49	117±96.73	102±67.02	24.07±30.91	-
Beans	1.11±0.84	39.67±43.96	34.59±38.35	-	-	-
Cowpeas	1.55±6.43	35.15±27.19	33.79±26.86	38±-	10.16±16.17	16.67±11.55
Green grams	0.88±0.62	32.17±31.95	19.20±12.97	61.54±73.16	-	18.00±16.41
Sorghum	0.98±0.59	57.88±56.47	47.47±40.13	-	13.86±8.89	69.00±28.81
Millet	1.00±0.53	50.34±34.97	48.59±34.78	-	7.29±3.50	-

Different crops were grown but at different land proportions for the last 2 seasons. Most of the households practiced mixed crop farming. The land portion for growing maize (2.04±1.35) was the highest followed by cowpeas (1.55±6.43) and beans (1.11±0.84). Millet was the less grown crops (Table 5). Maize was the highly harvested, consumed, sold and given out.

### 3.5.3 Food access

Food accessibility is another dimension of food security which affects household food security through household income and infrastructure. The accessibility of food by the household was

measured by assessing the source of the food, physical presence of food in the households, food storage, the total household income, means of transport and distance to the market, and the amount of food in the store. The household source of income was as a result of on-farm and off-farm activities. The total household income was calculated from the summation of all sources of income which include off-farm and on-farm income. The major sources of food, the causes of food shortage and the methods of food storage in the households are presented in Table 6.

**Table 6:** Major Sources of Household Food and Methods of Food Storage.

Variable	N=167	%
Source of food		
Home production	58	34.6
Purchase	63	37.9
Food aid	46	27.5
Methods of food storage	n=138	
Granary	131	78.4
Storing in plastic bags in the house	7	4.2

Three main sources of household food were used. Purchasing was the most popular source of household food. Home production was also commonly used but slightly lower than purchasing. Most of households (82.6%) stored food after harvesting using different methods while the rest consumed the food when still in the farms (Table 6). The granary was the most commonly used compared to the modern stores.

Income from off-farm and on-farm activities was a way of

diversification of sources of income by the households to assist them in the accessibility of food. Off-farm income of the households was from different occupations which include salaried jobs, casuals, traders, Charcoal dealers and farming. Charcoal selling was not used as a coping strategy in the area but as a source of livelihood by some households. The mean income of the households was 69.59 ± 89.96\$.

**Table 7:** Off-farm, Livestock and Crop Income.

Source of income		%	Income (\$) Mean±SE
Off-farm	n=131		
Permanent employed	26	19.8	
Casuals	94	71.8	
Traders	6	4.6	
Charcoal dealers	5	3.8	
Sale of livestock	n=115		
Sale of chicken	50	43.5	15.51±4.80
Sale of eggs	6	5.2	0.61±1.74
Sale of hides & skins	4	3.5	1.35±5.68
Sale of oxen	3	2.6	308.33±60.16
Sale of cow	5	4.3	214.00±49.76
Sale of sheep	5	4.3	31.60±5.53
Sale of goat	40	34.8	56.40±6.48

Sale of donkey	2	1.7	55.00±4.99
Selling of crops	N=167	%	
Sold crops	10	6	-
No crops sold	157	94	-
Crops sold	n=19		
Maize	7	36.8	8.05±2.44
Millet	2	10.5	0.67±7.86
Green grams	10	52.6	1.11±1.78

Income from livestock was as a result of selling different types of livestock and their products. Chicken and goat were the most sold livestock in the area (Table 7). Cows and oxen were the rarely sold but fetched more income for the households who sold them.

Households also sold crops to get money which is used in the acquisition of other food items which are not available in the household. Majority of the households never sold the crops in the last 4 weeks prior to the study (Table 7). Green grams

fetched the highest mean income among the sold crops.

Access to market is important for it affects availability and accessibility of food in the market place. Households can sell their surplus in the market as well as affordability of food stuff in the market if it is accessible through good road infrastructure. The market accessibility was assessed through the means of transport, distance covered and time spend to the market.

**Table 8:** Market Accessibility Characteristics retain this table. It is good here.

Variable	N=167	%
Means of transport		-
Bicycle	10	0.6
Motor Vehicles	17	15.6
Walking	140	83.8
Distance to the market(km)		
≤10 km	51	29.3
11-15 km	67	40.1
≥16km	49	29.3
Time spend to the market (Minutes)		
≤60 minutes	27	16.2
61-120 minutes	54	32.3
≥120 minutes	86	51.5

The households reported three main means of transport which included walking, use of bicycles and motor vehicles. More than half of the households walked to the market. About 29.3% of the households covered more than 16km to the

market place.

Market prices were also looked at to see if they have affected food security and this is presented in Table 9 below.

**Table 9:** Market prices.

Food commodity	Price (ksh) per kg/litre	Price (\$) per kg/litre
Maize grains	30	0.3
Posho flour	60	0.6
Sifted maize meal	70	0.7
Millet	50	0.5
Sorghum	50	0.5
Wheat floor	140	1.4
White Rice	70	0.7
Dry Beans	70	0.7
Green grams	100	1.0
Dry cow peas	60	0.6
Sugar	130	1.3
Cooking oil	140	1.4
Cooking fat	100	1.0
Packed milk	90	0.9

The commodity prices were high as reported by the sellers. Most of the bread winners could have been buying less food

for the household members because of their low purchasing power.

### 3.7 Relationship between demographic and socio-economic characteristics to household food security

Demographic and socio-economic characteristics of

households and household head were used to assess how they influence household food security. This is presented in table 8 and 9 below.

**Table 8:** Relationship between demographic and Socio-economic characteristics to household food security.

Variable	Regression coefficients	SE	P-value
(Constant)	3.486	0.714	0.001
Gender HHh			
Male	-0.049	0.596	0.935
Marital status HHh			
Widowed	-0.530	0.771	0.493
Occupation HHh			
Employed	0.108	0.245	0.660
Casual	2.019	2.001	0.314
Farmer	0.247	0.248	0.321
Trader	-0.362	0.490	0.460
Charcoal/firewood dealer	0.748	0.420	0.760
Household Education Level			
College	-0.343	1.364	0.802
Secondary	-0.269	0.540	0.619
Primary	-0.207	0.459	0.652
Livestock ownership	-0.413	0.256	0.108

(R<sup>2</sup>=0.076,  $\alpha$ =0.05, multiple linear regression)

Gender and household head marital status negatively affected the probability of household being food secure. None of the predictors was statistically significant to household food security ( $p>0.05$ ).

The socio-economic predictors include household head education level and occupation; and livestock ownership. Traders, educational level and livestock ownership affected the probability of a household to be food insecure negatively. None of the predictors were statistically significant to household food security ( $p>0.05$ ).

#### 4. Discussions

Demographic characteristics which were captured in the regression model include gender and marital status. Gender is an important variable in household food security issues. It describes the socially determined attributes of male and female. Both men and men participate in food production but there has been a lot of discrimination to the females in terms of access to, and control to agricultural assets and inputs [10]. Women being expected to look after children and cook on daily basis in most rural areas, they still provide food and engage in other farm work. It has been argued that households with female heads are more likely to be food insecure than those with male heads. Women play an important role in the production of food [21]. A study in Tseikuru, Kitui County by [19] reported that gender (male) was statistically significant in explaining household food security in the County. The female headed households were the most vulnerable to food insecurity due to limited access to land ownership and other valuable assets by the women. This was not the case in the present study which reported that gender (male) was not significant to household food insecurity. Marital status is an important determinant in food security. The present study reported that marital status is not significant to household food security. The findings of the present study concurred with a study by [20] which showed that gender and marital status were

not statistically significant to household food security. This implies that gender and marital status are not important predictors in explaining household food security. Therefore, demographic characteristics which include gender (male) of the household heads and household head marital status are not important determinants in explaining household food security in Kitui county.

Socio-economic characteristics and resources which include occupation, education level and livestock ownership of individual household have been identified as basic determinant influencing the household food security status by different researchers. A study in South Africa by [20], reported that employment status of the household head was positively and significantly affected the household food security. The present study showed that occupation of the household head affected household food security status positively except for those who were traders. Despite those relationships with household food security, no occupation of the household head was statistically significant to household food security. This means that the more the income, the more food insecure the households became. This may be because of lack of priorities in the household. Education is an important determinant in food security. According to a study in Kitui County by [19], and another study in Pakistan by [2], reported that education of household head was statistically significant to household food security. This meant that household heads with higher education level tend to be more knowledgeable on modern farming method unlike the uneducated household heads who use the traditional farming method thus low food production. The findings of these studies did not agreed with the present study which showed that education was not statistically insignificant to household food insecurity.

According to [16], livestock play a key role in contributing to food security through enabling direct access to milk, meat, eggs etc.; providing cash income from sale of livestock and livestock products for purchasing food, especially during

times of food shortage and contributing to increased grain yields as a result of improved productivity from use of manure and traction. In their study, they reported that livestock ownership was positively and significantly related to household food security. In the present study, livestock ownership was negatively related and not statistically significant to household food insecurity. The findings of this study did not concur with the findings of a study in Ethiopia by <sup>[5]</sup> which reported that livestock holding was statistically significant to household food insecurity. This is an indication that ownership of livestock does not act as a hedge against food insecurity in the present study. Despite the fact that household head occupation and education; and livestock ownership are significant to household food security in other areas, they are not important determinants in explaining food security in Kitui County.

Food security comprises of three main components which include availability, access, utilization where availability is often measured through proxies at the population level, such as national agricultural output, while access and utilization are more often measured at the household and individual levels respectively <sup>[3]</sup>. Household food access has often been measured indirectly, through child anthropometry or agricultural productivity <sup>[1]</sup>, but because reliability of HFIAS measurement tool in terms of low-cost and valid measures, many researchers opted to use it. It gives valid data on household food insecurity which is necessary in predicting accurately the prevalence of food insecurity in response to changing conditions before the outcome of food insecurity is seen in children. Household food insecurity arises when families do not have enough to eat due to food being neither available nor accessible. Food insecurity was predominant in many households in the study area <sup>[14]</sup>. The present study reported high prevalence of food insecurity with majority of the households being food insecure. The findings of this study concurred with a study in Rift-Valley region, Kenya, by <sup>[4]</sup>, which reported a high prevalence of household food insecurity after using the same tool. The reasons for the high prevalence of food insecurity was because, the tool captured all the three dimensions of the access component of household food insecurity: anxiety and uncertainty about household food access; insufficient quality; and insufficient food intake and its physical consequences before the outcome is evident in the children. Other tools like anthropometry may have not captured a lot of information since it is only access, the outcome of food insecurity. Also, the high prevalence of household food insecurity was prone to seasonality bias as the study was cross-sectional. The study was carried out in October which is locally considered as transitional months of household food insufficiency, so that might be reason for high prevalence of food insecurity.

## 5. Conclusion

There was high prevalence of household food insecurity. Socio-economic and demographic characteristics of the household which include gender, occupation, education level and marital status household head; and livestock ownership were not significant to household food insecurity in this study. The ministry of agriculture and Non Governmental Organisations should encourage researchers to do similar

study on cultural and environmental factors which may be affecting food security in the county.

## 6. Acknowledgement

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