DETERMINANTS OF HOUSEHOLD FOOD EXPENDITURE AND FOOD SECURITY IN RURAL KENYA

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DECLARATION

I declare that this is my original work and that it has not been submitted in any University for any degree award.

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DEDICATION

I would like to pass my dedication to my late grandmother for her invaluable support towards my education and teaching me the virtues of determination and hard work.

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This paper has been made possible through the support and help from everyone including my supervisor, family, colleagues and fellow classmates.

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ABSTRACT

During the period after independence in Kenya, the government's dominance in the production and marketing of goods and services held back development of the private sector due to its inability to continuously support food production financially and technically. As such, there was a decline in agricultural growth and development as a whole. The purpose of food self-sufficiency in Kenya was to a large extent attained in the early years of independence until the late seventies after which massive food shortages set in partly because of low government support for agriculture and rural development and severe droughts according to (Fernando, 2013). In the 1980's, production of main food commodities began to increase reaching very high levels in 1987 and worsened in 1988, a decline which was attributed to poor price incentives and drought but in 2011, from its own production, Kenya could feed 88% of its population. With 80% of the population living in the rural areas and agriculture being the main economic activity, a third of the country's population is food insecure and over 10 million people are suffering from chronic food insecurity. It's on this basis that this study examined the determinants of household food expenditure in rural Kenya by the use of secondary data obtained from the Kenya Integrated Household Budget Survey by the Kenya National Bureau of Statistics. The specific objectives of the study are: To analyze the expenditure patterns in rural Kenya; to determine the food security situation in rural Kenya and to determine how of household food expenditure affects food security in rural Kenya. Ordinary least squares were used in the estimation of the relationship amongst the variables under study and data was analyzed using Stata. The findings were that the education level of the household head, household size and household income level were positive and statistically significant in determining food expenditure at 5% level of significance and the shortcomings were that the study could not utilize current data which is now being collected by KNBS for 2015. However, the study recommended use of recent data to investigate if there are other factors affecting household food expenditure and food security in rural Kenya.

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LIST OF ABBREVIATIONS

MPC   Marginal Propensity to Consume

SSA   Sub- Saharan Africa

GEM   General Equilibrium Model

SPSS   Statistical Package for Social Sciences

APC   Average Propensity to Consume

WFP   World Food Program

KNBS   Kenya National Bureau of Statistics

UNDP   United Nations Development Program

FAO   Food and Agriculture Organization

VIF   Variance Inflation Factors

KES   Kenya Shillings

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CHAPTER ONE

INTRODUCTION

1.1 Background

In Sub Saharan Africa, expenditure on food constitutes a greater percentage of the household disposable income compared to the amount saved. More than 925 million people were suffering from hunger globally (Food and Agricultural Organization, 2010) with Sub Saharan Africa taking the largest share of between 168 million people reported in the year 2000 to more than 239 million people in 2010. Hunger is a manifestation of food insecurity and according to the World Food Summit (1996), food security can be defined as a situation which exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life.

Food security is built on some pillars and these include; food utilization, availability, access, stability and food sustainability. Household access to food is dependent on food demand satisfaction in relation to the varying food prices and food output fluctuations coupled with the stability of household income/wages. Food availability is a measure of the amount of food that is available for domestic consumption in the food value chain. Food stability occurs when there exists a continuous unchanging flow of food that is required for household consumption from one period to the other. Food sustainability is a state when the amounts of food available for consumption in a given period are consumed in reasonable amounts bearing in mind that the future generations will also be in need of the food. Therefore some quantities are left for this generation hence, household food insecurity denotes a drop in the households' access to food which may be caused by instability in production, food prices or incomes and which collectively interact with considerable effects on the levels of household expenditure patterns (FAO, 2010).

Food security situation in Kenya

In Kenya, 80% of the population live in the rural areas with agriculture being the main economic activity and a third of the country's population is food insecure with over 10 million people suffering from chronic food insecurity and 2 to 4 million in dire need of urgent food assistance at any particular time (Republic of Kenya, 2011).

In 2008, an estimate of 1.3 million people in rural areas and 3.4 million people in the urban areas of Kenya remained food insecure according to International Food Policy Research Institute, (2008).The post-election crisis according to Famine Early Warning Systems(2009) www.fews.net/kenya, had further caused an estimated 150,000 people in high potential areas of Rift Valley to be extremely food insecure and as a result of the food crisis, 100,000 children were malnourished adding to the nearly 30% of children who are classified as malnourished (Republic of Kenya, 2008).

The African Women Studies Centre and Kenya National Bureau of Statistics (2014) carried out a study to get the food security score in Kenya and the findings revealed that nine percent of Kenyans were suffering from chronic food insecurity while twenty four point four per cent were low food secure as shown in Table 1.

Table 1: County Food Security Score

County	Food Secure Percentage	Low food Security Percentage	Chronic Food Insecure Percentage	Number of Households Surveyed
ElgeyoMarakwet	76	20.2	3.8	208
TaitaTaveta	74	20	6	215
Baringo	75.4	16.1	8.5	211
Bomet	83.7	14.8	1.5	196
Bungoma	65.4	30.8	3.8	211
Isiolo	47.6	37.7	14.6	212
Kajiado	80.7	17.9	1.4	207
Kiambu	84.2	15.3	0.05	215
Kirinyaga	94.8	4.7	0.05	192
Kisii	33.8	41.9	24.2	198
Kwale	46.9	43.1	10	209
Laikipia	75.7	16.8	7.6	185
Makueni	66.5	26.1	7.3	218
Migori	41.7	37.5	20.8	168
Mombasa	65.1	28.4	6.4	218
Nairobi	73.8	14.5	11.7	214
Nakuru	86.4	10.9	2.7	221
Nandi	65.1	23.3	11.6	215
Trans-Nzoia	55.9	36.6	7.5	186
Turkana	23.4	37.3	39.2	158
Total	**66.6**	**24.4**	**9**	**4060**

Source: African Women's Studies Centre and KNBS (2014)

Turkana, Kisii and Migori counties had over twenty percent of their population suffering from chronic food security while Kirinyaga, Nakuru, Kiambu and Bomet counties had the highest percentage of their population being food secure.

Food self-sufficiency is the ability to produce rather than buy or import food crops from other countries in order to meet consumption needs of a country. In Kenya, the purpose of food self-sufficiency was to a large extent attained in the early years of independence until the late seventies after which massive food shortages set in partly because of low government support for agriculture and rural development and severe droughts (Fernando, 2013). In the 1980's, the yields were better but worsened in the 1990's but in 2011,from its own production, Kenya could feed 88% of its population (Dietz et-al, 2014)./ A number of factors are mentioned in the literature that led to food insecurity in the country. Among them are policy failures in areas of agricultural pricing, marketing of input and output, distribution and extension that have introduced inefficiencies and decreased agricultural production and the ability to cope with unfavorable climatic conditions (Nyangito, 1999).

Table 2 shows the rapid growth in population against the total food production and it is clear that the population is growing at a higher rate than the growth in food production.

Table 2: Population and basic food production in Kenya, 1961-2014

YEAR	1961	1970	1980	1990	2000	2011	2012	2013	2014
Population (millions)	8.4	11.3	16.3	23.4	31.3	42	43.1	44.2	45.3
Total basic food production (million tons)									
Cereals	1.4	2.1	2.2	2.8	2.6	4.1	3.6	4.3	4.4
pulses	0.3	0.3	0.4	0.8	0.5	0.8	0.9	0.8	0.8
Roots/tubers	0.8	1	1.2	1.6	1.6	3.8	4.6	4.4	3.9

Source: http://faostat.fao.org/site/567/default.aspx.*FAO (2014)*

In Kenya, about 30% of food consumed is from purchases while 70% is own production by rural households who largely depend on rain fed agriculture and eight percent of Kenyans heavily rely on cereals for their food intake leading to overwhelming demand that more often exceeds the supply. According to the Kenya Food Security and Outcome Monitoring Survey (World Food

Programme,2014), the amount of income spent on food has increased to seventy five percent as compared to two years ago thus making the citizens more vulnerable to price shocks. The actual amount of these cereals produced and availed for consumption has in the past not been meeting the quantity demanded by the citizens. Low access to fertile lands and productive production resources has been a major cause of food insecurity which is inherited from one generation and transferred to the subsequent generations as the population swells. However poor climate and unpredictable weather conditions have always been a major contributor to poor seasonal harvests which have been leading to food insecurity in the country (Owuor, 1999).

It is hard for most people who are food insecure to meet their food energy requirements and Kenya is not exceptional hence, as per the Kenya Integrated Household Budget Survey (ROK, 2006), around 47.2% of the rural population is food poor implying that they are unable to afford the daily food intake of 2250 kilo calories per adult, per day and this trend is continuing to date.

Table 3 shows the energy requirements in kilo calories for light and moderate level of activities by age and gender of individuals in the households and it is clear that men require more calorie intake than women of the same age.

Table 3: Energy Requirements (kcal) by Age and Sex for Light and Moderate Activity Levels

Age/sex group	Requirement for light activity (kcal)	Requirement for moderate activity (kcal)
Children 0 5 years		
0 1	820	820
1 2	1 150	1 150
2 3	1 350	1 350
3 5	1 550	1 550
Males 5 and over		
5 7	1 850	1 850
7 10	2 100	2 100
10 12	2 200	2 200
12 14	2 400	2 400
14 16	2 650	2 650
16 18	2 850	2 850
18 30	2 600	3 000
30 60	2 500	2 900
60+	2 100	2 450
Females 5 and over		
5 7	1 750	1 750
7 10	1 800	1 800
10 12	1 950	1 950
12 14	2 100	2 100
14 16	2 150	2 150
16 18	2 150	2 150
18 30	2 000	2 100
30 60	2 050	2 150
60+	1 850	1 950

Source: WHO (2002).

In 2004, the Republic of Kenya through the Ministry of Agriculture came up with the Njaa Marufuku Kenya (NMK) which was an approach to address the state of food insecurity. Njaamarufuku Kenya is a Swahili language term meaning eradicate hunger in Kenya but even with this approach, the beneficiaries targeted in Arid and Semi-Arid areas still rely heavily on food relief from donors and other agencies (Kamoni, Ombati, Nkurumwa, 2013).

1.2   Statement of the problem

The demand for food in Kenya has increased time after time as indicated by the rise in food expenditure levels (World Food programme, 2014). Rural household food expenditures have grown over the years due to the increase of household sizes which according to the Republic of Kenya (2009) was an average of 5.1 members compared to 4.4 members recorded in the 1999 Population Census and with fixed amounts of income in the households, this poses a food security threat. Studies on food security issues have been done without mention on the specific quantities consumed at given income levels and how the expenditures impact on food security. For instance, the Kenya National Bureau of Statistics (2014) in the Kenya Demographic Health Survey indicated a steady rise in the death of children at 39 per 1000 births while the UNDP (2013) in the Millennium Development Goals says it should be at 22 deaths per 1000 births and causes were identified as malnutrition, morbidity, and impaired mental and physical development. In reality Kenya faces real declining food security due to changing consumption patterns, decreased agricultural output, and persistent poverty (Okumba, 1997).

It is in this view that this study seeks to analyze the determinants of household food expenditure at varying income levels and different food purchase decisions made by households as food prices fluctuate and their implications on food security in rural Kenya.

1.3   Research Questions

To achieve the objectives, the study seeks specific answers to the following research questions:

1. What are the food expenditure patterns in rural Kenya?
2. What are the determinants of household food expenditure in rural Kenya?
3. What are the policy implications on food security in rural Kenya?

1.4   Research Objectives

The general objective of the study is to analyze the determinants of household food expenditure and food security in rural Kenya

The specific objectives of the study are;

1. To analyze the expenditure patterns in rural Kenya.
2. To establish the determinants of household food expenditure in rural Kenya.

3. To determine the policy implications on food security in rural Kenya.

1.5   Justification/significance of the study

This study will contribute to the generation of reliable information on the determinants of household food expenditure patterns and their implications on food security in order to inform policy makers on the current situation for better livelihoods in rural Kenya.

It will also lay a basis that will enable policy makers to develop a framework that will be used as a guide on the food expenditure patterns in rural Kenya and add useful literature on rural household food expenditure patterns for further studies. Moreover, a number of studies have been carried out on either food expenditure or food insecurity separately without an amalgamation of the two key issues. This study will focus on the two issues concurrently.

1.6   Organization of the Study

The rest of this research paper is organized as follows: Section two reviews the theoretical literature, empirical literature and the overview of the literature review, section three presents the research methodology, section four presents the empirical results and section five gives the conclusions and policy recommendations.

CHAPTER TWO

LITERATURE REVIEW

2.1   Introduction

The price of maize, which is the key staple food in Kenya, has risen in rural Kenya significantly in the recent past with constant income levels, putting vulnerable households at increased food security risk (United Nations, 1998).The countries neighboring Kenya that have civil unrest leave the country under the exposure of price changes, restrictive cross-border market flows and in turn cause refugee to flood thus increasing the likelihood of struggle for natural resources (United Nations, 2000).

According to Mwangi (1995), many factors affect food insecurity and these include climate, nutrition, vegetation, markets, political, historical, social and also economic issues most of which are being combined into coming up with standardized approaches to lessen the risk and plan progress and response tactics. An integrated assessment of the issues underlying chronic food insecurity, including conflict, infrastructure, international relations and coping strategies is advocated for.

2.2   Theoretical Literature

Theoretical literature will examine the available theories on food security and expenditure patterns with a keen look at how the two are interconnected.

2.2.1   Keynesian Absolute income Hypothesis

Keynes (1963) postulated a relatively stable relationship between consumption and disposable income. He dismissed the importance of other factors such as wealth, interest rates, and distribution of income and concentrated on disposable income. In explaining the relationship between consumption and income, he used a simple linear consumption function with consumption being a positive function of disposable income. Autonomous consumption was included in the model to cater for that part of consumption that does not directly come from disposable income. The MPC was also included to show changes in consumption levels as income changes. The value of MPC is less than one implying that income and consumption have a positive relationship though the increase in consumption is not as much as the increase in

income. He also pointed out that the APC falls as the level of income rises. Thus according to Keynes, MPC exceeds APC and that MPC increases at higher income levels. The author in his theory does not consider maximization of utility neither is there an explanation given as to why the consumer behaves the way he assumed.

2.2.2   Relative income hypothesis

Duesenberry (1949) came up with a model of Relative Income Hypothesis which states that consumption behaviours are interdependent and irreversible over time. He argued that an individual's consumption not only depends past levels of income but also on the absolute income. He poses that it was particularly difficult to reduce previously attained level of consumption than to reduce the saving. This reflected the cyclical behavior of APC. The theory explained both time series and cross- section formulations of consumption behavior. This theory was not widely accepted but rather dominated by the life cycle and permanent income hypothesis because of the fact that consumption increases as expected lifetime resources of an individual increase.

2.2.3   Permanent Income Hypothesis

Friedman (1957) differentiated measured income (income actually received) and permanent income (income on which consumers base their consumption). According to him, consumption depends on permanent income, interest rate, non- human income to wealth ratio and tastes and preferences. The average propensity to consume declines as current income increases above permanent income in the short-run. This implies that, in the, long run the higher the disposable income, the greater the consumption level. This hypothesis gives less importance to the current income.

2.2.4   Life Cycle Income Hypothesis

Modigliani and Ando (1963) analyzed the behaviours of individuals at given points in time and concluded that individuals adopt a planning horizon for their lifetime consumption by building up assets at the early stages of their working lives and later on making use of this stock during retirement. A typical consumer may choose a consumption stream in order to maximize their utility function defined on current and future consumption which is subject to a lifetime resource constraint. Income is allocated in accordance to the present resources in order to maximize utility over the lifetime. An increase in income adds to consumption as much as it adds to total lifetime

resources. However, one can note that the elderly save more since they want to leave bequest for their children and are cautious of unpredicted expenses which may be caused by ill health and other medical expenses.

2.2.5 The Engel curve

This was introduced by Ernst Engel (1857) who analyzed the relationship between household expenditure and income and concluded that food expenditure rises with a rise in income and family size but food budget shares decreases with the decrease in income. His findings also led to the formulation of the Engel's law which says that, households with lower income spend more on food than those with middle or higher income. According to Engel, expenditure on food is very essential hence a decline in household income may put pressure not to spend on non-essentials and a rise may have the opposite effects. Thus larger households spend much of their income on food than smaller households. However, Engel failed to recognize the effect of price changes on food expenditure and also failed to explain the variations in individual's consumption.

2.3 Empirical Literature

Aidoo et-al (2013) argue that there are five variables that have a significant impact on the household being food secure. These are marital status, size of the household, farm size, off farm income and access to credit. An expansion in the area under cultivation leads increased food production and families headed by the unmarried are more food secure than those headed by the married as the latter may be having more mouths to feed. Both access to credit and off farm income have a positive effect on food security because this may lead to improvement in capacity to produce more food. This study found that an increase in household size reduced income and expenditure per head and per capita food consumption since a larger household demands more food while in reality, this will be depended more on the age of the increased household member which may have a negative or positive impact on food security status.

Kassie et-al (2012) in the study on the determinants of household food security in Kenya puts more focus on the role of the household head. The study suggests that female headed households are more food insecure compared to those headed by the males. Increase in the quality of extension workers helps increase food security in households headed by the females and improvement in their skills in turn affects the dissemination of technology hence impacting

positively on food security. This study will seek to prove if the findings of this author still hold and if the same case applies in rural Kenya.

Household age and income are important in explaining the food security status of the household because income has a positive effect on food security while the age implies a longer stay in the private and public sector meaning a higher income. A narrower gap between the rich and the poor in order to attain an even distribution of income, improved food security and eradication of poverty as well as creation of employment is recommended by Anyaeji and Arene (2010) and in their study, they found that older household heads were more food secure than the younger ones and thus an increase in age has a positive effect on food security status.

According to Kiran and Sethia (2013), in their factors influencing food consumption are income, demographic characteristics, level of education, size and pattern of assets, time use, information and social barriers. Income gives a wide range of consumption options as one can buy diverse and nutritious food instead of own crop and when it rises, consumption also rises. Population growth rate, level of education of household head, family members' age and size affect the household savings with the level of education determining the income earned. Information in turn gives awareness on the foods available in the market. This study doesn't not consider the role of the household head in determining the household food security status.

Donkoh et-al (2014) analyzed the relationship between household expenditure and income. The findings were consistent with those of Engel that food expenditure increases as income and the number of members in a family increases but food budget shares decreases with a decline in income. The conclusion was that households which are not well endowed with resources spend a good size of their incomes on consumables and thus any increase in household income leads to increased expenditure on food items. The authors use budget share of food expenditure as the dependent variable.

Otundo (1982) carried out studies on the Rural- urban dualism and consumption behavior of Kenyan households using the integrated rural survey of 1974-75. The author tested the hypotheses that marginal propensity to consume is higher in rural areas than in urban areas and that the marginal food budget for food is higher in urban areas than that for non- food in rural

Kenya. The findings of the study postulated that the MPC is higher in rural areas than in urban areas.

Some regions within the boundaries of Kenya have little access to food leading to a never ending problem of undernourishment according to Owuor (1999). The author suggested that the problem needs to be addressed through formulation of policies and strategies which could be strong enough to overcome the challenges. During periods of poor harvest, food insecurity is seen to be on the rise and vice versa.

The study on the food security status for rural landless households in Punjab by Bashir et-al (2012) found that both household's income and the level of education of the household head had a positive effect on the food security situation. On the other hand, the age of the household head and the family size had a negative impact on the food security situation such that younger people are stronger than the elders and eat more while an increase in the number of the household members will lead to a decline on the food security status. The study fails to give number of the amounts purchased from the food markets and the minimum income earned.

According to Mohajan (2014), in Kenya, maize security is portrayed as food security and households that produce enough food for their consumption and have some to sell in the market, are seen as being able to maintain a balanced diet daily. The author says that if agriculture and rural investment is prioritized in order increase productivity, taxes reduced, access to financial services improved, agribusiness grown and rural infrastructure improved, then this will improve food security and nutrition status. Even though the republic of Kenya has tried to attain national and household food security, household food availability cannot be guaranteed and the food gap continues to widen and thus this study will put forward the determinants of household food expenditure and thereby help reduce this gap by recommending the best policies.

Omotesho et-al (2006) in their study argue that non-farm income of rural households has a great consequence on the food security level and that households should be assisted so as to diversify their income source in their quest to attain the minimum food requirement. There is also need to educate rural households on modern family planning practices in order to bear the number of children that they can support even with their current incomes and empower them to get soft loans that will assist in increasing the farm size hence improve the food security situation. The

author does not consider other factors that also determine food security situation other than non-farm income.

2.4   Overview of literature review

The studies carried out point out on expenditure patterns without a mention on the effect and implications of these expenditure behaviours on food security in rural Kenya. For instance, Otundo (1982) in the studies on the rural- urban dualism and consumption behavior of Kenyan households using the integrated rural survey of 1974-75. The hypothesis that marginal propensity to consume is higher in rural areas than in urban areas and also that the marginal food budget for food is higher in urban areas than that for non- food in rural Kenya does not bring out the issue of food expenditure and implications on food security.

 Kassie et-al (2012) in their study on the determinants of household food security in Kenya puts more focus on the role of the household head and does not consider other factors that influence the food security situation in the household.

Considering the analysis above, there is need to explore the determinants of rural household food expenditure and their implications on food security concurrently.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1   Introduction

This section outlines the methodology that will be used in carrying out the study. It comprises of the conceptual framework, the economic model and variables to be studied, research design, sample size and sampling procedure, data collection methods and analysis and presentation techniques.

3.2   Conceptual framework

The Engel curve gives a clear description of how household expenditure on a particular good or service varies with household income. The Engel's law states that families that are not economically well endowed with resources spend a larger budget share of their disposable income on food.

For normal goods, as income increases, the quantity demanded also increases. Although the Engel curve remains upward sloping, it bends toward the Y-axis for necessities and towards the X axis for luxury goods. Food is a necessity therefore we expect the Engel curve to bend towards the Y axis.

Food security at the national level is dependent on food self-sufficiency, imports to bridge the gap between what is produced locally and the shortages, cash transfers to the farmers in the form of subsidies in order to increase food production with a goal of cutting down food shortages and food insecurity and also food aid from abroad through non-governmental organizations.

Expenditure on food determines whether a household is food secure or food insecure and it is dependent on the income level, the size of the household, the level of education of the household head, the price of cereals, tubers and pulses, the age of the household members and the gender of household members.

Figure 1 shows the conceptual framework showing the independent and dependent variables.

Figure 1: Conceptual Framework

Independent Variables   **Dependent Variable**
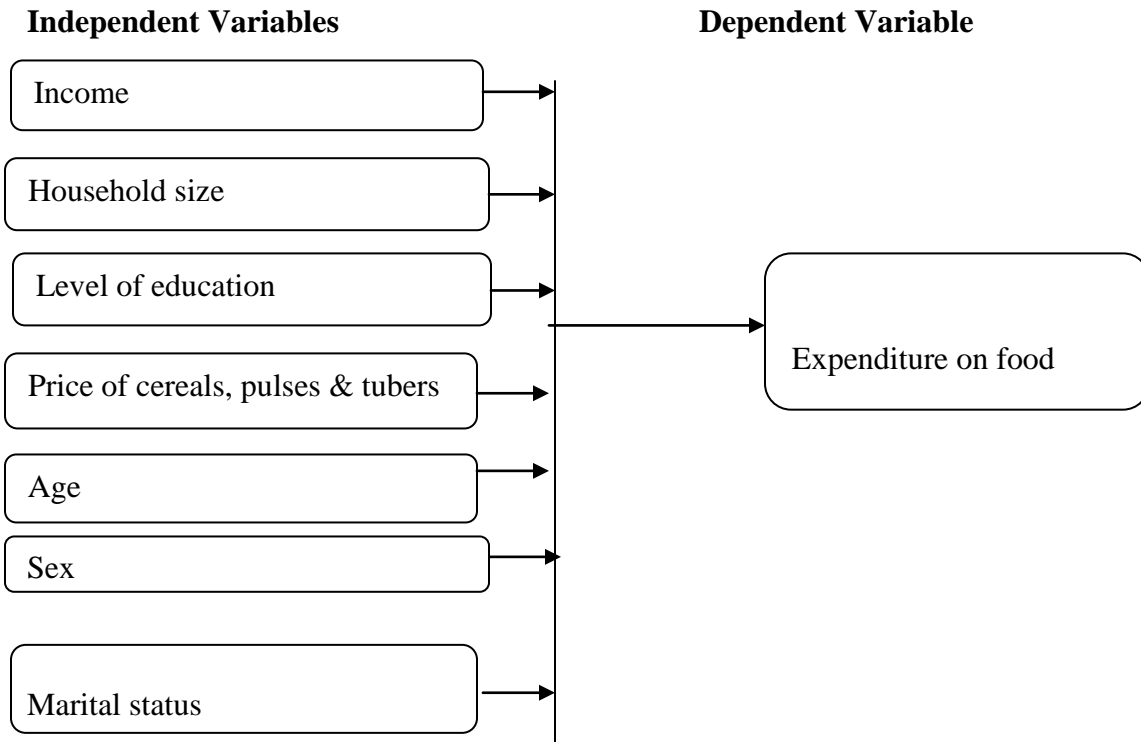
Source: Author (2015)

From figure I, expenditure on food is dependent on the amount of income held by the household such that the lower the income, the higher the expenditure on food items as discussed in the literature and the occupation of the household head has an impact on the income earned. It is also dependent on household size such that as the number of members in a household increases, the proportion of food expenditure also increases.

Expenditure on food is also dependent on the level of education of the household head whereby it is presumed that people with higher educational qualifications are in a position to acquire sufficient amounts of food and that the more educated one is, they are able to buy a variety of food than the less educated who may concentrate on buying one type of food only. The higher the price of a given food item, the less the amounts that will be purchased for consumption.

It is also presumed that household members who have not yet attained the working age and the elderly do not contribute to food expenditure hence higher dependency ratio and that a household

with children less than a year old, are likely to spend more on their food. Households dominated by male members are alleged to be consuming more food than female dominated households.

The marital status of the household head has an impact on food expenditure because it has an effect on the food security status of the household. Whether the household head is married, single, widow or widower, separated, divorced, polygamous or living together will affect the food security level.

3.3 Economic Model and Variables to be studied

To establish the household expenditure patterns and their implications on food security in rural Kenya, the Keynesian consumption function (assuming that Consumption= Expenditure) will be applied. The function is of the form;

$$C = C_o + C_1 Y \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots. (1)$$

Where:

C = Household Consumption

C_0 = Autonomous consumption

C_1 = Marginal propensity to consume

Y = Disposable income

Therefore equation (1) states that, consumption/Expenditure depends on autonomous consumption and the consumption depended on disposable income. Borrowing may allow a household to sustain its consumption at some level thus enabling recurring expenditure and food security. Hence, a debt augmented Keynesian consumption function can be as follows:

$$C = C_o + C_1 Y + C_2 D + C_3 Z \dots\dots\dots\dots\dots\dots\dots\dots.. (2)$$

Where;

$C_2 D$ = Consumption dependent on debts

$C_3 Z$ = Consumption dependent on other variables which determine household expenditure.

Equation 2 depicts the relationship between consumption/ Expenditure and debt accumulation which may lead to food insecurity due to overdependence on debts thus creating debt servicing difficulties. Data on household debts is usually not available and thus it will not be considered in the estimation model.

When all the other variables which affect the level of consumption at a particular point in time ceteris paribus are taken into consideration, then it follows that;

$$C = f\,(\,C,\,Y,\,HH,\,A,\,S,\,E,\,P,\,M\,)\ldots\ldots\ldots\ldots\ (3)$$

Where;

C= Consumption/ Expenditure Level

Y= Total income including income from the farm, non-farm, cash transfers and remittances

HH = Household size

P = Price level of cereals

A = Age of household head

S = Sex of household head

E = Education level of household head

M= Marital status of the household head

Therefore, the empirical model will be stated as;

$$E = f\,(Y,\,HH,\,Ed,\,A,\,S,\,P,\,M)\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ (4)$$

Where Y is income, HH is household size, Ed is education level of household head, A is age of household head, S is sex of household head, P is price of cereals and M is marital status of the household head.

To estimate how expenditure changes by a change in the independent variables by a certain proportion, the specification model is estimated by the use of linear linear model as shown in equation 5 below:

$$E = \alpha_o + \alpha_1 Y + \alpha_2 HH + \alpha_3 Ed + \alpha_4 A + \alpha_5 S + \alpha_6 P +_{\alpha 7} M + \varepsilon \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (5)$$

Where α_o is the multiplicative variable showing consumption not dependent on any variable and $\alpha_{i's}$ are the coefficients to be estimated or the elasticities and ε is the error term. The techniques of OLS will be used in the estimation of the determinants of household expenditure.

3.3.1 Definition of variables

Dependent variable

E is the household expenditure on food in Kenya for the period 2005/06 measured as a ratio of recurrent expenditure. Expenditure on food will measure the household food insecurity through food energy deficiency, diet diversity and the percentage of total expenditure on food.

Independent variables

Y is total income including income from the farm, non-farm, cash transfers and remittances. A positive relationship is assumed between income, expenditure and food security.

HH is the household size measured in terms of number of dependents in the household. It is assumed that, as the household size increases, expenditure also changes in the same direction leading to food insecurity if the household income does not increase hence a negative relationship.

Ed is the highest level of education attained by the household head. It is assumed that, the higher the level of education, the higher the expenditure level the less the food insecurity thus a positive relationship is expected.

P is the price of food commodities. It is assumed that, as prices of food go up, expenditure on the commodities decrease leading to food insecurity assuming income remains constant. Thus a negative relationship is expected between expenditure and price.

S is the sex of household head. It is assumed that generally the male household members spend a higher share of their disposable income on food compared to the female counterparts. Therefore a positive relationship between consumption and male gender is expected.

A is the age of household head. The younger the member is, the greater the marginal propensity to consume. A negative relationship may be expected.

M is the marital status of the household head. It is assumed that households with the household head married or living together more food secure. This variable expected to take a positive sign.

3.4   Research Design

Cross sectional data from the Kenya Integrated Household Budget Survey 2005/2006 on household food expenditure and food security will be used in this study.

3.5   Data Analysis Methods and Procedures

Methods of checking multicollinearity and heteroskedasticity will be carried out to ensure that variables are not highly correlated with others and that the standard errors of the estimates are not biased.

To carry out significance tests on the OLS estimates that will be obtained from the model specified above, the null and alternative hypotheses will be set as follows;

H_0: $a_i = 0$, Implying that, the variables do not have a significant effect on household expenditure.

H_1: $a_i \neq 0$, implying that, the variables have a significant effect on household expenditure.

The student t- values will be used to accept or reject the hypotheses. Rejecting the null hypothesis will be an implication that the coefficient in question will be significantly different from zero thus, statistically significant. Accepting the null hypothesis, will be an indication that the coefficient in question is statistically not different from zero and therefore statistically insignificant.

3.6 Data Collection Methods and Procedures

The study will mainly rely on cross sectional data. The data will be obtained from the already existing government publications for the Kenya Integrated Household Budget Survey 2005/2006 report by the Kenya National Bureau of Statistics.   This data was collected from 13,430 households comprising of 8,610 from the rural areas and 4,820 from the urban centers.

CHAPTER FOUR

EMPIRICAL RESULTS

4.1 Introduction

In this chapter, results of empirical analysis are presented. The chapter discusses descriptive statistics of the data, diagnostic tests and report on the regression results.

4.2 Descriptive Statistics

Table 4 shows the descriptive statistics of the dependent and independent variables.

Table 4: **Descriptive Statistics**

Variable	Obs	Mean	Std Dev.	Min	Max
fexp	17779	38178.73	32941.33	0	536724.7
Age	13198	35.02932	13.59107	15	64
Sex	17779	.4914787	.4999414	0	1
Married	17779	.0776759	.2676684	0	1
Education	14506	1.861437	1.409416	1	10
Hhs	17776	6.135576	2.639026	1	23
Price	5053	684.9283	3105.732	0.5	150000
Income	5087	12873.51	48745.07	1	1500000

The study considered eight variables (one dependent and seven independent variables). The total observations considered for total expenditure on food were 17779. Total expenditure on food deviates from its mean (KES 38178.73) by KES 32941.33 but ranging between KES 0 and KES 536724.7. The total observations considered for age were 13198. Age deviates from its mean (35.02932 years) by 13.59107 but ranging between 15 years and 64 years. The total observations considered for number of educational years were 14506. Number of educational years deviates from its mean (1.861437 years) by 1.409416 years but ranging between 1 year and 10 years. The total observations considered for the income of the household were 5087. Income of the

household deviates from its mean (12873.51) by 48745.07 but ranging between 1 and 1500000. In general the standard deviation for each variable indicates the value by which a given variable deviates from its mean. Among the variables under study, dummy variable for married has the least standard deviation, an indication that it does not deviate much from its mean. Total expenditure on food has the largest deviation indicating that it deviates much from the mean.

4.3 Correlation Matrix

Correlation of the variables is examined in table 5.

Table 5: Correlation matrix

Variables	Fexp	Age	Sex	Married	Education	Hhs	Price
Fexp	1						
Age	0.0082	1					
Sex	0.0171	0.1236	1				
Married	-0.0017	0.1653	0.0005	1			
Education	0.0666	0.1838	0.1422	-0.0212	1		
Hhs	0.2808	0.0242	0.0058	0.1256	-0.0291	1	
Price	0.0311	0.0098	0.003	0.0298	0.038	0.0032	1
Income	0.0748	0.1161	0.0583	0.0327	0.0796	0.0537	0.4078

From Table 5, we observe the relationship existing between various variables used by this study. There is a positive association between total expenditure on food and all other variables in the study except marital status of the head of the household. Age of the household head has a positive relationship with sex, marital status of the household head, educational years of the household head, household size, price of cereals, tubers and pulses and income of the household. Sex of the household has a positive relationship with marital status of the household head, educational years of the household head, household size, Price of cereals, tubers and pulses and income of the household. Marital status of the household has a positive association with household size, Price of cereals, tubers and pulses and income of the household whereas it depicts a negative relationship with educational years of the household head. Educational years of the household have a positive relationship with Price of cereals, tubers and pulses and income of the household but it depicts a negative relationship with household size. Household size has a

positive relationship with Price of cereals, tubers and pulses and income of the household. Price of cereals, tubers and pulses has a positive relationship with income of the household.

4.4   Diagnostic Tests

The diagnostic tests used in this study are to check for heteroscedasticity and multicollinearity.

4.4.1   Heteroscedasticity

Using Breusch-Pagan test, results reveal that the variances of the random error terms are constant across observations since the p-value of 0.0000 (See Table 6) leads to rejection of the null hypothesis of homoscedasticity. This confirms presence of heteroscedasticity.   The study corrects heteroscedasticity by use of robust estimation.

Table 6: Test for Heteroscedasticity

Breusch-Pagan / Cook-Weisberg test for heteroscedasticity
Ho: Constant variance
Variables: fitted values of fexp
chi2(1) = 883.82
Prob> chi2 = 0.0000

4.4.2   Multicollinearity

To test for multicollinearity, Variance Inflation Factors (VIF) was examined. For VIF values greater than 10, multicollinearity is deemed to be present (Nachtscheim, 2004). All the variables had VIF less than 10 (see Table 7) meaning there is no multicollinearity.

Test for Multicollinearity using Variance Inflation Factors

$$VIF = \frac{1}{1-R^2}$$

Where VIF= variance inflation factor

R^2= coefficient of determination

1/VIF= tolerance

Table 7: Variance Inflation Factors

Variable	VIF	1/VIF
Income	1.23	0.815076
Price	1.20	0.830820
Age	1.09	0.917782
Education	1.06	0.945106
Married	1.05	0.954449
Sex	1.03	0.967967
Hhs	1.02	0.980276
Mean VIF	1.10	

4.1 Empirical Findings

The empirical findings of the study are shown in table 8.

Table 8: Regression Results in Levels

Linear regression		Number of obs	=	3388
		F(7, 3380)	=	21.85
		Prob > F	=	0.0000
		R-squared	=	0.0889
		Root MSE	=	31596

Fexp	Coef.	Robust Std. Err.	t	P>t	[95% Conf.	Interval]
Age	-32.5567	44.82234	-0.73	0.468	-120.4383	55.32499
Sex	251.0815	1113.219	0.23	0.822	-1931.569	2433.732
Married	-4781.26	2030.901	-2.35	0.019	-8763.177	-799.3382
Education	1511.802	323.4186	4.67	0.000	877.6862	2145.918
Hhs	3707.453	387.0614	9.58	0.000	2948.555	4466.352
Price	0.062701	0.149339	0.42	0.675	-0.2301025	0.3555054
Income	0.037151	0.0121825	3.05	0.002	0.0132654	0.061037
Cons	13853.13	2786.089	4.97	0.000	8390.536	19315.72

4.2 Interpretation of the Results

The results above indicate that regression did not do well in regard to the goodness of fit but did well in terms of overall significance with an R^2 of 8.89 % and F statistic of 0.0000. This implies that 8.89 % of the variation in the total expenditure on food is explained by the explanatory variables in the model.

The results further show that when all the independent variables in the model assume the value of zero, total expenditure on food will be 13853.13. Holding all other factors constant, total expenditure on food will decrease by 32.5567 units when age of the household head increases by one unit. When all other factors are held constant, total expenditure on food will increase by 251.0815 units when the head of a household is male. When all other factors are held constant, total expenditure on food will decrease by 4781.26 units when one is married. When all other factors are held constant, total expenditure on food will increase by 1511.802 units when years of education of the household increases by one unit. Holding other factors constant, total expenditure on food will increase by 3707.453 units when household size increases by one unit. Holding other factors constant, total expenditure on food will increase by 0.062701 units when price of cereals, tubers and pulses increases by one unit. Finally, holding other factors constant, total expenditure on food will increase by 0.037151 units when income of the household is increased by one unit.

4.3 Discussion of the Findings

The coefficient of age of the household head is negative and insignificant in determining expenditure on food in rural Kenya. The results conform to economic theory since as one grows older, they tend to depend more on others for their food consumption implying food insecurity but contradicts the findings of Anyaeji and Arene (2010) who argue that older household heads were more food secure than the younger ones .
The coefficient of education is positive and significant in determining expenditure on food in rural Kenya and this means that the highly educated may be buying processed foods which may be more expensive and unhealthy. The results conform to the finding of Bashir et-al (2012) who in their study found that the level of education had a positive impact on the food security situation of the household.

The coefficient of household size is positive and significant in determining expenditure on food in rural Kenya which means that there are more mouths to feed in the household. The results conform to the findings of Aidoo et-al (2013) who in their study found that an increase in the size of the household reduced income and expenditure per head and per capita food consumption since a larger household demands more food.

The coefficient of income of the household is positive and significant in determining expenditure on food in rural Kenya. The average income per day is KES. 35.27 which is less than a dollar implying poverty hence income increases but by a small margin. The results are in agreement with what was found by Aidoo et-al (2013), Anyaeji and Arene (2010, Kiran and Sethia (2013), Donkoh et-al (2014), Bashir et-al (2012) and Omotesho et-al (2006) that more income meant more food secure.

The coefficient of price is positive but taking a very small value and significant in determining expenditure on food in rural Kenya. This is because as price increases, one still consumes more of the necessities and thus expenditure on food is not reduced because one doesn't have an alternative.

CHAPTER FIVE

CONCLUSIONS AND POLICY IMPLICATIONS

5.1   Summary and Conclusion

This study has investigated the factors that determine household food expenditure and food security in rural Kenya for the period 2005/2006. It adopted the Keynesian consumption function assuming that consumption is equal to expenditure in estimating the relationship between food expenditure and the explanatory variables. Diagnostic tests have been undertaken and the OLS methods of data analysis were adopted.

The study's findings show that food expenditure is determined by marital status, education level, age, sex of the household head, household size, household income level and price. The education level of the household head, household size and income level of the household were found to be positive and statistically significant in determining food expenditure at 5% level of significance. Marital status of the household head is found to be negative and statistically significant while price of cereals, tubers and pulses was positive but statistically insignificant. Sex and age of the household head were both negative and statistically insignificant in determining food expenditure at 5% level of significance.

5.2   Policy Implications

Our investigation has evidently shown that food expenditure in rural Kenya is determined by various factors. These factors are the variables under study and include marital status, education level, age, sex of the household head, household size, income level of the household, price of cereals, tubers and pulses and the impact of each of these variables differs in sign and degree. Not all the variables under investigation are statistically significant in determining food security status in rural Kenya. These findings therefore provide a pool of information for policy makers in Kenya.

According to the study results, the Republic of Kenya should aim at maintaining those variables that are statistically significant in our study and also try to see what to improve on those that are statistically insignificant. With regard to the statistically significant ones, for instance; the income level of the household, the government should encourage income generating activities in the rural areas so as to improve food expenditure. As for the education level and expenditure on food, the government can encourage lessons on nutrition to reduce the purchase of processed

foods which the highly educated are spending more on and also encourage more to join the free education by enrolling in schools both for the young ones and the elderly. The government should ensure households are educated on family planning methods to encourage them to bear the number of children that they can sustain and thus control the household size and decision making among the married women should be encouraged because women they seem to lose this power they had when they were single.

For the variables that are statistically insignificant, use of cash transfers for the elderly should be encouraged to help them have some purchasing power and have some protection from the government. Gender equality should be encouraged so that even females have some power to make decisions with regards to food expenditure in the household and increase in production will make the prices of necessities to fall.

5.3 Limitations of the Study

The study findings may not be the actual truth of the situation on the ground currently since economic conditions have changed from the time this data was collected by KNBS. This implies that there may be other factors which could be determining expenditure on food in rural Kenya but not considered in this study.

5.4 Areas for Further Study

Future study can investigate the determinants of expenditure on food in rural Kenya using the most recent data. Thus variables which have not been examined in this study can be investigated by future researchers.

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GLOSSARY

Food insecurity -   A situation which exists when people lack secure access to sufficient amounts of safe and nutritious food for normal growth and development and an active and healthy life. It may be chronic, transitory or seasonal.

Food security -   A situation that exists when all people at all times have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life.

Food self-sufficiency– The ability to produce rather than buy or import food crops from others.

Kilocalorie (kcal) - A unit of measurement of energy. One kilocalorie equals 1000 calories.

Undernourishment - A state lasting for at least one year, of inability to acquire enough food.