

Determinants of Sorghum Producing Households' Expenditure and Implications for Food Security in Western Kenya and Eastern Uganda

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Abstract

Even though studies have addressed determinants of household expenditure, no effort has been made to evaluate such factors among sorghum producing households in western Kenya and Eastern Uganda. The paper examines household expenditure pattern, its determinants and implications for food security among sorghum farmers in western Kenya and Uganda. Data was collected using ODK software in 5 counties of western Kenya and 4 sites in Uganda, and analyzed using Stata. Sorghum farmers in Western Kenya spend US\$ 1,090 annually on basic needs, unlike Ugandan counterparts who use US\$ 1,273. Food took 52 % of budget in western Kenya unlike in Uganda where it accounted for 28 %. Education, medicare, clothing and social events took 29 %, 8 %, 6 % and 5 % in Kenya, unlike Uganda where they accounted for 30%, 23 %, 9 %, and 10 % respectively. In western Kenya, income significantly influenced expenditure on food, education, medicare and clothing, unlike Uganda where it only influenced expenditure on education and clothing. Gender influenced expenditure on food and medicare in Western Kenya calling for intra-household consultation when programming food and medicare, but was a non-issue in Uganda. Education only influenced expenditure on clothing in western Kenya, but in Uganda it influenced expenditure on social events and medicare. Household size influenced expenditure on education, clothing and social events in western Kenya, but in Uganda it influenced expenditure on education and medicare. While age influenced expenditure allocations on food, education and medicare in Uganda, it was not significant in Kenya. Economic empowerment of sorghum producing households is critical for increased access to basic necessities. Farmers should be encouraged to increase sorghum production as a way of ensuring food security, and unlocking household income for other pressing family needs.

Keywords: Determinants, Expenditure, Sorghum Producing Households, Food Security, Western Kenya, Uganda

1 Introduction

Food and livelihood insecurity is a major problem in Eastern Africa, whose majority of their population derives their livelihoods from Agriculture. In 2010 the number of globally food hungry was 925 million with Sub-Saharan Africa accounting for 239 million hunger sufferers. Out of this about 18.5 million hungry people were traceable to Kenya (FAO 2010). Uganda with a population of 39 million produces more food than it consumes. Yet, poverty still limits 20 % of people's access to nutritious food, especially in the north and east of the country (WFP, 2018). To make matters worse Uganda hosts more refugees than any other country in Africa, including people who have fled from South Sudan, the Democratic Republic of Congo and Burundi. Poverty is perpetuated and development is hampered where food insecurity exists. Poverty has a twin impact on household food security. First, it reduces the capacity of households to access farm inputs due to capital limitations thus hindering expanded food production, and it also prevents households from accessing food due to their low or non-existent purchasing power (Nyangweso 2007). Additionally, poverty exposes households to poor health thus reducing households' ability to physically engage in food production activities.

Sorghum is one of the staple food crops and source of livelihood mainly produced by smallholder farmers who use low inputs, have limited access to technologies and face multiple production challenges. It is predicted that in the marginal areas of Eastern Africa, global climate change will cause more food deficit, increasing vulnerability of the populations.

Household expenditure is a good indicator of resource constraints many households face in their endeavour to meet their many needs. Most households spend their budgets on food, education, Medicare, clothing and social events. Sorghum growing households in western Kenya and Eastern Uganda allocate their budgets to their different needs, but budgetary constraints are a common feature among them. The proportion of their budgets allocated to different items depends on household prioritization. However, prioritization of household budgets depends on certain determinants. Even though studies have addressed determinants of household expenditure, no effort has been made to evaluate such factors among sorghum producing households in western Kenya and Eastern Uganda. This paper attempts to address the following questions: what is the expenditure pattern of

sorghum producing households in western Kenya and Eastern Uganda? What are the factors that drive the aforementioned expenditure pattern? What are their policy implications for food security among sorghum producing households in western Kenya and Eastern Uganda?

2 Methodology

The survey was carried out in key sorghum growing areas of western Kenya and Eastern Uganda. The study had 6 experimental sites located in 5 counties of western Kenya and 4 experimental sites located in 4 counties of Uganda (appendix II). The counties selected in Kenya were Homabay, Migori, Busia, Kakamega and Siaya. Two sites namely Homabay and Karungu were selected from Homabay County and one site from Migori County. Matayos was selected from Busia County, Koyonzo from Kakamega County and Segga from Siaya County respectively. The counties selected in Uganda were Amuria, Kumi, Bukedea and Kanyum

2.1 Data Types and Sources

Both primary and secondary sources of data were used. Both qualitative and quantitative data were collected. Types of data used in this study included general demographics of respondents such as age, gender, education, marital status, household expenditure pattern. Primary data was obtained through a survey while secondary data was acquired through perusal of government and private research documents, journals and other publications relevant to the study.

2.2 Sampling Procedures

The target population was all sorghum farmers in western Kenya and Eastern Uganda. Cluster sampling was used with project sites being criterion for clustering. In each cluster a sample was selected proportional to the population of sorghum farmers in the selected study sites. However, due to non-response and poor response to some questions the set of analyzable responses reduced to 210 in western Kenya and 152 in Eastern Uganda. In each site, farmers were systematically selected. However, the first farmer was selected randomly and subsequent farmers selected by skipping every 2 sorghum farmers.

2.3 Data Collection Instruments and Methods

Questionnaires, observation, and focused group discussions were used to collect information from farmers. Instruments of data collection were pre-tested in Segga site in western Kenya on 10 farmers to ensure validity and reliability and revised before embarking on the actual survey. Standardized research protocol for the survey was generated for use across the sites and uploaded in the ODK software and posted to the McKnight server. Standard protocol for the survey was downloaded to Smart phones on android application and subsequently used to collect data by research assistants from sorghum farmers. Upon collection of data, research assistants proceeded to upload filled questionnaires to the McKnight server.

2.4 Data processing and analyses

Coding of responses was automatically generated by ODK software. Data for the six project sites in western Kenya and four project sites in eastern Uganda were downloaded from the McKnight server in form of excel spreadsheets, cleaned before being imported into STATA software. Further data cleaning was done in Stata to remove outliers, create consistency and test the integrity of the data. Data was analyzed descriptively by identifying characteristics of variables under study using measures of central tendencies, dispersion, bar charts and cross tabulations. Regression analysis was done to determine determinants of expenditure pattern of sorghum producing households. Statistical analysis was done using STATA and Ms-Excel.

Considering a consumer whose expenditure function is $e(u, p, z)$, with u targeted utility, p a vector of commodity prices and z a vector of individual characteristics, the consumer's objective function is to minimize expenditure with respect to quantity, x , subject to a targeted utility constraint $u(x) = u$. This can be specified as (1): -

$$\begin{aligned} & \text{subject to} & \min_x & e = e(u, p, z) \\ & & & u(x) = u \end{aligned} \quad (1)$$

This can be re-specified as (2):

$$\min_{x, \gamma} px + \gamma(u - u(x)) \quad (2)$$

The corresponding Lagrangian function is given by (3):

$$L = e(u, p, z) + \gamma(u - u(x)) \quad (3)$$

The first order conditions are as follows in (4) to (6): -

$$\frac{\partial L}{\partial x_1} = p_1 - \gamma \frac{\partial u(x)}{\partial x_1} = 0 \quad (4)$$

$$\frac{\partial L}{\partial x_n} = p_n - \gamma \frac{\partial u(x)}{\partial x_n} = 0 \tag{5}$$

$$\frac{\partial L}{\partial \gamma} = u - u(x) = 0 \tag{6}$$

Equations (4) to (6) can be expressed as:

$$\nabla L(x^*, \gamma^*) = 0 \tag{7}$$

These conditions are used to derive the optimal solution for expenditure minimization problem, which occurs when the marginal rate of commodity substitution (MRCS) between goods i and j is equal to the rate of exchange of the two goods.

$$\text{MRCS} = \frac{\partial x_i}{\partial x_j} = \frac{\partial u(x^*)/\partial x_i}{\partial u(x^*)/\partial x_j} = \frac{p_i}{p_j} \tag{8}$$

The sufficient conditions for this expenditure minimization problem when, $f(\cdot) = px$ and $g(\cdot) = u - u(x)$, are twice differentiable and vectors $x^* \in R^n$, $\lambda^* \in R^m$ exist such that

$$\nabla L(x^*, \gamma^*) = 0 \tag{9}$$

$g(x^*) = 0$ occur for $p = 2, 3, \dots, n$, if the bordered Hessian of the second derivative of the Lagrange function is positive semi definite as shown below.

$$D(p) = \begin{vmatrix} \frac{\partial^2 L(x^*, \gamma^*)}{\partial x_1^2} & \frac{\partial^2 L(x^*, \gamma^*)}{\partial x_1 \partial x_2} & \dots & \frac{\partial^2 L(x^*, \gamma^*)}{\partial x_1 \partial x_p} & \frac{\partial g(x^*)}{\partial x_1} \\ \frac{\partial^2 L(x^*, \gamma^*)}{\partial x_2 \partial x_1} & \frac{\partial^2 L(x^*, \gamma^*)}{\partial x_2^2} & \dots & \frac{\partial^2 L(x^*, \gamma^*)}{\partial x_2 \partial x_p} & \frac{\partial g(x^*)}{\partial x_2} \\ \dots & \dots & \dots & \dots & \dots \\ \frac{\partial^2 L(x^*, \gamma^*)}{\partial x_p \partial x_1} & \frac{\partial^2 L(x^*, \gamma^*)}{\partial x_p \partial x_2} & \dots & \frac{\partial^2 L(x^*, \gamma^*)}{\partial x_p^2} & \frac{\partial g(x^*)}{\partial x_p} \\ \frac{\partial g(x^*)}{\partial x_1} & \frac{\partial g(x^*)}{\partial x_2} & \dots & \frac{\partial g(x^*)}{\partial x_p} & 0 \end{vmatrix} \geq 0 \tag{10}$$

2.5 Model specification

A variety of models have been used to describe the allocation of consumers' expenditure that is compatible with consumers behaving according to well-defined preferences. Such models include linear expenditure system (Stone, 1954), direct and indirect translog system (Lau, 1984), quadratic expenditure System, Price independent generalized linearity (PIGL) demand System (Muellbauer, 1980, De Janvry, 1993), Price independent generalized logarithm (PIGLOG) demand systems (Muellbauer, 1980, 1986) Almost Ideal Demand System (AIDS) (Deaton and Muellbauer, 1980). Many of the demand models are not well suited to survey data. Linear expenditure system is overly restrictive. Direct and indirect translog systems are expensive to estimate using extensive survey data. The AIDS model suffers from neither of these drawbacks (Cheser and Rees, 1987). Further, the AIDS model can be easily estimated by inexpensive non-iterative methods and be used to examine expenditure allocation within a broad item and also between broad expenditure items. This paper uses an AIDS model. The model expresses the share of total expenditure allocated to good i, $w_i = y_i/x$, as a linear function of the logarithm of total expenditure, x , and of prices, $p_j \dots j = 1 \dots m$, thus:

$$w_i = \alpha_i^* + \beta_i \ln(x/P) + \sum_{j=1}^m \gamma_{ij} \ln p_j + \mu_i \tag{11}$$

Where:

$$\ln = \alpha_0^* + \sum_{k=1}^m \alpha_k^* \ln p_k + \frac{1}{2} \sum_{k=1}^m \sum_{i=1}^n \gamma_k \ln p_k \ln p_i \tag{12}$$

P is a price index.

Homogeneity and symmetry restriction of demand theory require that: α_i^* , γ , and β_j which are easily imposed and tested to meet the following conditions:

$$\sum_i \alpha_i^* = 1 \quad \sum \gamma_{ij} = \sum \gamma_{ji} = 0 \quad \sum_j \beta_j = 0 \quad \gamma_{ij} = \gamma_{ji} \tag{13}$$

With prices constant, as they are approximately for many commodities within one survey period, the model yields an income -expenditure relationship of the form:

$$w_i = \alpha_i + \beta_i \ln(x) + \mu_i \tag{14}$$

Where;

$$\alpha_i = \alpha_i^* + \sum \gamma_k \ln p_j - \beta_j \ln P \tag{15}$$

This is the form of the Engel curve used by Working (1943), later developed by Leser (1963, 1976), Deaton and Muelbauer (1980), Nyangweso et. al. (2007) and found to perform well when faced with cross-section data. In the AIDS model, income elasticities of expenditure, which depend on both prices and total expenditure through

the budget shares w_i , are given by:

$$\eta_i = \frac{\partial \ln y_i}{\partial \ln x} = 1 + \beta/w \tag{16}$$

Commodities for which $\beta_i < 0$ are necessities and as total expenditure increases become inferior once $\beta_i + w_i < 0$. Following Deaton and Muellbauer (1986) income is expressed per capita using a simple headcount of household members and the intercept in the model is augmented to allow for influence of household composition. The model estimated is:

$$w = \alpha + \beta \ln \left(\frac{x}{n} \right) + \gamma z + \varepsilon \tag{17}$$

Where; n = number of household members
 x = household annual total expenditure on good i.
 w = a vector of ratio of survey year expenditure on each item to household yearly total expenditure.

z is vector of household characteristics, while α , β and γ are corresponding vectors of parameters to be estimated, and ε is a normally distributed random error term

3 Results and Discussion

This section is composed of two set of results. The first set presents descriptive results on sorghum producing households' profile and expenditure pattern in western Kenya and Eastern Uganda. The second set discusses regression results of determinants of expenditure pattern among sorghum producing households in western Kenya and eastern Uganda.

3.1 Socioeconomic profile of sorghum producing households

Table 1 shows age and household size of sorghum producing households in western Kenya and Eastern Uganda.

Table 1: Age of household heads

Variable	Western Kenya				Eastern Uganda			
	N	Mean	Min	Max	N	Mean	Min	Max
Age(years)	210	49	20	100	149	44	18	84
Household size	210	6	1	17	146	8	2	23

Source: Survey data 2015

Ugandan sorghum farmers were more youthful than their Kenyan counterparts with a mean age of 44 years as compared to 49 years despite both groups of farmers falling in the most productive age group. Unlike Kenyan farmers whose average household size was 6, Ugandan households were more procreative with a family size of 8 members.

Tab 2: Education of respondents by country

	Western Kenya		Eastern Uganda	
		%		%
Pre-primary		16.2		21
Primary		59.5		58
Secondary		20.5		16
Post-secondary		3.8		5
n		210		149

Source: Survey data 2015

Results (table 2) show that about 76% of respondents in western Kenya and 79% Eastern Uganda did not go beyond primary school indicating high levels of illiteracy which could compromise comprehension of sorghum advisory programmes. Literacy levels should therefore be factored into programmes that intend to empower farmers economically. This is very important when making production and expenditure decisions.

Tab 3: Religion of respondents across by country

	Western Kenya	Eastern Uganda
	%	%
Christian	99	99
Muslim	1	1
Other	0	0
n	210	151

Source: Survey Data, 2015

An overwhelming majority of farmers, 99%, subscribed to the Christian faith both in Western Kenya and eastern Uganda. Islam accounted for only 1% of the respondents.

Table 4: Gender Distribution by country

	Western Kenya	Eastern Uganda
	%	%
Male	55.7	74
Female	44.3	26
n	210	151

Source: Survey Data, 2015

About 44.3 percent of the households were female headed and 55.7 percent were male headed in western Kenya, unlike Eastern Uganda where 74% were male headed while only 26 % were female headed.. This is an indicator that both men and women were actively involved in making household farming decisions in Western Kenya, unlike Uganda where men dominated farming decisions. Therefore mainstreaming gender in sorghum farm decision making is more critical in Uganda than western Kenya.

3.2 Expenditure pattern of sorghum producing households

To appreciate the discussion of expenditure regression analysis (table 6, Appendix), it is important to shade some light on the role each purchased commodity plays with respect to its share of the total household expenditure. Figure 1 portrays the share of these broad goods and services while table 5 shows the actual annual expenditure on each commodity category in US dollars

Table 5: Expenditure pattern among sorghum farmers

Item	Western Kenya		Eastern Uganda	
	n	Annual expenditure(US\$)	n	Annual Expenditure (US\$)
Food	210	523	147	346.62
Education	210	379	145	374.45
Medicare	210	85	144	280.57
Clothing	210	54	145	111.94
Social events	210	48	142	126.56
Total	210	1,090	130	1,273.85

Source: Author's Baseline survey, 2015

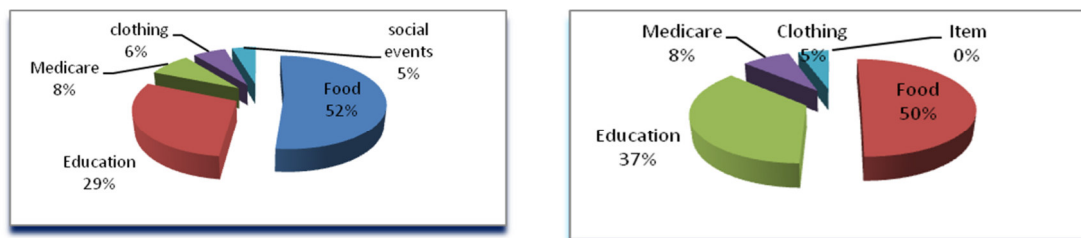


Fig 1: Expenditure shares for sorghum Farmers in (a) Western Kenya (b) Eastern Uganda

Source: Author's Baseline survey, 2015

It is important to note that the percentage share a household spends on food compared to other expenditure items is a signal of the economic strength of the household, region or country. For example, empirical evidence suggests that consumers in industrialized countries spend 10% -20 % of their budget on food whereas in developing countries, the share ranges between 60% -80 % (Pacey And Payne, 1985; FAO, 2009). An average sorghum producing household spends US\$ 1,090 in western Kenya and US\$ 1,274 in Uganda (table 5) annually on food, education, medicare, clothing and social events. Results of this study showed that overall food

expenditure accounted for 52 % of the total household budget of sorghum producers in western Kenya which amounts to US\$ 523, unlike Uganda which accounted for 28%. This is the single most important budgetary item and is below previous findings. The same scenario replicated itself across sites in western Kenya with food expenditure share ranging from 50% in Homabay to 55 % in Migori. The high expenditure on food is an indicator of inadequacy of income to cater for multiple expenditure objectives for sorghum producing households in Western Kenya. Sorghum farmers in Kenya spent more on food and education than their counterparts in Uganda. On the contrary, sorghum farmers in Eastern Uganda spend more than double what their counterparts in western Kenya spend on medicare, clothing and social events an indicator of better endowment resource wise.

The Western Kenya sorghum producing households on average expend 29 % of their budget on education which is not significantly different from their Ugandan counterparts who spend 30% of their budget on education. However, this figure varies from as low as 22% in Segia to as high as 36% in Migori. This still represents a substantially higher share of their income on education compared to the developed world that spends less than 3%. This is a depiction of the inadequacy of the public sector to perfectly finance and manage education alone (Idalinya et. al, 2011). Despite the free primary education, most sorghum producing households in western Kenya have to fend for their education needs at secondary and postsecondary levels. This calls for policy frameworks to cushion such households from the rising burden of educating their children.

Mean shares of 8 % and 6 % were assigned to Medicare and clothing respectively by sorghum producing households in western Kenya, unlike their counterparts in Uganda who spent 23% and 9% respectively. The provision of health services in Western Kenya is still very rudimentary and portrays a lack of most basic facilities for treating simple diseases (GOKV 2002). The scenario replicates itself in Eastern Uganda. Therefore most farmers initially resort to self- medication before opting for specialist visit at the Health Clinics in the region. The low expenditure on clothing is attributed to cheap second hand clothing available in the region and the different buying cycle for clothes which is not as regular as food. These findings are pretty similar to Indalinya et. al. (2011).

The share on social events, which includes outings, treats for friends and relatives, idiosyncratic activities like weddings and funerals as well as other cultural commemorations, shows an expenditure share of 5 % for the sorghum producing households in western Kenya and double percentage points in Eastern Uganda. Such events were not very regular, but were found to be crucial in the financial lifecycle of most households. These findings are lower than Idalinya et. al (2011)'s findings in Vihiga County and could be attributed to the diversity of the counties covered in western Kenya. This study covered Siaya, Busia, Kakamega, Migori, and Homabay counties (see appendix II) while Idalinya focused on only Vihiga County. The results for Uganda show that Ugandan sorghum farmers engage in more social events than their Kenyan counterparts another indicator of level or resource endowments.

3.3 Determinants of sorghum producing Household Expenditure

The paper evaluated household expenditure on food, education, medicare, clothing and social events in western Kenya and Eastern Uganda. It was assumed that similar variables were likely to influence the expenditure behaviors of households thus subjecting each regression equation to the same set of independent variables.

3.3.1 Determinants of food expenditure

As earlier found the expenditure on food averaged at 52 percent of the total household budget in western Kenya and 28% in Eastern Uganda. The coefficient of income with regard to food was negative in both western Kenya and Uganda (table 6)a, however only significant at 10 % in western Kenya. According to the findings in literature, the higher the income the higher is the propensity of expenditure shares on food to be reduced. This is consistent with Idalinya et. al. (2011) and Engel law. The implication is that boosting household income through alternative sources of livelihoods will reduce poverty and improve access to food.

The coefficient of gender of household head with regard to food was negative and significant at 5 % in western Kenya, but insignificant in eastern Uganda. The decision on how much of the household budget should be allocated to food is gender responsive in western Kenya, but nonresponsive in Eastern Uganda. Previous findings have shown mixed results. Idalinya et. al. (2011) and Kostakis (2012) were consistent with the current study's results. However, Wynand et. al. (2012) found that gender has no effect on budgetary allocations to food by households. Where there are gender responsive households, intra-household consultations are crucial in budgetary allocations. Age, marital status, education, religion and household size did not significantly influence food expenditure among sorghum producing households in western Kenya, unlike in eastern Uganda where experience and household size reduces allocations to food budget.

3.3.2 Determinants of Education Expenditure

Earlier results (fig 1) indicated that expenditure on education accounted for 29 % of sorghum producing households' budget in western Kenya and 30% of the budget in Eastern Uganda. Education share of household budget was significantly influenced by income in western Kenya and Uganda. The sign was, however, positive

implying an incremental correlation between household income and share of education expenditure. A similar observation was made by Lambert and Sahn (2002) in Madagascar and Tanzania where households in the lower earning echelons assign a smaller share of their income on education compared to the higher income households. This is inconsistent with Idalinya et al. (2011), but consistent with Wyland et. al. (2012). It also confirms Chai et. al (2014) findings that households tend to diversify their spending across a wide range of goods and services as they become more affluent. Economic empowerment of sorghum producing households in western Kenya and Eastern Uganda is crucial for increased access to education since the government structures do not provide equal access to education at all levels. Drive for quality education may also result in some households seeking for alternative avenues for accessing education.

The coefficient of household size with regard to education share was significant and positive at 5 % in both countries. The bigger the household size the higher the demand for education thus escalating budgetary allocation to education. Age and gender were significant determinants of expenditure on education in Uganda, unlike in western Kenya where they were non issues.

3.3.3 Determinants of Medicare Expenditure

Medicare accounted for only 8 % of the household budget in western Kenya and 23% in eastern Uganda. However, poor medical infrastructure in the region necessitates investment of a substantial amount of money on Medicare by households. This compels most farmers to seek their own-initiative, including own finance, in safeguarding their health condition as is characteristic of most SSA countries (Morrison, 2002). The coefficient of household income with regard to expenditure on medicare was negative and significant in western Kenya, but insignificant in Eastern Uganda. The implication is that well endowed households spend a smaller share of their income on medicare because they are able to meet most of their basic needs thus being less vulnerable to diseases. The coefficient of gender of household head with regard to expenditure on medicare was significant in both countries implying that expenditure on medicare is gender responsive and should be factored into medical programmes in western Kenya and eastern Uganda. Age was a significant determinant of expenditure on medicare in Eastern Uganda, unlike western Kenya where it was not an issue.

3.3.4 Determinants of Expenditure on clothing

Expenditure on clothing (fig 1a &1b)) accounted for 6 % of the total household income in western Kenya and 9% in Eastern Uganda. Income was a significant determinant of expenditure on clothing in both countries with a negative sign. This implies that as income levels rises households allocate less proportion of their budgets to clothing which is one of the basic necessities. Education of household head and household size were significant determinants of expenditure on clothing in western Kenya unlike Uganda where they were non issues. The implication is that more educated households are more sophisticated and tend to allocate a bigger share of their budgets to clothing. Similarly as household size increases households allocate less proportion of their budgets to clothing which is one of the basic necessities, as they focus on higher household objectives.

3.3.5 Determinants of Expenditure on Social Events

Social events accounted for 5 % (fig 1a, 1b)) and 10% of the household budget among sorghum producing households in western Kenya and Eastern Uganda respectively. Household size was a significant determinant of expenditure on social events in western Kenya, but insignificant in Eastern Uganda. This implies that as household size increases in western Kenya less proportion of income is spent on social events. This was attributed to the desire by households to meet their basic needs such as food, education, medicare and clothing before resorting to socializing which is ranked last on the budgetary priorities. The implication is that as family sizes increase budgetary pressure for basic necessities increases denying most households an opportunity to socialize. However, while income, age, education, marital status, religion, gender did not significantly affect budgetary allocation to social events in western Kenya, education was a critical determinant of expenditure on social events in eastern Uganda. The results also met the requirements that:

$$\sum_i \alpha_i^* = 1 \quad \sum_{ij} \gamma_{ij} = \sum_{ji} \gamma_{ji} = 0 \quad \sum_j \beta_j = 0.$$

4 Conclusion and Policy implications

The study documented socioeconomic profile, household expenditure pattern and its determinants among sorghum farmers in western Kenya and Eastern Uganda. On socioeconomic profile, the mean age of household head was 49 years in western Kenya and 44 years in eastern Uganda implying that sorghum farmers were relatively active but younger in Uganda as compared to their Kenyan counterparts. Most households averaged at 6 members in western Kenya and 8 members in Eastern Uganda. On average 76% of respondents in western Kenya and 79% of respondents in Eastern Uganda did not go beyond primary school indicating high illiteracy which could compromise comprehension of extension messages. Almost all respondents subscribed to Christianity in both countries. Most households in Western Kenya and Eastern Uganda were male headed with dominance of male in Uganda (74 %) exceeding that in Kenya (56%) indicating need for gender sensitive programming in the region. An average sorghum producing household spends US\$ 1,090 annually on food, education, medicare, clothing and social events in western Kenya and US\$ 1,273 in Eastern Uganda. Food was

the single most important budgetary item accounting for 52 % of the total household budget in western Kenya, unlike Uganda where it accounted for 28%. Kenyan policy makers need to put in twice as much effort as their Ugandan counterparts in their attempt to guarantee sustainable access to basic necessities such as food.

Education consumes 29 % of the household budget annually equivalent to US\$379 in western Kenya and 30% equivalent to US\$374 in Eastern Uganda which is higher than household expenditure on education in the developed world reportedly at less than 3%. There is therefore need to cushion households from the rising burden of educating their children. Sorghum producing households in western Kenya allocated 8 %, 6 % and 5% to medicare, clothing and social events respectively, unlike eastern Uganda with 23 %, 9 % and 10% to medicare, clothing and social events respectively.

On determinants of expenditure, food expenditure was significantly influenced by income and gender of the household head in western Kenya, unlike Eastern Uganda where age and site were the most critical determinants. This implies that boosting household income through alternative sources of livelihoods will reduce poverty and improve access to food. In addition, budgetary allocation to food is gender responsive calling for extensive intra-household consultation. The share of education expenditure was not only influenced by income and household size in both countries, but was also determined by age in Eastern Uganda. Economic empowerment of sorghum producing households in the region is crucial for increased access to education and big households demand more education thus escalating budgetary allocation to education. Provision of certain public goods such as education and medicare should be embraced more by both Kenya and Uganda to unlock household budgets for allocation to other more needy basic necessities.

Income and gender of household head influenced expenditure on medicare in western Kenya, unlike eastern Uganda where age, education and household size were the critical factors. Therefore well endowed households spend a smaller share of their income on medicare because they are able to meet most of their basic needs thus being less vulnerable to diseases. Also, expenditure on medicare is gender responsive, sensitive to household size and level of education and should be factored into medical programmes in the region.

Income, education and household size significantly influenced expenditure on clothing with variation in signs in western Kenya and eastern Uganda which implied that as income level rises households allocate less proportion of their budgets to clothing which is one of the basic necessities. Educated households were more sophisticated and tended to allocate a bigger share of their budgets to clothing. Only household size significantly influenced expenditure on social events in western Kenya, unlike eastern Uganda where education influenced expenditure on social events by sorghum producing households implying that as household size increases less proportion of income is spent on social events which is attributed to budgetary pressure for satisfaction of basic necessities denying most households an opportunity to socialize.

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APPENDIX

Author's Biography

Prof. Philip Mulama Nyangweso

He is Acting Principal Moi University Odera Akang'o College Campus. He served as Director Academic Programmes, Odera Akang'o College Campus for almost 3 years. He served as Chairman of the Department of Agricultural Economics and Resource Management, Moi University, Kenya for 4 years. He is an Associate Professor of Agricultural Economics and Resource Management in the Department of Agricultural Economics and Resource Management, Moi University, Kenya. He has published over 70 articles in refereed publications and international conference proceedings. In 2007 was awarded the Prize for the best scientific presentation at the African Association of Agricultural Economists in Accra, Ghana. He has attended over 33 international conferences in USA, South America, Many parts of Africa, Canada and Europe. Has organized and continue to organize international conferences in Africa and globally on agricultural Economics and Farm Management issues by mobilizing funds and professionals as a council member of International Farm Management Association headquartered in the United Kingdom and a president of Africa Farm Management Association headquartered at Moi University. He has supervised over 60 undergraduate, 25 masters, and 14 PhD students. He has also been involved in fundraising efforts either singly or collaboratively for professional associations, institutional grants for purchase of equipment and books for his department or multidisciplinary research on sorghum and maize and their implications for food security in East Africa. He joined Moi University in March 2004 after serving in various capacities and stations in the Kenyan Ministry of Agriculture. Prior to joining the University, Prof. Nyangweso worked as a Senior Agricultural Officer in the Ministry of Agriculture where he executed government advisory services on various community development projects with special focus on Agricultural Marketing and Extension. Apart from teaching and supervision of both undergraduate and graduate students, his research interests are: Agriculture and Food Policy, Agricultural Marketing, International Trade and Household Food Security, Microeconomic and Macroeconomic Modeling, Farm and agribusiness management. He was consulted in 2010 as an expert on Agriculture and Food Policy by the Southern Africa Development Community (SADC) which was in the process of formulating a Regional Agriculture and Food Policy. He was consulted by IGAD in December 2016 to train ministry staff in 8 IGAD member countries on latest Developments in the System of National Accounting. He has externalized exams for Maseno University and Kabianga University for 2 years in Agricultural Economics and Agribusiness management.

Table 6: Regression results of determinants of Expenditure share of sorghum producing households

item		Constant	lnw	Age	Marital status	Education	Religion	gender	HHsize	R ²
		α_i	β_i	γ_{i1}	γ_{i2}	γ_{i3}	γ_{i4}	γ_{i5}	γ_{i6}	
Food	W/Kenya	1.0928 ^a (-0.2739)	-0.0390^b (-0.0209)	-0.0011 (-0.0011)	0.0240 (-0.0204)	-0.0283 (0.0230)	0.0077 (0.1457)	-0.0645^a (0.0323)	-0.0064 (0.0058)	0.079
	E/Uganda	0.8491 ^a (0.255)	-0.0249 (0.0183)	-0.003^a (0.0011)	0.0230 (0.0277)	0.0007 (-0.0217)	-0.0364 (0.0377)	-0.00127 (-0.0035)	-0.0119^a (0.00293)	0.160
Education	W/Kenya	-0.8130 ^a (0.2784)	0.0876^a (0.0212)	0.0012 (0.0011)	-0.0187 (0.0207)	0.0022 (0.0234)	-0.0346 (0.1481)	0.0294 (0.0328)	0.0178^a (0.0059)	0.190
	E/Uganda	-1.229 ^a (0.317)	0.0788^a (0.0228)	0.00274^b (0.00135)	-0.0346 (0.00437)	0.0298 (0.0269)	0.0856 (0.0344)	0.0175^a (0.0469)	0.0154^a (0.0036)	0.281
Medicare	W/Kenya	0.2736 ^a (0.1074)	-0.0211^a (0.0082)	-0.0002 (0.0004)	0.0061 (0.0080)	0.0087 (0.0090)	0.0258 (0.0571)	0.0338^a (0.0127)	-0.0020 (0.0023)	0.118
	E/Uganda	0.6654 ^b (0.287)	-0.0201 (0.0206)	0.000919^a (0.001222)	-0.0182 (0.0311)	-0.0454^b (0.0244)	-0.0047 (0.0424)	-0.0107 ^a (0.00395)	0.0004 (0.00329)	0.0876
Clothing	W/Kenya	0.3127 ^a (0.0892)	-0.0245^a (0.0068)	-0.0001 (0.0003)	-0.0085 (0.0066)	0.0157^a (0.0075)	0.0249 (0.0475)	0.0054 (0.0105)	-0.0032^a (0.0019)	0.108
	E/Uganda	0.5553 ^a (0.1488)	-0.0322^a (0.0107)	-0.0005 (0.00063)	0.0005 (0.0161)	0.0147 (0.0126)	-0.0058 (0.0219)	-0.0031 (0.0021)	-0.00144 (0.00170)	0.1063
Social events	W/Kenya	0.1339 (0.1057)	-0.0030 (0.0080)	0.0002 (0.00041)	-0.0029 (0.0079)	0.0017 (0.0089)	-0.0238 (0.0562)	-0.0042 (0.0125)	-0.0023 (0.0023)	0.046
	E/Uganda	0.1593 (0.2053)	-0.00165 (0.0147)	-0.000109 (0.000874)	0.0294 (0.0223)	0.000179^a (0.01743)	-0.0386 (0.0303)	-0.00245 (0.0028)	-0.00249 (0.00235)	0.0338
Total		1.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	

S.E are in parentheses ^a-Significant at 5 percent, ^b-significant at 10 percent

Source: Author's compilation from cross-sectional survey, 2015



Fig 3: Map of Western Kenya and location of selected counties

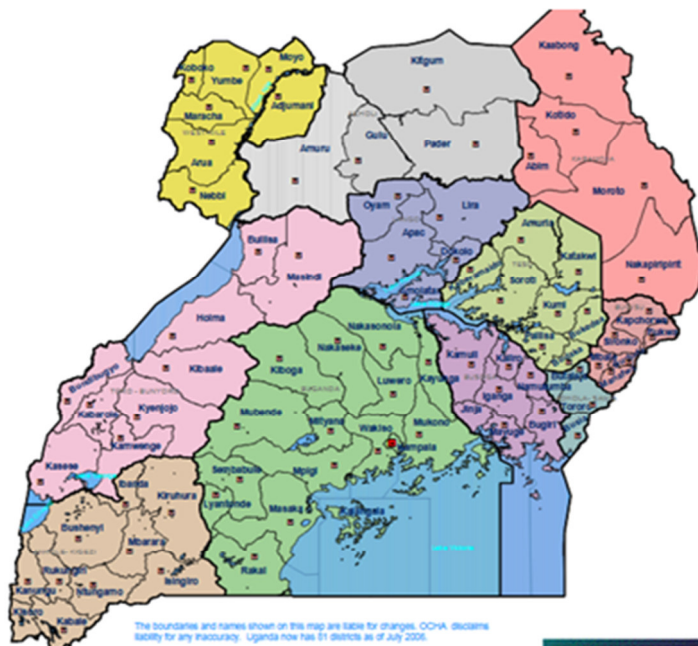


Fig 4: Map of Uganda and location of selected counties