



# Analysis of household food expenditure patterns. A case of Shamva district Zimbabwe

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The study was designed to analyse the food expenditure patterns of smallholder farming households. Income and expenditure data were collected from 281 randomly sampled farming households in Shamva District. Descriptive statistics (mean and frequency) were used to analyse the income sources and main expenditure categories. The Ordinary Least Squares regression was used to model the determinants of household food expenditure. The results indicated cash crop, food crop and livestock sales as the major farm income sources. Remittances, wages, salaries and pensions were the major non-farm income sources. Statistics showed that 64% of the cash income was obtained from farm activities. Food expenditure accounted for over 60% of total expenditure. Household size ( $p < 0.05$ ), dependency ratio ( $p < 0.05$ ) and income (cash crop income, food crop income, livestock income and non-farm income) positively affected household food consumption. Age of household head ( $p < 0.01$ ) negatively affected household expenditure. The research results highlight the need for government to channel more resources towards improving smallholder agricultural productivity as the major household income source to foster demand-led agricultural growth and development in rural areas. By implication, this will similarly help to inform policy makers on appropriate instruments to improve income, food security and wellbeing of the farming households.

## 1. Introduction

Around 45% of the population in Sub-Saharan Africa lives below the minimum poverty line of US\$1 per day, with a greater disparity in income between urban and rural households. The current debates on human development are centred on reducing poverty and income inequality in rural areas (World Bank, 2008; Adekoya, 2014; Mignouna et al. 2015). The rural areas in sub-Saharan Africa are characterised by poverty, food insecurity, unemployment, inequality and a

lack of important socio-economic services (Njiman-ted, 2006). Smallholders constitute two thirds of the poor population in rural areas (World Bank, 2008). Smallholder farmers depend on agriculture for their livelihoods and are subject to shocks and stresses such as climate change and volatility of food prices, making them vulnerable (O'Brien et al., 2008). The extent to which rural households are able to feed themselves depends on their own food production as well as abil-

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ity to purchase food using non-farm and farm income (Bhaipethi and Jacobs, 2009).

Proponents of agricultural-led economic growth argue that an increase in farm incomes results in an increase of expenditure on consumer goods and services, and thus can lead to indirect growth in non-farm incomes and employment (Browne et al., 2007; Baipethi and Jacobs, 2009). Therefore, for low income countries with large shares of the labour force living in rural areas, raising farm productivity has the potential to drive overall economic growth, reduce poverty (including food poverty) and improve social development and transformation (Baipethi and Jacobs, 2009). However, Jayne (1994) and Dorward et al. (2005), argue that services such as road infrastructure and markets are preconditions for agricultural development and unless such services are granted, the manufacturing industry would outcompete agriculture for labour. Though such pre-conditions for rural growth exist, an analysis of household main income sources provides a background on the necessary rural growth pathways that policy makers can take. Income levels give an indication of the welfare of the rural households.

Studies on expenditure patterns are regarded as key to monitor and explain inequalities and changes in material living standards, general welfare and food security. Food expenditure in the low-income communities constitutes the largest share in consumption. There are no international conventional standards to use for assessing vulnerability using share of food as a proxy for food security. However, Smith and Sumbadoro (2007) postulated that households who spent over 75% of their income on food are the most vulnerable and food insecure, as they can be affected by volatility of food prices. The duo also classified households spending 50-75% as having medium food insecurity, whereas those spending less than 50% as having low food insecurity. In the context of this study, where the smallholder farmers are regarded as low-income, understanding food expenditure patterns has strong implications on household food security.

Few recent studies exist on income and expenditure patterns of smallholder farmers and their dominance of the poor population (Umer and Asagowa, 2012; Biswajit and Sangeeta, 2015). A knowledge gap exists on relative contribution of agricultural income to total household income and how such income is used

to meet household food needs. The objective of the study is therefore, to analyse the income and expenditure sources for smallholder farming households. The study also specifies the determinants of household food expenditure. This will assist in formulation of policy instruments to improve household income and food security of smallholder farming households.

### 1.1. Theoretical framework

Production theories recognise that smallholder farming households are both producers and consumers of goods and services. Consumption theory is based on the idea of diminishing marginal utility. Therefore, households choose the best alternative combination of commodities to maximise utility subject to constraints, i.e., time, resources and technology (Mignouna et al., 2015). The overall assumption of the household consumption and production theories is that farming households act rationally, to simultaneously decide on a bundle of commodities to produce and purchase that give them maximum satisfaction, subject to constraints. In rural households of low-income countries, where savings and investments are low, consumption expenditure can be used as a proxy for well-being (Seng, 2015; Adekoya, 2014). Previous work on household expenditure surveys have used five main components of expenditure: food, education, health, agricultural inputs and durable goods (Smith and Sumbadoro, 2007; Mignoun et al., 2015). For households in low income areas, food expenditure is the highest expenditure category (Browne et al., 2007; Sekhampu, 2012; Adekoya, 2014; Akaakohol and Aye, 2014; Seng, 2015) and the marginal food expenditure is expected to increase significantly with changes in income (Browne et al., 2007). Food expenditure in rural households is affected by income, price and other socio-economic and demographic characteristics (Meng et al., 2012).

According to Babatunde and Qaim (2010), both farm and non-farm income positively affect food expenditure. Akphan et al. (2013), used regression to analyse the determinants of food expenditure and realised that food expenditure contributed more than 40% of total expenditure for agro firm workers in Nigeria. A study by Adekoya (2014) in Nigeria found that income, age, sex and marital status were the major determinants of household expenditure. Seng (2015) analysed the determinants of household food consumption and



realised income, age of household head, household head's education, and household members <15 years directly affect household food consumption. Similarly, Sekhampu (2012) and Sekhampu and Niyimbanira (2013) realised that income, age of household head, marital status, household size and education status of household head affected both food expenditure and household monthly expenditure in a South African Township. However, in the same study, married household heads had significantly lower food consumption than non-married ones. In a comparative study in Ghana and Nigeria Mignouna et al. (2015) found that apart from other factors already mentioned, farm size positively influenced household expenditure for yam growing farmers. Cuong (2015) used Ordinary Least Squares (OLS) to analyse impact of cash crop income on expenditure and found a positive effect on expenditure. Jodlowski (2016) analysed the impact of livestock on food consumption using Tobit regression and realised livestock income and household size positively affected food expenditure.

## 2. Materials and methods

### 2.1. Data Sources

The data for this study were collected in Shamva District in Mashonaland Central Province in Zimbabwe. A questionnaire was administered to 281 smallholder farming households selected using a multistage random sampling technique through face-to-face interviews. The questionnaire was pretested and administered by trained enumerators. The data collected include household characteristics, resources and levels of income and expenditure. Data were analysed using Statistical Package for Social Sciences (SPSS) and STATA. Specifically, descriptive statistics and the Ordinary Least Squares (OLS) regression were employed. Income and expenditure patterns were analysed using the mean, standard deviation and t-test. The OLS is used to predict a dependent variable, based on continuous and/or categorical independent variables, where the dependent variable takes a continuous form (Gujarati and Dawn, 2009). This model is suitable for assessing the factors determining food expenditure in the household.

### 2.2. The empirical model

The OLS regression model is specified as follows:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_n X_n + u$$

Where Y is the dependent variable, and this is given as monthly expenditure on food items.

X<sub>1</sub>... X<sub>n</sub> are the independent or explanatory variables.

B<sub>0</sub> is the intercept, β<sub>1</sub>... β<sub>k</sub> are the estimated coefficients of independent variables and u is the error term capturing the net effect of omitted factors. Since cross sectional data was used, the price was assumed to be constant across different households; therefore, unobserved characteristics were relegated to the error term. Cross sectional data usually have some degree of collinearity (Lauridsen and Mur, 2006). However, the Variance Inflation Factor (VIF) test was used to test for the presence of multicollinearity in which the data set had none. This was done to ensure more linear combinations of explanatory variables are screened, thereby ensuring the consistency of the expenditure function estimates. A VIF value of 1 shows the absence of collinearity and higher values of VIF implies higher collinearity. However, it is for values greater than 10 when one must remove such values in the model to ensure the model remains consistent (Liao and Richard, 2012).

#### 2.2.1. The Dependant variable

The dependent variable is the household monthly food expenditure as estimated from a 30-day recall period. It summarises all the cash expenditure on food items consumed by the household.

#### 2.2.2. Explanatory variables

Table 1 summarizes the demographical and socio-economic explanatory variables with their expected signs. The selection of variables likely to influence food expenditure was inspired by theory and previous studies such as Sekhampu (2012), Umeh and Asogwa (2012), and Akhpan (2013).

## 3. Results and discussion

### 3.1. Household income sources

Households' main sources of farm income were from cash crop sales, food crop sales, livestock sales and vegetable sales. The main sources of non-farm income



**Table 1.** Demographic and socio-economic explanatory variables for household food expenditure

Description of Variable	Measurement	Expected sign
Sex of household head	1=Male, 0 = Female	+
Age of household head	Number of years	-
Marital status of household head	1 = Married, 0 = otherwise	+
Household size	Number of people	+
Dependant ratio	Ratio of household dependence	-
Non-farm income	Income in US\$	+
Food Crop Sales	Income in US\$	+
Cash crop sales	Income in US\$	+
Livestock sales	Income in US\$	+

Source: Authors computation 2019.

were remittances, salaries, wages, pension and trading. The mean annual income per household from main sources is summarised in Table 2. About 10% of the farmers' income was coming from remittances. Over 25% of the sample had income from cash crop sales with a mean household income of USD696. The results are consistent with findings from Ellis and Freeman (2004) highlighting that in low income communities of Uganda, Kenya, Tanzania and Malawi, few households participated in export-oriented cash crops. Literature, however, shows that cash crop production plays a significant role in reducing rural poverty and improving household welfare (Cuong, 2009;

Akaakohol and Aye, 2014).

The annual income per capita showed that, on average, a household spent around USD0.5 per day per head, which is far below the World Bank poverty line. The statistics showed that 64% of the cash income was obtained from farm activities comprising mainly of crop and livestock sales. The non-farm income contributed 36% of the total income. This implies that though smallholder farmers rely more on agriculture for cash generation, other non-farm activities also play a significant role (Bowne et al., 2007; Babatunde and Qaim, 2010; Akaakohol and Aye, 2014; Adekoya, 2014).

**Table 2.** Mean annual household income in USD

Income Sources	Mean	Standard deviation
Cash crop income	696	1398
Food crop income	135	468
Livestock income	84	214
Trading (non-farm)	64	234
Wages + Salaries	118	450
Remittances	50	168
Total farm income	600	759
Total non-farm income	339	569
Total Income	939	936
Income per capita	189	265

Source: Authors computation 2019

### 3.2. Household expenditure patterns

The information in Table 3 shows the mean month-

ly expenditure in USD across different categories. Household expenditure for farming households could be split into five main categories. Food presented the



highest expenditure accounting for 62% of monthly income. Based on Smith and Sumbadoro (2007)'s classification of food security relative to food expenditure, smallholder farmers in Shamva District can be classified as medium food insecure. Such households are vulnerable to the volatility of food prices. The next biggest category is education, which accounted for 17% of total expenditure. Agricultural inputs accounted for about 13% of the monthly expenditure. Health and other expenses such as durable goods had similar spending of 4%. A typical household would spend about USD78 per month for all their household needs. The results are consistent with previous studies, which found food as the main expenditure category for low income farming households (Umeh and Asogwa, 2012; Mignouna et al., 2015; Seng, 2015).

### 3.3. Household food expenditure

#### 3.3.1. Descriptive statistics

Additional descriptive statistics of household characteristics for sampled households are summarised in Table 4. Male-headed households dominated the sample and had a significantly higher mean food expenditure than female-headed households ( $p < 0.008$ ). Married households head also had a significantly higher expenditure on food than unmarried, with unmarried households only constituting 20% of the population. The unmarried household heads included widows, singles and separated. Over 50% of the households had household sizes of 4-7 people and food expenditure increased significantly with household size. The descriptive statistics for explanatory variables for income have already been discussed from Table 2. The aggregated non-farm income was used. However,

farm income was disaggregated, and each component was fitted into the model.

#### 3.3.2. Determinants of household food expenditure

The results of the regression model on determinants of household food expenditure are summarised in Table 5, The model was able to predict 40% of the variation ( $R^2 = 0.400$ ). The results show that age of household head ( $p < 0.01$ ), household size ( $p < 0.05$ ), dependent ratio ( $p < 0.05$ ), non-farm income ( $p < 0.01$ ), cash crop income ( $p < 0.01$ ), food crop income ( $p < 0.01$ ) and livestock income ( $p < 0.001$ ) significantly influenced food expenditure. As age of household head increased food expenditure decreased. The results are consistent with Sekhampu (2012) and Hopper (2011) as older household heads are likely to spend less as they become more risk averse. Household size positively affected food expenditure. Similar findings were realised in Nigerian farm workers (Akphan, 2013). The bigger the household the greater the food demand, therefore, such household spend more on food consumption. Children and elderly people who constitute the dependants in the household usually require more expensive protein rich diets thus increasing food expenditure (Sekhampu, 2012). This applies to high income groups who do not use a large proportion of income on food expenditure. For low income level households, as the number of dependants increase, per capita income decreases resulting in lower food expenditure (Yimer, 2011). Contrary to Yimeh (2011), the results of this study indicate that dependant ratio significantly positively affected food expenditure.

As expected, income from all sources significantly affected food expenditure positively. For every USD1

**Table 3.** Average monthly household expenditure in USD

Expenditure category	Mean	Standard deviation
Food	49.72	31.75
Agricultural inputs	6.44	21.71
Education	13.21	26.82
Health	2.79	6.25
Durable goods	4.19	28.88
Total	78.18	78.16

Source: Authors computation 2019.



**Table 4.** Descriptive statistics for household characteristics

Variable	Frequency (%) n=281	Mean Food Expenditure	Standard deviation	Sig.
<b>Gender</b>				0.008***
Male	81	51.59	33.62	
Female	19	38.77	30.97	
<b>Marital Status</b>				0.003***
Married	80	52.02	30.97	
Otherwise	20	38.22	32.94	
<b>Age</b>				0.382
< 30 years	7	36.22	21.13	
30-39years	21	50.90	31.90	
40-49years	27	59.79	35.17	
50-59years	21	47.53	29.63	
> 60 years	24	40.61	28.59	
<b>Household Size</b>				0.065*
2-3 people	15	32.13	26.74	
4-5people	32	47.67	27.20	
6-7people	27	55.19	35.04	
8-9people	13	52.44	35.29	
10 and above	13	57.06	30.91	
<b>Dependent Ratio</b>				0.815
0-<0.3	11	52.77	24.20	
0.3-<0.6	41	48.98	32.54	
0.6 and above	49	48.75	31.75	

Significant at: \* 10%, \*\*5 % and \*\*\* 1%

Source: Authors computation 2019

increase in non-farm income, food expenditure increased by USD0.01. Non-farm income significantly positively affected household food expenditure. In line with Babatunde and Qaim (2010), farming households rely on different sources of income for their food consumption. Cash crop income also positively significantly influenced food expenditure. An increase by USD1 in cash crop income resulted in USD0.01 increase in food expenditure. Cuong (2009)

realised similar results in Vietnam with annual cash crops. Food crop income was also significantly influenced food expenditure positively, with each dollar increase in food crop income resulting in USD0.01 increase in food expenditure. Where there is a surplus in food crop production, the income gained from such crop sales can be used to supplement food. In line with Jodlowski et al. (2016), livestock income was found statistically significance and had a positive im-



pact on household food expenditure. This explains the importance of livestock of ensuring food security for the smallholder farmers.

#### 4. Conclusion and policy implications

The study was designed to analyse the income and expenditure patterns of farming households and the determinants of food expenditure. It was realised that households' main sources of farm income included cash crop sales, food crop sales and livestock sales. Main sources of non-farm income for households were wages and salaries, small businesses and remittances. Per capita income was far below the World Bank standard implying that the smallholder farmers are considered poor. Food expenditure dominated the

household expenditure accounting for as much as 62% of total expenditure. Non-farm income, cash crop income, food crop income, livestock income, household size and dependant's ratio significantly influenced household food expenditure positively. However, age of household head negatively influenced household food expenditure. Considering farm income constituted over 64% of the total household income, agriculture growth can be one of the vehicles for economic development for the rural poor. It is important for the Government and Non-governmental sector to introduce programmes such as input subsidies to improve agricultural incomes. Using the relative proportion of income spent on food, the farming households can be classified as low income and medium food insecure. The results of this study further emphasise the impor-

**Table 5.** Determinants of household food expenditure

Variables	Coef.	Std. Err.	t	P> t	dy/dx
Sex	2.39	5.29	0.45	0.651	2.394
Age	-0.33	0.12	-2.78	0.006	-0.328
Marital status	0.48	4.57	0.11	0.916	0.484
Household size	1.56	0.52	2.90	0.004	1.560
Income from food crop sales	0.01	0.00	3.72	0.000	0.012
Income from cash crop sales	0.01	0.00	9.55	0.000	0.010
Income from livestock income	0.02	0.01	2.04	0.042	0.019
Total non-farm income	0.01	0.00	5.62	0.000	0.015
Dependents	12.85	7.47	1.72	0.087	12.853
constant	31.61	7.57	4.18	0.000	31.61

Number of obs = 281  
 F (9, 271) = 20.10  
 Prob > F = 0.0000  
 R-squared = 0.4004  
 Adj R-squared = 0.3804  
 Root MSE = 24.946

Predictive margins  
 Model VCE: OLS  
 Expression: Linear prediction, predict ()

	Delta-method	t	P> t
Margin	Std. Err.		
constant	49.322	1.488	33.14
			0.000

Source: Authors computation 2019.



tance of farm incomes to food expenditure implying that expenditure should be encouraged to promote demand-led agricultural growth and food security. Furthermore, non-farm employment opportunities should also be created to improve household incomes. Mechanisms to allow efficient flow of cash remittances should be allowed as they are an important source of income for farming households.

### Conflict of Interest

The authors declare that there is no conflict of interest.

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