

## **Determinants of Rural Households' Food Security in Shiselweni Region, Swaziland: Implications for Agricultural Policy**

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**Abstract:** *This paper attempts to identify the fundamental factors that are key determinants of rural households' food security in Shiselweni region, using cross-sectional data and a 2-stage sampling technique to select randomly 141 households from 4 constituencies (Tinkhundla). The coping strategies, head count ratios, and logistic regression model were used to obtain the households' food security status and determine significant factors influencing food security, respectively. Results reveal that 51.7% of the rural households in the region are food insecure. Logistic regression results show that age, gender, land, and livestock ownership variables are significantly associated with households' food security at 5 per cent ( $p < 0.05$ ). This study also indicates that 46% of households are likely to employ different coping strategies (reducing food consumption, skipping meals, consuming less than 3 meals per day) as their survival strategy. The implication for policy is that when moving forward in designing and implementing pro-agricultural policy, policy makers should emphasize on improving food availability and accessibility to rural households.*

**Keywords:** *Coping strategies, food security, logistic regression, pro-agricultural policy, Swaziland*

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### **I. Introduction**

The Food and Agriculture Organization [1] defines food security as the ability of all people to have access to nutritious food for a healthy life. Food security is viewed in terms of food availability, access, utilization and stability of access [2]. Food security measure matters because the national and household levels are assessed differently [3].

Almost a billion people worldwide do not have access to nutritious food [4]. According to Labadarios et al. [5], about 250 million people in sub-Saharan Africa are under-nourished and spend at least a day without food. They went on to point out that African countries are also struggling to maintain a constant and stable access to food mainly because population growth has been higher than food production. The number of food insecure individuals has been increasing steadily since the 1990s [6]. Swaziland has not been an exception to this worldwide food insecurity tragedy.

#### **1.1 Why is food security important?**

Results of the 2013 Cost of Hunger in Africa study indicate that Swaziland's economy loses up to 3.1 per cent of its GDP annually associated to chronic under-nutrition [7]. Food security becomes an issue for concern and for possible policy response when it points to nutritional deficiencies and increased hunger and poverty [8]. Understanding the determinants of food security can help design optimal policies that may prevent these losses in the future.

There are a number of studies that looked at food security issues in Swaziland. Masuku and Sithole [9] study the impact of HIV and AIDS on agriculture and food security in Swaziland. They find that HIV and AIDS pose a developmental problem and challenge the ideals of a long-term strategy for poverty reduction and food security in the country.

Vella [10] studies food and water security in Swaziland: potential for crises. The author finds that (1) the country's food insecurity is, in part, due to a poor crop marketing system, which is controlled by the state and (2) lack of food purchasing power, stemming from decades of entrenched poverty. Mabuza et al. [11] study the impact of food aid on maize prices and production in Swaziland. They find that the food aid from Non-Governmental Organizations (NGOs) and government social grants have played a very important role in providing food to households on a short-term or temporary basis. However, the amount received under this social programme is not enough to make the recipients food secure. While the previous studies cover the populations of all the four regions in the country (Manzini, Hhohho, Lubombo and Shiselweni), this paper looks at the determinants of rural population's food security in the Shiselweni region—implications for agricultural policy.

## 1.2 Food security in Swaziland

Food security is a concern especially among the poor living in the rural areas [1]. Since gaining independence in 1968, Swaziland has consistently been a food deficit country. It is reliant upon imports and international assistance to satisfy the food requirements of its population [10]. High unemployment, economic crisis and the rising food prices have been pushing more people into a state of food insecurity [12].

## 1.3 Swaziland's key points

Swaziland has a population of around 1.2 million people, the majority of whom occupy rural farms on Swazi National Land (SNL). Around 63 per cent of Swazis live in poverty [13]. The country has the highest rate of HIV/AIDS infection in the world; 26.5 per cent of the population aged between 15 and 49 years are HIV positive [10]. The country has four administrative regions as shown in Fig. 1.



Figure 1 Swaziland's Administrative Regions [13]

## II. Literature Review

Feleke et al. [14] came up, in their determinants of households' food security study in Southern Ethiopia, with a number of factors affecting food security such as age, education, sex, unemployment rate and income level. Liverpool-Tessie et al. [2] found that factors affecting food security were grouped as social, economic, demographic, and policy related factors. Demographic factors include household size, household land holdings. Cyclones, drought and land degradation are considered as environmental factors. Social and economic factors can be war, productive assets ownership, employment status, income, and use of public goods by both government and local residents.

The urban poor in South Africa are affected much more by food insecurity than the rural households are. The rural dwellers have access to natural resources mainly land and water, which they can use to produce food [15]. In contrast to this, Matshe [16] argued that the rural dwellers are the most food insecure due to their dependency on income generated by natural products. Ellis and Mdoe [17] agreed with [16] that rural households in Tanzania were worse off in terms of poverty and food security than urban residents were.

Vulnerability Assessment Committee and World Food Programme [18] report that about 67% of sampled residents of Shiselweni region indicate that they frequently go to bed without food. The study found that 38% of residents in Shiselweni region were extremely food insecure while in Lubombo region 22%, Hhohho 21% and Manzini region 11% were highly food insecure. This had shown that Shiselweni residents were most vulnerable to food insecurity.

Food insecurity in Ethiopia is high for households above 45 old years, and food security decreased with age. Female-headed households are worse off in terms of food security compared to their male counterparts who are engaged in income generating activities both on the farm and off farm [19].

Gender of household heads in Bangladesh has no significant effect on food security due to lower number of female households; education is associated positively with food security as household heads with more human capital are prone to suffer less food insecurity [20]. This aligns with Cock's findings [21] that education is important determinant of food security in Limpopo rural areas, South Africa.

There exists a negative relationship between food security and household size [22]. Altman et al. [3] observe that household size is one of the most important socio-economic determinants of food insecurity because it increases the number of consumers within the household; hence putting pressure on the food within the household.

Swaziland's study in the urban areas shows that there is a link between type of house owned by the family and food security. Those who are able to build brick houses with tiles/ iron roof are considered food secure while those living in tin/ shack houses are mostly found to be food insecure [18]. Faridi and Wadood [20] noted that house owners were more food secure than those who were renting or homeless as they could afford to buy food.

### III. Methods

#### 3.1 The Study Area

The study was conducted in Shiselweni region, where most households reside in the rural areas [13]. The region is divided into 14 constituencies (*Tinkhundla*) namely, Gege, Hosea, Kubuta, Maseyisini, Matsanjani South, Mtsambama, Ngudzeni, Nkwene, Sandleni, Shiselweni I, Shiselweni II, Sigwe, Somntongo and Zombodze. These constituencies are each divided into chiefdoms ranging from 5-9 chiefdoms.

#### 3.2 Data

##### 3.2.1 Sampling Technique

The following formula from [23] was used to obtain a representative sample:

$$N = \frac{Z^2 pq}{d^2}$$

Where

$N$  = sample sized desired,  $Z$  = the standard normal set at 1.96, which corresponds to 95% confidence interval,  $d$  = degree of accuracy required set at 0.05,  $p$  = the estimated proportion of target population with the desired attribute (food secure), and  $q = 1 - p$ . A two-stage sampling technique was used. The first stage involved the purposive selection of 4 out of the 14 constituencies in the region. Each constituency (*Tinkhundla*) was given a random number from 1 to 14 on a list. The second stage involved random selection of 2 chiefdoms per constituency (*Tinkhundla*). A sample of 141 households was drawn from the selected constituencies.

##### 3.2.2 Data analysis

Descriptive statistics (frequencies, percentages, means, medians, standard deviations) and bivariate analysis using cross tabulations were conducted to describe the demographic structure of households. The cross tabulations were done to identify the relationship between food security and independent variables. Differences in proportions were assessed by chi-square analysis. A p-value of less than 0.05 (p-value < 0.05) was considered significant. Correlates with a p-value < 0.10 were also retained. The index of household coping strategies was also used to measure how households adapt to the threats of food shortage.

Logistic regression model was used to identify the factors affecting food security in the region. The outcome variable was food security with a value of 1 denoting positive answer (food security) and 0 indicating a negative answer (food insecurity). Therefore, the probability of being food secure can be written as follows:

$$P_i = \epsilon(\gamma = 1) | X_i = \left( \frac{1}{1 + e^{-(\beta_0 + \beta_1 X_i)}} \right) \quad (1)$$

taking  $\beta_1 + \beta_2 X_i$  to be

$$z_i \text{ and the equation becomes } Prob(\text{foodsecure}) = \left( \frac{1}{1 + e^{-z_i}} \right) = \left( \frac{e^{z_i}}{1 + e^{z_i}} \right) \quad (2)$$

Where  $z_i = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \dots + \beta_n X_n$ . (3)

Which implies a linear combination of correlates,  $X_i$  with  $i$  ranging from 1 to  $n$  and the  $\beta_i$  ( $i = 0$  to  $n$ ) represents the coefficients for the correlates. The value of  $z_i$  ranges from  $-\infty$  to  $+\infty$  and therefore,  $P_i$  ranges between 0 and 1. Given that  $P_i$  is the probability of being food secure then  $1 - P_i$  becomes the probability of being food insecure.

### 3.3 Model Specification

For the purpose of empirical estimation, the logistic regression model is specified as follows:

$$z_i = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \beta_9 X_9 + \beta_{10} X_{10} + \beta_{11} X_{11} + \beta_{12} X_{12} + u_i \tag{4}$$

Where

- X1 = age of household head
- X2 = gender of household head
- X3 = household size
- X4 = household head marital status
- X5 = household head education
- X6 = household head employment status
- X7 = household head land ownership
- X8 = household head assets ownership
- X9 = household head health status
- X10 = household head type of house
- X11 = household head income source
- X12 = household head livestock ownership status

## IV. Results And Discussion

### 4.1 Socioeconomic Status of Households

Majority of households surveyed were males (60.3%). A greater number of households are below 40 years old and fall within the family size bracket of 4-6. The mean age of households is 46 years implying that over 70 % of households are below retirement age. The literacy level is low as 52.5% of households have primary education that prevents them from being productive in generating income. This finding is consistent with Omotesho's observation [22] indicating that educated household heads have greater chance of providing incomes and food for their families.

Most of the respondents are married (61.7%).The unemployed in the region is (76.6%), which aligns with the COS's statistics [13] that indicate that the rural unemployment in Swaziland is about 75 %. Whereas, 60.3% and 86.5 % of the households own land below one hectare and different types of assets (hoe, spade, hoespipe, wheelbarrow, harrow), respectively. This small size of land does not allow them to produce enough staple food (maize) to sustain their food availability. More than 70 % of households in Shiselweni region own at least one type of domestic animal. Chicken is the most owned livestock (62.1%), and 37.1% of households own cattle. Regional Hunger and Vulnerability Programme [24] also finds that chicken is the most type of livestock in rural households as it is a source of meat when the household cannot afford to purchase from the market.

**Table 4.1**Socioeconomic Status of Households

Gender	Frequency	Percentage %
Male	85	60.3
Female	56	39.7
Total	141	100
Age (years)	Frequency	Percentage
Below 40	60	42.6
40 - 49	41	29.1
50 – 59	22	15.6
60 – 69	10	7.0
70 – 79	6	4.3
80 – 89	2	1.4
Total	141	100
Marital Status	Frequency	Percentage %
Single	13	9.2
Married	87	61.7
Divorced	11	7.8
Widowed	30	21.3
Total	141	100
Education	Frequency	Percentage %
No formal	52	36.9
Primary	74	52.5
Secondary	12	8.5
Tertiary	3	2.1
Total	141	100

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Household size		Frequency	Percentage %
1 – 3	31		22.0
4 – 6	68		48.2
7 – 9	30		21.3
10 -13	12		8.5
Total	141		100
Health Status			
Good	115		81.6
Poor	26		18.4
Total	141		100
Assets Ownership		Frequency	Percentage %
Yes	122		86.5
No	19		13.5
Total	141		100
Livestock Ownership		Frequency	Percentage %
Yes	101		71.6
No	40		28.4
Total	141		100
Employment		Frequency	Percentage %
Employed	33		23.4
Unemployed	108		76.6
Total	141		100
Land Ownership		Frequency	Percentage %
None	27		19.1
Below 1 hectare	85		60.3
Above 1 hectare	29		20.6
Total	141		100
Type of House		Frequency	Percentage %
Stone and stick	81		57.4
Brick	39		27.7
Shack	21		14.9
Total	141		100
Source of Income		Frequency	Percentage %
Own farm	59		41.8
Off farm	58		41.1
Remittances	7		5.0
Grants	17		12.1
Total	141		100

#### 4.2 The Strategy Coping Index

Calculating a weight sum of the different strategies, which is one of the strategies designed by [25] was used to obtain the households' food security status. Frequency of each coping strategy was ranked from 1-5 whereby 1 is never and 5 is always. The lower the sum, the more food secure is the household. It is observed that 42.6 % of households are highly food secure with 5.7 % being on the borderline. Severe food insecure and least food insecure households represent 32.6 % and 19.1 %, respectively as shown in Table 4.2

**Table 4.2** The Coping Strategy index

Classification of Food Security	HCSI score	Frequency	%	Total %
Highly food secure	8 – 14	60		42.6
Moderately food secure	16 – 19	8		5.7
Least severe food insecure	20 – 24	27		19.1
Severe food insecure	25 – 40	46		32.6
				51.7

#### HCSI (Household Coping Strategies Index)

#### 4.3 The Percentage Distribution of Households Coping Strategies

Households in region reveal some coping strategies used when facing food security concern. More than 48 % of sampled residents indicate that they sometimes consume less than 3 meals per day, while 45 % reduce their food consumption, and 44.7 % of them consume less food than required as indicated in Table 4.3.

**Table 4.3** The Percentage Distribution of Households' Coping Strategies

Coping Strategies %	Never %	Rarely %	Sometimes %	Often %	Always %
Consume less than 3 meals	39.7	1.4	48.9	3.5	6.4
Reduce quantity of food served to men	48.2	5.7	42.6	0.7	2.8
Reduce own consumption	44.7	0.7	45.4	2.8	6.4
Reduce quantity of food served to children	44	3.5	46.8	2.8	2.8
Skip own meals due to lack of food	44.7	2.1	43.3	5.7	3.5
Consume less food than Required	44	2.8	44.7	3.5	5
Resort to begging due to lack of food	58.2	5	31.2	2.8	2.8
Go to bed hungry due to lack of food	53.9	4.3	37.6	1.4	2.8

**4.4**The Head Count Index

A head count index was constructed to show the ratio of food secure and food insecure households. It is observed that 0.48 of the households are food secure while 0.51 of the households are food insecure as indicated in Table 4.4

**Table 4.4**The Head Count Index

Head Count	Food Secure	Food insecure	Total
Ratio	0.483	0.517	-
Percentage	48.3	51.7	100
Number of households	68	73	141

**4.5** The Logistic Regression Results

The Hosmer-Lemeshow statistic test (7.63) indicates that the model adequately fits the data; and the average marginal effect (0.51) measures the expected change in the probability of being food secure due to change in the regressors. The table 4.5 shows that age, gender, land size above hectare and livestock significantly ( $p < 0.05$ ) influence the household food security status. Age has a negative coefficient indicating that as household gets older the probability of being food secure decreases. This result agrees with [26] who found that age was negatively related to food security. Male headed households are likely more food secure than female headed households as women do not have access to resources.

The households with land size above hectare are food secure as land ownership is a very important factor in rural settings. The finding confirms the Omotesho's [22] that reported a significant positive effect on food security in the rural households of Kwara State in Nigeria. The study also finds that households owning livestock are likely to be food secure than those without any livestock. Haile et al. [27] found the similar results in Ethiopia. Whereas, education, employment, and income are found to be insignificant in determining the food security status in region. This may reflect low education level and high unemployment rate in the region under the study. Contrary to these findings, Cock et al. [21] found that education was a very important determinant of food security in the rural areas of Limpopo, South Africa. Arene and Anyaeji [28] found that income was a very important factor in determining a household's food security in Nsukka Metropolis of Enugu State, Nigeria.

**Table 4.5** Logistic Regression Results

Variables	Coefficient	standard Error	Z-value	P>   z	Odds Ratio	Marginal effect
Age	-0.4237	0.018	-2.31	0.021**	0.96	-0.0075
Gender	1.1022	0.532	2.12	0.034**	3.01	0.1948
Marital status	0.1385	0.611	0.26	0.795	1.15	0.0245
Primary education	0.3829	0.459	0.83	0.404	1.47	0.0677
Higher education	0.1628	0.817	0.2	0.849	1.18	0.0288
Employment	0.4480	0.546	0.82	0.412	1.57	0.0792
Own farm income	-0.1363	0.714	-0.19	0.849	0.87	-0.0241
Off farm income	-0.2530	0.745	-0.34	0.734	0.78	-0.0447
Health status	-0.1342	0.607	-0.22	0.825	0.87	-0.0237
Livestock ownership	1.0935	0.557	1.96	0.05**	2.98	0.1933
Household asset ownership	-0.7090	0.777	-0.91	0.362	0.49	-0.1253
Dwelling	0.5203	0.505	1.03	0.303	1.68	0.0920
Household size	-0.0127	0.090	-0.14	0.888	0.99	-0.0022
Hectare land	0.0006	0.611	0	0.999	1.00	0.0001



Above hectare	0.9451	0.395	2.39	0.017**	2.57	0.1671
Cons	0.5608	1.403	0.4	0.689	1.75	
Log likelihood =	-71.8566		Number of cases =136			
LR chi2 (15) =	44.71		Average marginal effect= 0.515			
Prob>chi2 =	0.001		Hosmer-Lemeshow chi2(8)=7.63			
Pseudo R2 =	0.2373					

\*\*\* Significant (p-value<0.01); \*\* Significant (p-value<0.05); \* Significant (p-value<0.1)

## V. Conclusion And Policy Implication

This paper has identified the determinants of households' food security in Shiselweni region. Although Swaziland is a middle-income country, food security remains an issue for concern and for possible policy response when it points to nutritional deficiencies and increased hunger and poverty, especially for people living in rural areas. The policy implication is that pro-agricultural policies cannot be effective unless institutional and cultural reforms, and sound pro-economic policies are implemented. The impact evaluation of Comprehensive Agriculture Policy in Swaziland (CAPS) on food security deserves future research attention.

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