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# Determinants of the consumption expenditure of cereals and its products in Malawi

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## Introduction

- Malawi is regarded as a low income country
- This could be reflected on the pattern of food consumption for both rural and urban households
- Malawi is known to produce and consume diverse food items which can be categorized as cereals, root tubers, legumes, vegetables, meat, fruits, milk products, sugars/fats, spices and beverages
- Cereal category will be considered because it constitute part of the daily meal of households
- Consumers aim to maximize utility derived from food consumption subject to the constraint on income
- The behavior of household towards food consumption is a reflection of the state of their wellbeing
- Household modify their expenditure on food in response to some external and internal shocks
- These may include income, prices of commodity for purchase, prices of other commodity, distribution of income, age, occupation, educational status, and other socioeconomic factors

## Objectives

To examine the household consumption expenditure on cereals and cereals products in Malawi using the Integrated Household Survey IV (IHS 4) 2016 data. The specific objectives include to:

- determine the factors that influence household consumption decisions of cereal and cereal products
- estimate the demand systems and elasticity for cereal and cereal products

## Methods

- Integrated Household Survey IV (IHS 4) data by the Malawian National Statistics Office (NSO) was used
- Multivariate Probit Model and Quadratic Almost Ideal Demand System (QUAIDS) were used for data analysis
- Multivariate Probit Model was specified as:

$$y_1 = \alpha_1 + \gamma_1 x_1 + \gamma_2 x_2 + \gamma_3 x_3 + \dots + \gamma_{13} x_{13} + \varepsilon_1$$

$$y_2 = \alpha_1 + \gamma_1 x_1 + \gamma_2 x_2 + \gamma_3 x_3 + \dots + \gamma_{13} x_{13} + \varepsilon_2$$

$$y_3 = \alpha_1 + \gamma_1 x_1 + \gamma_2 x_2 + \gamma_3 x_3 + \dots + \gamma_{13} x_{13} + \varepsilon_3$$

$$y_4 = \alpha_1 + \gamma_1 x_1 + \gamma_2 x_2 + \gamma_3 x_3 + \dots + \gamma_{13} x_{13} + \varepsilon_4$$

- Quadratic Almost Ideal Demand System (QUAIDS) was specified as:

$$w_1 = \alpha_1 + \gamma_1 \ln p_1 + \gamma_2 \ln p_2 + \gamma_3 \ln p_3 + \gamma_4 \ln p_4 + \beta_1 \ln \text{Exp} + \beta_2 \ln \text{Exp}^2 + \varepsilon_1$$

$$w_2 = \alpha_1 + \gamma_1 \ln p_1 + \gamma_2 \ln p_2 + \gamma_3 \ln p_3 + \gamma_4 \ln p_4 + \beta_1 \ln \text{Exp} + \beta_2 \ln \text{Exp}^2 + \varepsilon_2$$

$$w_3 = \alpha_1 + \gamma_1 \ln p_1 + \gamma_2 \ln p_2 + \gamma_3 \ln p_3 + \gamma_4 \ln p_4 + \beta_1 \ln \text{Exp} + \beta_2 \ln \text{Exp}^2 + \varepsilon_3$$

$$w_4 = \alpha_1 + \gamma_1 \ln p_1 + \gamma_2 \ln p_2 + \gamma_3 \ln p_3 + \gamma_4 \ln p_4 + \beta_1 \ln \text{Exp} + \beta_2 \ln \text{Exp}^2 + \varepsilon_4$$

**Table 1: Food group for cereal and cereal products**

s/no.	Food group	Food items
1	Maize	Maize grain; maize flour – normal, fine, and bran; green maize; refined maize
2	Rice	Rice
3	Millet	Sorghum; finger millet; pearl millet;
4	Wheat	Wheat flour, Bread; buns, scones, biscuits; spaghetti, macaroni, breakfast cereals, infant feeding cereals, pasta, others consumed

## Results

- Table 2: Majority of the households were male (71.29 %), Married (71%), No formal education (62 %), Consumed cereals 7 times in a week (90%) and reside in urban areas (82%). The mean of age of household head and household size was 43 years and 4 respectively
- Table 3: The probability of consuming cereals increased with household income, household size, and with households with MSCE. However, cereal consumption decreased for male headed household and being single
- Table 4: Maize (66%) and wheat (21%) groups had the highest budget share. Expenditure elasticity showed that all cereal group were normal good
- Table 5: Household expenditure share for specific cereal increased with its own price but cross price of specific cereal group was inversely related to the other cereal group. The budget share for maize, rice and millet decreases as expenditure increases while the budget share for wheat increases with expenditure. However, a continuous increase in their income expenditure, will result in the increase in the expenditure share for maize and rice group while millet and wheat decreases
- Table 6: Uncompensated and compensated own price elasticity of all cereal group was inelastic. The compensated cross price elasticity showed that the maize group are close substitutes to rice, millet and wheat

**Table 2: Socioeconomic characteristics of households**

Variables	Percentage	Mean
Female	28.71	
Male	71.29	
Age	-	43
Married	70.76	
Single	29.24	
Household size	-	4
No Education	61.89	
Primary School Leaving Certificate (PSLC)	12.56	
Junior Certificate Examination (JCE)	11.09	
Malawi Secondary Certificate Examination (MSCE)	9.34	
Tertiary education	5.12	
Formal employment	16.96	
Household who consumed rice within a week	97.36	
Household who consumed rice within a week	25.02	
Household who consumed millet within a week	6.88	
Household who consumed wheat within a week	41.13	
Urban households	81.75	
Rural households	18.25	

**Table 3: Simulated Maximum likelihood Multivariate Probit model**

VARIABLES	Maize	Rice	Millet	Wheat
lnHHincome	0.105*** (0.030)	0.776*** (0.025)	0.072*** (0.024)	0.919*** (0.023)
Urban	-0.057 (0.090)	0.241*** (0.043)	-0.183*** (0.062)	0.288*** (0.045)
Sex	0.034 (0.096)	-0.180*** (0.054)	-0.079 (0.070)	-0.138*** (0.048)
PSLC	-0.0539 (0.085)	0.0850* (0.048)	-0.00562 (0.062)	0.130*** (0.042)
JCE	0.142 (0.108)	0.148*** (0.049)	-0.084 (0.069)	0.212*** (0.047)
MSCE	0.247* (0.139)	0.331*** (0.056)	0.065 (0.076)	0.434*** (0.058)
TERTIARY	-0.451*** (0.135)	0.499*** (0.083)	0.010 (0.108)	0.755*** (0.121)
Age	-0.004** (0.002)	0.000 (0.001)	-0.002 (0.002)	-0.001 (0.001)
Divorced/Separated	0.133 (0.120)	-0.269*** (0.064)	-0.079 (0.084)	-0.218*** (0.057)
Widow/Widower	-0.100 (0.125)	-0.146* (0.077)	-0.126 (0.101)	-0.074 (0.069)
Never Married	-0.228 (0.153)	-0.294*** (0.088)	-0.175 (0.130)	-0.248*** (0.088)
hhsiz	-0.006 (0.015)	0.096*** (0.009)	0.061*** (0.011)	0.102*** (0.008)
Occupation	0.026 (0.090)	0.100** (0.043)	-0.018 (0.061)	0.200*** (0.044)
Constant	0.940** (0.380)	-10.400*** (0.313)	-2.454*** (0.303)	-11.520*** (0.286)

**Table 4 : Budget shares and expenditure elasticity**

Cereal group	Observations	Budget Share	Expenditure Elasticity
Maize	9,895	0.66	0.946
Rice	9,895	0.12	0.921
Millet	9,895	0.01	0.895
Wheat	9,895	0.21	1.396

**Table 5: Parameter Estimates of QUAIDS**

Variables	Maize	Rice	Millet	Wheat
Constant	0.429*** (0.001)	0.199*** (0.009)	0.374*** (0.010)	-0.002 (0.010)
lnP1	0.102*** (0.001)			
lnP2	-0.038*** (0.001)	0.089*** (0.001)		
lnP3	-0.025*** (0.001)	-0.030*** (0.002)	0.069*** (0.003)	
lnP4	-0.039*** (0.001)	-0.021*** (0.002)	-0.014*** (0.002)	0.073*** (0.003)
lnExp	-0.024*** (0.001)	-0.015*** (0.001)	-0.035*** (0.002)	0.074*** (0.004)
(lnExp) <sup>2</sup>	0.064*** (0.002)	0.048*** (0.004)	-0.002 (0.006)	-0.110*** (0.007)
IMR	-0.308*** (0.063)	0.331*** (0.011)	0.012 (0.019)	-0.035 (0.066)

\*\*\*, \*\*, and \* indicate statistical significance at 1, 5, and 10 percent, respectively  
 Standard errors in parentheses

**Table 6: Uncompensated and Compensated Price Elasticity**

	Maize	Rice	Millet	Wheat
Demand				
Maize	-0.753 (-0.325)	-0.145 (-0.071)	0.003 (0.0104)	-0.193 (0.013)
Rice	-0.096 (0.332)	-0.695 (-0.621)	-0.009 (-0.002)	-0.121 (0.086)
Millet	-0.068 (0.360)	-0.123 (-0.049)	-0.869 (-0.861)	-0.092 (0.114)
Wheat	-0.108 (0.320)	-0.082 (-0.008)	-0.017 (-0.009)	-0.713 (-0.507)

( ) Compensated price elasticity

## Conclusion

- Most household consume cereals and its products daily. Maize is the most consumed and millet is the least consumed
- Income and education is an important indicator for household consumption
- Change in price of a specific cereal group influenced the demand for the other groups
- Cereal products are normal goods but have a competitive relationship with each other
- Household cereal consumption level can be improved and prices stabilized by considering these relationships between cereal groups

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