FACTORS AFFECTING CONSUMPTION OF CASSAVA MEAL IN ZAMBIA'S LUSAKA DISTRICT

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BY

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LIST OF ACRONYMS

CSO	Central Statistics Office
FAO	Food and Agriculture Organization
FRA	Food Reserve Agency
HCN	Hydrocyanic acid
MACO	Ministry Of Agriculture and Cooperatives
NGO	Non-Governmental Organization
PAM	Programme against Malnutrition.
RTIP	Root and Tuber Improvement Program
SPSS	Statistical Package for Social Sciences
UND	United Nations Development Program

ABSTRACT

Factors affecting Consumption of Cassava Meal in Zambia's Lusaka District

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The main objective of this study was to find out the factors affecting consumption of cassava meal, and perceptions consumers have regarding cassava meal. It is based on sample survey data from Lusaka district of Lusaka Province of Zambia. Collected data was analyzed in Statistical Package for Social Sciences (SPSS) to generate descriptive statistics. Frequency distribution tables were generated to calculate each response as a percentage of the total responses available for a particular question. The study considered characteristics of consumers such as the level of education, marital status, sex and age.

Field results showed that most of the respondents were females. The age group of 31-40 years had the highest percentage and the least was the age group of 61-70 years. In terms of distribution of respondents by education most of them reached secondary followed by primary and those who never attended school represented the least percentage. On the reasons of preference of cassava meal the highest percentages were for the reasons of being blended with maize meal, being used in baking and being available even in cases of drought and the least percentage was for the reason of being easy to prepare. In terms of sources of awareness 65% heard from friends, 58% from TV, 50% from Radio, 47% from magazines, 50% from newspapers, 2% from government extension workers, 55% from the village, 42% from posters and 40% from brochures. Distribution of respondents based on cassava meal characteristics, the characteristic of nutritious had 55.4%, affordability had 73.6%, associated with the poor had 40.9%, accessibility had 53.6, safety 92.7%, sustainability 51.8% and the fact that one can advise someone to buy cassava meal had 83.6%.

The probit model was used in analyzing the effects of independent variables on the dependent variable which was consumption of cassava. The independent variables were age, sex, household size, marital status, residential area and education. The consumption of cassava meal was found to be significantly explained by household size (p value=0.003), level of income (p value=0.004) and residential area (p value= 0.022). The household size had a positive coefficient meaning that it had a positive effect on the consumption of cassava meal. Income was a dummy variable and low income level was found to be negatively significant meaning that it had a negative effect on the consumption of cassava meal. Residential area was also a dummy variable and rural area was found to be positively significant in explaining consumption of cassava meal, meaning that one belonging to the rural area increased the possibility of consuming cassava meal.

Based on the findings my recommendations would be promotions of cassava meal and awareness programs which would concentrate on low income groups, rural areas and families with large household size, this is because these groups are more likely to accept consumption of cassava meal. Also studies that would focus on finding the reasons why there is low consumption among high income groups, households from urban areas and households of small size.

CHAPTER ONE

INTRODUCTION

1.1 Background

Zambia's two main staples, maize and cassava, both reached Zambia about 300 years ago from their native home in the Americas. Since their arrival, these two imported food crops have revolutionized Zambian agriculture. As a result, today maize supplies about 60% of national calorie consumption and serves as the principal food staple in central, southern and eastern Zambia. Cassava furnishes a further 15% of total calories and constitutes the mainstay of diets in northern and western Zambia (FAO, 2002). Historically, heavy government subsidies for maize production - amounting to 17% of total government spending at its peak in the late 1980's - have artificially inflated maize production in Zambia (Howard and Mungoma, 1996). Following withdrawal of these substantial subsidies, maize production has trended gradually downward, while cassava production has grown rapidly. (FAOSTAT, 2002). Around its declining trend, maize production has varied widely from year to year over the past decade and a half. Its low drought tolerance, coupled with erratic rainfall, lead to recurrent food shortages in southern, central and eastern Zambia where households consume a primarily maize-based diet. Yet in northern Zambia, where more drought-tolerant cassava serves the principal food staple, food supply proves more stable and food aid appeals are rare. Noting this striking correlation between drought vulnerability and the prevalence of maize as a staple food, Zambia's Programme against Malnutrition (PAM) and a number of other agencies have been promoting cassava production in the country's erratic rainfall zones as a form of low-cost drought insurance. Although low temperatures in the plateau areas of the extreme south prevent production of a temperature-sensitive tropical crop such as cassava, the river valleys of the south and most areas of central and eastern Zambia house broad swaths of land suitable for cassava production. Nationally, interest in cassava has accelerated in recent years, as Zambian scientists from the Root and Tuber Improvement Programme (RTIP) have released a stream of new, highly productive, early maturing cassava varieties. In research station trials in northern Zambia, these new varieties yield 30 to 40 tons per hectare using no purchased inputs. Since cassava roots contain up to 70% water, this amounts to a dry-matter yield of 9 to 12 tons per hectare, far higher than the historic

average smallholder maize yield of 1.5 tons (Ministry of Agriculture, Food and Fisheries, 1999). Not surprisingly, these highly productive recommended cassava varieties are spreading rapidly in northern Zambia, through farmer-to-farmer distribution of planting material (Ministry of Agriculture, Food and Fisheries, 2000).

Cassava production in eastern Zambia is also growing rapidly, though from a much smaller base. Cassava meal is a type of meal prepared from cassava by first removing the outer covers of cassava with sharp knives then soaking the remains in water for a good number of days until they become soft, after which they are dried in the sun for a good period until they dry, after which the dry cassava is ground to make meal which can be used in preparation of nsima and other uses. Aside from the lower values of crude protein and energy of cassava relative to those of maize, the greatest limitation in the use of cassava meal as a substitute for maize is that of its hydrocyanic acid (HCN) content which is harmful. The HCN content of fresh cassava (which is a breakdown product of hydrolysis of cyanogenic glycosides in the presence of linamarase) has to be reduced greatly in order to promote its acceptability and utilization. Several processing methods have been applied to fresh cassava to reduce the cyanide content. These include grating and sun drying (Tewe et al., 1976), ensiling (Obioha and Anikwe, 1982), fermentation (Tewe and Kasali, 1986), boiling, freezing (Obioha et al., 1983), oven drying (Tewe and Kasali, 1986; Osei and Twumasi, 1989), sun drying (Osei and Duodu, 1988; Esonu and Udedibie, 1993), parboiling and sun drying. The optimal inclusion level and utilization of the processed cassava would therefore depend upon the processing method used. Studies (Tewe et al., 1976; Obioha and Anikwe, 1982; Tewe and Kasali, 1986) indicated that ensiling and fermentation are the most efficient methods while oven-drying is the least efficient method for cyanide reduction in fresh cassava.

1.2 Problem Statement

Zambia's population is estimated at 13 million of which 72.9% live below the poverty line. The countries ranking in the Human Development Index has been declining in the recent past, in fact Zambia ranked among the least developed countries in 1999.Even though Zambia is now ranked as the middle income country, the main challenge for Zambia therefore remains to bring about

sustained improvements in the livelihood of the approximately 73% of the population living in poverty. This challenge necessitates greater targeting of developmental projects towards the poor and the vulnerable. And in order to reach the first millennium development goal which is eradicating extreme poverty by 2015 the Government should consider projects that move in this direction. Considering the fact that Maize-meal prices have more than doubled in the past two years in a country where most people live on less than a dollar a day, so at around US$20 for a25kg bag in some rural areas, the national staple is quickly becoming unaffordable.

Consumer surveys were conducted in Lusaka, Kabwe, Monze, Chipata, Mongu, Mansa, Ndola and Solwezi. Most of the consumers interviewed, 83 per cent, were regular consumers of cassava products in markets around the country, 58 per cent bought fresh root, 33 per cent bought chips as snacks, 44 per cent bought cassava meal and 21per cent bought leaves. Most interviewees preferred maize meal, 61 per cent, while 32 per cent preferred cassava meal. Seven per cent were indifferent. There has been no study done to find out the factors that affect consumption of cassava meal and why the high percentage was found to like maize meal and not cassava meal and also despite the fact that cassava is easy to produce and require less inputs as compared to maize production, cassava meal is not demanded by many Zambians as meal. Therefore assessing the factors affecting consumption of cassava meal is the only answer to the question of why cassava meal is not consumed in the same way maize meal is consumed.

1.3 Objectives

1.3.1 General Objective

- To determine consumer preferences that affects the demand of cassava meal.

1.3.2 Specific Objectives

- To find out consumer perceptions about cassava meal
- To identify the socio-economic, institutional and attitudinal factors influencing the demand of Cassava meal.

- To find out if cassava is accessible on the market.
- .To gain knowledge about consumer attitude towards cassava meal.

1.4 Rationale

Awareness of the preferences affecting the consumer's demand of cassava meal is essential to successful development and eradication of absolute poverty in Zambia. It also adds to the existing body of knowledge, therefore a quantitative approach of the adoption study is essential because it not only identifies the factors but also provides information on the significance of each factor that may affect decisions on demand for cassava meal.

CHAPTER TWO
LITERETURE REVIEW

2.1 Introduction

This chapter reviews relevant literature and definitions of key terms, significance of cassava meal, potential urban demand, consumer preference a summary of variables likely to affect demand of cassava meal and the conceptual frame work.

2.2 Definitions of Key Terms

In economics, demand is the desire to own anything, the ability to pay for it, and the willingness to pay. The term demand signifies the ability or the willingness to buy a particular commodity at a given point of time. Economists record demand on a demand schedule and plot it on a graph as a demand curve that is usually downward sloping. The downward slope reflects the relationship between price and quantity demanded: as price decreases, quantity demanded increases. In principle, each consumer has a demand curve for any product that he or she would consider buying, and the consumer's demand curve is equal to the marginal utility (benefit) curve. When the demand curves of all consumers are added up, the result is the market demand curve for that product. If there are no externalities, the market demand curve is also equal to the social utility (benefit) curve.

The term "preferences" is used in a variety of related, but not identical, ways in the scientific literature. This makes it necessary to make explicit the sense in which the term is used in different social sciences. In psychology, preferences could be conceived of as an individual attitude towards a set of objects, typically reflected in an explicit decision-making process. Alternatively, one could interpret the term "preference" to mean evaluative judgment in the sense of liking or disliking an object which is the most typical definition employed in psychology. However, it does not mean that a preference is necessarily stable over time. Preference can be notably modified by decision-making processes, such as choices, even in an unconscious way. "Preference" may also refer to non-choices, such as genetic and biological

explanations for one's preference. Sexual orientation, for example, is no longer considered a sexual preference.

2.3 Significance of Cassava Meal

As food prices soar and stocks continue to fall, Zambians are finding it increasingly difficult to depend on maize and are being urged to look at a cheaper, drought- and pest-resistant alternative that already puts food on the table. "Even if there is no [maize-meal], I can't suffer. I am able to eat my cassava", said Ruth Chalwe, a small-scale farmer in the Samfya district of Luapula Province. Maize-meal prices have more than doubled in the past two years in a country where most people live on less than a dollar a day, so at around US$20 for a25kg bag in some rural areas, the national staple is quickly becoming unaffordable.

The government has been releasing maize from the Food Reserve Agency's [FRA] three-month strategic reserve stock, and making it available to millers and rural consumers at subsidized prices since December 2008: but the strategic reserves are running out. The recent floods have made matters worse: "We are already struggling with low food stocks the floods will affect our food production for the coming season," DominicanoMulenga, national coordinator of Zambia's Disaster Management and Mitigation Unit, told IRIN in an interview on 24 March. Without significant imports to bridge the gap, private traders have warned that Zambia may experience a countrywide shortage of the staple food by April 2009, and that it could last until the next harvest in May 2009. Bernard Machila, permanent secretary in Zambia's ministry of agriculture, said the government had long advocated cassava farming to improve food security, to varying degrees of success.

"I think our major challenge at the moment is to make our people appreciate other crops apart from maize ... they just can't seem to accept mealie-meal [maize-meal] made from other crops apart from maize [grain]," Machila said.

This review has attempted to examine information pertaining to the role of cassava (Manihotesculenta) as a major food source for a large part of the world population, particularly the countries of South America, Africa, and Asia, where it is primarily a major source of energy

for 300 to 500 million people. Its cultivation, usually on small farms with little technology, is estimated to cover on an annual basis about 11 million hectares providing about 105 million tons, more than half of which is consumed by humans. The importance of cassava as an energy source can be seen by its growing demand in the European Economic Community countries where it forms up to 60% of the balanced diets for swine. Cassava is one of the crops that converts the greatest amount of solar energy into soluble carbohydrates per unit of area, thus 1 kg of moisture-free cassava meal may yield up to about 3750 kcal which would mean that a yearly production of 15 tons of cassava meal per hectare would yield some 56 million kcal. The major limitations of cassava as food appear to be its poor protein content and quality and the rapid post harvest deterioration of its roots which usually prevents their storage in the fresh state for more than a few days. However, in addition to its use for culinary purposes, cassava finds application in industrial products such as an adhesive for laundry purposes, for manufacturing paper, alcohol, butanol, dextrin, adhesive tape, textile sizing, and glue.

2.4 Summary of Variables likely to affect Demand of Cassava Meal

With reference to the thesis done by Mushingwani, Stanley, Maize is a staple food to many Zambians. It is for this reason that it has received a lot of support from government as a way of maintaining food security in the nation. No other crop in Zambia currently receives such level of support from government. Factors influencing its availability can thus seriously affect food security. In recent years, Zambia has not been spared by adverse climatic changes that have continued to affect the entire globe. In the early 1980s the southern "maize-belt" part of the country that was devastated by continuous drought that caused villagers to go hungry and lose a lot of livestock that was their main livelihood. The trend of decreasing rainfall in consecutive seasons has continued in many parts of the country. Because most smallholder farmers, who are the major contributors to the nation's food supply, depend on rain for crop production, there has been a deliberate policy by government through the Ministry of Agriculture and Co-operatives to encourage the farmers to diversify their on- and off-farm activities to improve food security at household and national level. To this end, the government has continued to encourage the growing of cassava. Several studies have suggested that cassava is a nutritious food crop. Cassava has a number of industrial uses too. Good attributes of cassava lie not only in the

nutrition content of the tuber and leaves but also in the fact that as a field crop it does not require expensive inputs like fertilizer and is better able to withstand drought compared to the maize crop. This study attempts to understand the economic factors that influence consumption of cassava to shed light on its potential to avert potential crisis associated with prolonged droughts. Based on the survey conducted in 2007 in Lusaka, the study found that price and quality of cassava meal are the principal determinants of cassava meal demand in Lusaka. Direct price elasticity of demand for cassava is -1.32, suggesting that cassava meal is price elastic. The study also found that the cross price elasticity between maize meal price and cassava meal demand is 0.04 suggesting that cassava meal is a substitute to maize meal, but inelastic. The income price elasticity of demand for cassava meal is -0.12. However, income was found to be statistically insignificant in determining the demand for cassava meal. As such these economic factors are keys to the consumption of cassava. Therefore, the study suggests that the demand for cassava meal in Zambia may be improved through deliberate promotion.

According to the Cassava Market Research Study in Zambia, Cassava meal has the potential to act as a substitute for maize meal in Zambia. Notwithstanding the current lack of availability of sufficient quantities of cassava meal, ignorance about is preparation is a barrier to adoption. While maize meal is prepared by boiling it with water, it is important that cassava meal is added to hot, not boiling water, and incorporated away from direct heat; otherwise it becomes transparent and "bubblegum-like". Around 1.56 million households consume around 1.5 million Mt of maize meal a year. Around 50 per cent of the population speaks languages associated with cassava consumption areas and is therefore considered to be cassava-familiar: 779,005 households might start consuming cassava meal tomorrow, if it were available. They represent the most important potential market for cassava-based product, but unfortunately, many of them, particularly in urban areas; have been brought up on diets of maize meal. Notwithstanding the existing consumption of home-made cassava meal by the rural population, the potential for switching remains 50 per cent, but it will be a hard target to meet in the near total absence of cassava meal to compete in availability and quantity with maize meal. Although many point to the government's intervention in maize pricing, cassava meal does not currently compete with maize meal on availability, quality, distribution, packaging or price. In addition, a number of the remaining people, unfamiliar with cassava products, may convert through suitably targeted

promotion, which could include instruction on preparation techniques. Perhaps 10 per cent of those might be convinced. The bottleneck in terms of using cassava meal as a substitute for maize meal rests with commercial millers. Few of those interviewed for this study were Interested in milling cassava. Reasons for the reluctance included the need to change sieving equipment[75], lack of resources for further buying, lack of availability of cassava chips[76], and a general unease to change existing business practices and procedures. APG Milling, which has mills in Monze, Choma, Mongu and Lusaka, was prepared to try milling cassava, on an experimental basis.

2.5 Potential Urban Demand

According to the Cassava Market Research Study in Zambia, Potential national demand does not indicate the accessible demand to market sellers, although it does demonstrate how important cassava ought to be to the economy. Accessible demand is better understood by examining the urban populations. The following figures show the urban populations of selected language speakers and the potential urban demand for cassava meal. The total urban population is 3.35 million, with a total minimum estimated consumption of 535,531Mt of maize meal per year. An estimated 54 percent of the urban population is cassava-familiar, 58 per cent of the urban population of Central, 68 per cent of Copper belt, 9 per cent of Eastern, 95per cent of Luapula, 38 per cent of Lusaka, 89 per cent of Northern, 43 percent of North-Western, 33 per cent of Southern and 69 per cent of Western. This suggests that 302,704 urban households might consume 100,895Mt of fresh root, if it were available; 7,422Mt in Central Province, 46,780Mt in Copper belt, 566Mt in Eastern Province, 5,972Mt in Luapula, 22,987Mt in Lusaka, 8,063Mt in Northern, 1,680Mt in North-Western, 4,394Mt in Southern and 3032Mt in Western Province. In addition they could consume 189,701Mt of cassava meal, 13,955Mt in Central Province, 87,954Mt in Copper belt, 1,063Mt in Eastern, 11,229Mt in Luapula, 43,219Mt in Lusaka, 15,159Mt in Northern, 3,159Mt in North-Western, 8,261Mt in Southern and 5,701Mt in Western. Potential leaf sales in urban areas are 110,487Mt for the country, 8,128Mt in Central Province, 51,227Mt in Copper belt, 619Mt in Eastern, 6,540Mt in Luapula, 25,172Mt in Lusaka, 8,829Mt in Northern 1,840Mt in North-Western, 4,811Mt in Southern and 3,320Mt in Western Province

2.6 Conceptual Framework

Probit model will be used to avoid having to work with negative dependent variables and assuming non-linear effects of the explanatory variables. Also, the Probit model discriminate better near median potency (i.e. probability of response) it is particularly well suited to experimental data and is more appropriate when the binary dependent is assumed to represent a normal distribution. This model is a popular specification of a generalized linear model, using the probit link function. The Probit model is specified as:

$$\Pr(Y=1|X=x) = \Phi(x'\beta)$$

Where β is a parameter to be estimated, and Φ is the normal cumulative distribution function (cdf). Under Probit model, the preference of the consumer for demand of cassava meal, *Yi,* can be represented by the equation;

$$Yi = 1\,(Y* > 0) = \begin{cases} 1 & if\ Yi* > 0 \\ 0 & otherwise \end{cases}, \text{ where } Yi* = x'\beta + \varepsilon, \text{ and } \varepsilon|x \sim N(0, 1).$$

Here i = 1, 2, 3, 4, 5...n and denotes the sample size surveyed, *Yi* is the dependent variable representing demand, β is the set of parameters to be estimated which reflect the impact of changes in x on the probability, x is a vector of independent variables and ε is the independent normally distributed error term assumed to be normal with zero mean and variance 1

CHAPTER THREE
RESEARCH METHODOLOGY

3.1 Introduction

This chapter describes the methods and procedures that were used to help in the achievement of stated objectives. The chapter also describes the study area, sample used and the method of collecting and analyzing data.

3.2 study sites

This study was conducted in Lusaka district. Lusaka was selected because it comprises of both maize meal consumers and cassava meal consumers who have settled there from various urban and rural areas. Therefore, it represents both of the consumers. This is a true representative of various household characteristics such as education and levels of knowledge, which are some of the variables this study will measure.

3.3 Sample

A sample of 110 consumer households was selected from a sampling frame comprising all consumer households in Lusaka. A simple random sample of a total of 110 households was selected from a number of camps to ensure representation of all categories of households. A consumer household will be used as a sampling unit.

3.4 Data analysis and collection

Both primary and secondary data was collected in this study. Primary data was collected through personal interviews using structured questionnaires which were carefully developed around the overall objectives of the survey. Secondary data was collected from various relevant publications and the internet.

The data from questionnaires was analyzed using the Statistical Program for Social Sciences (SPSS) to generate tables. Estimates of the parameters β was estimated by maximum likelihood method using the log-likelihood function. The Probit model was estimated in STATA.

CHAPTER FOUR

STUDY FINDINGS AND DISCUSSION

4.1 Introduction

This chapter presents and discusses the study findings. It begins with a presentation and discussion of the demographic characteristics, followed by the sources of awareness of cassava meal, Benefits and perceptions regarding cassava meal and then the probit regression estimates with a discussion of the resulting estimates.

4.2 Demographic Characteristics

The majority of the respondents (59%) were females while (51%) were males. There are more females because they are the ones that buy food in the house and they are the ones that are found at home. The information is shown in the table below.

Table 1: Distribution of Respondents by Sex

Sex	**Number**	**Percent**
Female	59	53.6
Male	51	46.4
Total	**110**	**100**

The majority of the respondents (30.9%) were in the age bracket of 21 and 30 years. About 41.8% constituted those that were between 31 and 40 years while 18.2 % were between 41 and 50 years. Further, 7.3% constituted those that were between 51 and 60 while 1.8% was between 61 and 70 years respectively. Age was one of the explanatory variables and it was expected that respondent in the higher age groups would be more willing to consume cassava, but age was not found to significantly affect the consumption cassava meal. As shown below.

Table 2: Distribution of Respondents by Age

Age group (years)	Number	Percent
21-30	34	30.9
31-40	46	41.8
41-50	20	18.2
51-60	8	7.3
61-70	2	1.8
Total	**110**	**100**

In terms of education, 58.2% of the respondents had reached formal school up to secondary level, 20.9% up to primary, 10.9% up to tertiary level and 10% never went for formal education. Level of education was expected to affect consumption of cassava meal, high levels of education was expected to decrease consumption, while low education was expected to increase consumption given the fact that low levels of education are associated with low incomes as will be shown later in the probit analysis. Low income levels were found to be positively significant in explaining why consumption of cassava meal was low.

Table 3: Distribution of Respondents by Education Levels

Education	Number	Percent
Primary	23	20.9
Secondary	64	58.2
Tertiary	12	10.9
None	11	10
Total	**110**	**100**

In terms of awareness about cassava meal 58% respondents heard about cassava meal from friends, 63% from TV, 50%from Radio, 47%from magazines, 50% from Newspapers, 2% from Govt Extension workers, 55% from the village, 42% from posters and 40% from brochures. The percentages are in such a way that one respondent can have more than one source of information. The highest source of awareness was the TV and this is because most Lusaka residents have TVs. The same applies to the radio, magazines and newspapers, they are available and most people can afford them. The brochures and posters are lower because they are not usually used as methods of communication.

Table 4: Sources of Awareness of Cassava Meal

Source of awareness	**Percent**
Friends	58
TV	63
Radio	50
Magazines	47
News Papers	50
Village	55
Posters	42
Brochures	40

In terms of reasons for preference of cassava meal 70% said it was cheaper, 55% said it has a good taste, 50.9% said it is nutritious, 40% said it is easy to prepare, 99% said it can be blended with maize meal, 94.5% said it can be used in baking, and 92.7% said it is available even in times of drought. The percentages were also in such a way that one respondent can choose more than one advantage. The reasons of being used in baking blended with maize and being available even in cases of drought had high percentages because almost everyone knows these reasons. For the taste and preparation they are subjective and depend on the respondent. As shown in the table below.

Table 5: Reasons for Preference of Cassava Meal.

Description	Percent
Cheaper	70
Good taste	55
Nutritious	50.9
Easy to prepare	40
Can be blended with maize meal	99
Can be used in baking	94.5
Available even in cases of drought	92.7

In terms of distribution of respondents based on cassava meal characteristics, 55.4% characterize cassava as being nutritious, 73.6% as being affordable, 40.9% as being associated with the poor, 53.6%said it is accessible, 92.7% said it is safe for consumption, 51.8% said they can substitute it for maize meal and 83.6% would advise others to buy cassava meal. The respondents had more than one characteristic to choose from, the safety and advice characteristics had high percentages because cassava meal is really safe for consumption since there are a lot of known techniques that get rid of the cyanide found in cassava, techniques such as sun drying. Affordability was also expected to be high because it is a fact that cassava meal is cheaper. These other characteristics depend on the respondent, they are subjective.

Table 6: Distribution of Respondents based on Cassava Meal Characteristics

Characteristics	Percent
Nutritious	55.4
Affordability	73.6
Associated with the poor	40.9
Accessibility	53.6
Safety	92.7
Substitutability	51.8
Advise to buy cassava meal	83.6

4.3 SOCIAL ECONOMIC FACTORS AFFECTING CONSUMPTION OF CASSAVA MEAL

4.4 Probit Regression

The probit model was estimated in STATA and data collected from the sample survey. Table 9 presents the probit regression (adjusted for heteroskedasticity) parameters for the consumption of cassava meal. The dependent variable is consumption of cassava meal. The model had a log likelihood of -58.718752 and was done for 110 observations.

4.5 Tests for Heteroskedasticity

.

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity

Ho: Constant variance

Variables: fitted values of consumption

chi2 (1) = 9.84

Prob>chi2 = 0.0017

The model was tested for heteroskedasticity and it was found that it was present since according to the Breusch-Pagan test it was found that the P-value was significant at 95%. And therefore robust standard errors were used.

Multicollinearity was not present because all the independent variables had variance inflation factors (VIF) within the accepted range (≤10) or 1/VIF≥0.1). This means that the degree of multicollinearity for the explanatory variables was within the acceptable limit.

Table 7: Test for Multicollinearity

Variable	VIF	1/VIF
Class of area	2.83	0.352985
Income	2.28	0.438353
Level of education	2.06	0.484751
Marital status	1.78	0.562759
Age	1.64	0.608256
Sex	1.39	0.719679
Family size	1.20	0.836783

Mean VIF 1.88

4.7 Model Specification

Ramsey RESET test using powers of the fitted values of consumption

Ho: model has no omitted variables

F (3, 99) = 1.54

Prob> F = 0.2078

Using the Ramsey test for model specification it was found that there were no variables which were missing because the P-value is greater than 0.05 (at 95% confidence level).

4.8 Probit Model

From the table, it can be said that consumption of cassava meal is significantly explained by household size, level of income and residential area. The coefficients of the explanatory variables shows the actual relationship to the dependent variable, the positive coefficient shows a positive relationship and negative coefficient represent a negative relationship, for example the positive sign in the marginal effect for household size shows that a unit increase in a household's size will increase consumption of cassava meal, the negative sign in the level of income coefficient indicates that an increase in household income reduces the consumption of cassava. Therefore consumption of cassava meal depends on class of area, level of income and household size.

Family size was found to be positively significant with a p-value of 0.003 with a coefficient of 0.24437 implying that increase in family size by one person increases the consumption of cassava by 24%. The level of income was a dummy variable classified into three categories, 1 for <K1, 000, 000, 2 representing those between K1, 000, 000 - K3, 000 000 and 3 for >K3, 000, 000, income 3 was dropped by the model to avoid a dummy variable trap and income 1(one) was negatively significant with a p-value of 0.004 implying that the respondents falling in the income level of <K1,000, 000 reduced the possibilities of consuming cassava meal. The class of area was in three categories also 1 for rural, 2 for peri urban and 3 for urban, rural area was found to be positively significant implying that the respondent belonging to the rural area increased the possibilities of consuming cassava meal. The constant was positive implying that there are other variables which affect consumption of cassava.

Number of obs	=	110
LR chi2 (10)	=	12.99
Prob> chi2	=	0.0723
Pseudo R2	=	0.1145

Log likelihood = -58.718752

Table 8: probit Regression Parameter Estimates for Consumption of Cassava Meal (Dependent Variable: Consumption of Cassava Meal)

consumption	Coef.	Robust Std. Err.	z	P>z	[95% Conf.	Interval]
Age	-0.04497	0.023605	-1.91	0.057	-0.0912341	0.001294
Marital	0.320999	0.187027	1.72	0.086	-0.0455676	0.687565
Family size	0.24437	0.081332	-3	0.003	-0.4037772	-0.08496
Sex1	-0.3753	0.343336	-1.09	0.274	-1.048228	0.297623
Sex2	(omitted)					
Education1	1.147681	0.642887	1.79	0.074	-0.1123544	2.407716
Education2	-0.18707	0.484683	-0.39	0.7	-1.137028	0.762894
Education3	(omitted)					
Income1	-2.15881	0.745791	-2.89	0.004	-3.620538	-0.69709
Income2	-0.22899	0.369531	-0.62	0.535	-0.9532536	0.495281
Income3	(omitted)					
Residentialarea1	1.625522	0.709665	2.29	0.022	0.2346032	3.01644
Residentialarea2	0.404643	0.506474	0.8	0.424	-0.5880281	1.397314
Residentialarea3	(omitted)					
_cons	1.69599	0.910793	1.86	0.063	-0.0891317	3.481112

Significance level= 5%

CHAPTER FIVE

CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter presents the conclusion and recommendations of the study based on the findings and interpretations of the study.

5.2 Conclusions

Knowing the factors that affect consumption of cassava is essential to improving the food security in that if these factors are known it can help us to play around with the factors and try to improve the consumption of cassava and given the fact that cassava is produced at a low cost it can really help in improving food security, as well as providing a sustainable way of earning income for those who produce cassava. And also it reduces the risks associated with only depending on maize meal as the staple food.

This study was designed to determine the factors affecting households' consumption of cassava meal. Probit analysis was employed to analyze and discuss the factors affecting consumption of cassava meal. The factors studied included household size, education, marital status, sex, Age, residential area and level of income. The factors which were identified as being statistically significant (with the probit model) level of income, household size and residential area. The significance of each of these variables was discussed to show its impact on consumption decisions.

5.3 Recommendations

Consumption of cassava can be increased through increasing promotions, awareness programs, replacing wheat imports with cassava flour, producing high quality cassava meal and developing new products that will use cassava meal.

A suggestion to future studies is to carry out surveys across the country with a much larger sample size in order to increase variations within the sample hence, capture more variables of importance. When results of such a survey are analyzed with available literature on the factors affecting consumption of cassava meal, there will be a greater understanding of factors affecting cassava consumption

REFFERENCES

Ababio, J., 1999. *Factors affecting the development and production of food grade cassava Flour.* MPhil thesis, Department of Nutrition and Food Science, University of Ghana, Legon, Ghana. (F)

Ababio, J.T., 1997. *Progress Report on the Cassava Flour Project.* Project R6504. Department of Nutrition and Food Science. University of Ghana, Legon, Ghana.pp 5 (C).

Ababio, J. and M. Amoako., 1996.A *survey of the market of flours and starches in Tamale.* Paper Presented at the Ministry of Food and Agriculture Natural Resources Institute Workshop On Root and Tuber Crops, Kumasi, Ghana, 3-5 July 1996. (G).

Day G, A.J Graffham, J. Ababio and M. Amoako., 1996. *Market potential for Cassava flours and Starches in Ghana.* Project R6504. Report R2333 (S). Joint Report of the Natural Resources Institute and Department of Nutrition and Food Science, University of Ghana.pp 57. (C).

Dziedzoave, N.T, A. Osei-Yaw, C. Gyato and B. Mensah., 1998. *Studies on cassava flour Production and utilization in composite flours for biscuit manufacture.* Project R6504.Food Research Institute Report, Food Research Institute, Accra, Ghana. pp 38. (C).

FAO and IFAD. 2000. The world cassava economy facts, trends, and outlook. Rome, Italy.

FAO (2002), FAOSTAT Database Collection

Holleman and A. Aten. Rome. FAO Agricultural Development Paper No. 54.

Ministry of Agriculture Food and Fisheries (2000b), Small Holder Farmer Participation in Cassava production, Lusaka, Zambia.

Osei, S.A., C.C. Atuahene, A. Donkoh, K. Kwateng, K. Ahhenkorah, B.O Azah, W. Haag,Twumasi Afriyie S (1994). *Further studies on use of QPM as feed ingredient for broiler Chickens.* Proc. Ghana Animal Sci. 22:51-55.

Tewe, O.O., 2002. *Cassava for livestock feed in sub-Saharan Africa: strategies for Industrialization.* Paper presented at the International Workshop on Cassava Competitiveness in Nigeria, IITA Conference Center, Ibadan, and November 18-20.

APPENDICES

Questionnaire

Questionnaire serial number: [| |]

Consumer preferences affecting demand for cassava meal.

Department of Agro Economics, UNZA, Zambia.

Survey Instrument

This questionnaire is for academic purpose only. Be rest assured that all the information you provide will be treated as private and confidential as possible. Feel free to answer all the questions honestly. Your cooperation in this regard will be highly appreciated.
Instructions: Please write some answers in the boxes and blank spaces provided.

1. is the respondent the owner of the house?

1. Yes [ ] 2. No [ ]

2. If the answer is No, what is your relationship to the owner?

1. Spouse [ ] 2. Child [ ] 3.Others (Specify).....

3. What is the sex of the respondent?

1. Male [ ] 2. Female [ ]

4. Age (at last birthday)..... [ ]

5. What is your marital status?
1. Single [ ] 2. Married [ ] 3. Divorced [ ] 4. Widowed [ ]

6. What is your highest level of education?
Primary [ ] 2. Secondary [ ] 3. Tertiary [ ] 4. None [ ]

7. How many are you in the family.....?

8. How do you classify the area where you come from?
Rural [ ] 2. Peri- Urban [ ] 3. Urban [ ]

9. How much income do you earn?
1. < K1, 000,000 [ ] 2. K1, 000,000-K3, 000,000 [ ]3.>K 3,000,000 [ ]

10. Do you consume cassava at home?
0=No
1=Yes

11. I now would like to ask you about awareness of cassava meal

Instructions: Filling the following table about the awareness of cassava meal. if your answer in question 1.8 above is yes indicate by ticking in the table below were you heard cassava meal.

	Sources of awareness of cassava meal	***Tick applicable***
No.	Description	
1	Friends	
2	TV	
3	Radio	
4	Magazines	
5	News papers	
6	Govt. Extension Workers	
7	Village	
8	Posters	
9	Brochures	

12. I would like to ask you about reasons for preference of cassava meal.

Instructions: Filling the following table about the reasons for preference of cassava meal. Indicate by ticking in the space provided in the table below.

Reason		Tick applicable
No.	Description	
1	Cheaper	
2	Good taste	
3	Nutritious	
4	Easy to prepare	
5	Can be blended with maize meal	
6	Can be used in baking	
7	Available even in cases of droughts	

13. I would like to know your perceptions regarding cassava meal.

Characteristics	Indicate your perceptions over the following.						
	Is cassava meal nutritious compared to other meals? 0= No 1= Yes	Is cassava meal affordable Compared to other options? 0= No 1= Yes	Is cassava meal associated with the poor 0= No 1= Yes	Is cassava meal accessible on the market 0= No 1= Yes	Is cassava meal safe for consumption 0= No 1= Yes	Would you substitute cassava meal for maize meal 0= No 1= Yes	Would you advise someone to buy cassava meal 0= No 1= Ye

14. Do you think that there are things that have to be improved to increase the demand for cassava meal? (Tick your option)
0= No
1= Yes

15. If your answer to question 14 is yes tick items that you feel need to be improved on.

a) Increasing promotion

b) Awareness programs

c) Replacing wheat imports with cassava flour

d) Producing high quality cassava meal

f) Developing new products that will use cassava meal

I thank you for sharing your experiences with me and may God bless you!