ANALYSIS OF DRY BEANS CONSUMPTION AND FACTORS INFLUENCING CHOICE OF DRY BEANS IN CONSUMERS' FOOD PURCHASING DECISIONS IN DAR ES SALAAM, TANZANIA

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A DISSERTATION SUBMITTED IN A PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTERS OF SCIENCE IN AGRICULTURAL ECONOMICS AND AGRIBUSSINESS OF SOKOINE UNIVERSITY OF AGRICULTURE. MOROGORO, TANZANIA.

2018

ABSTRACT

Dry beans are an important source of protein especially among poor consumers in Tanzania. This makes dry beans a strategic food for combating malnutrition. Yet, per capita consumption of dry beans in Tanzania is relatively low. However, the reasons for low beans consumption are not well established. This study provides empirical evidence on beans consumption and factors influencing beans choice in households' food purchasing decisions. The study used data collected by Legume Innovation Lab Project in Dar es Salaam in 2015 from random sample of 754 households. The study used both descriptive analysis and econometric models to analyze the data. Three major findings emerge from the study: First, poor households devoted large share of their income on beans consumption compared to rich households. Second, beans share was low among children below 5 years of age compared to adults among households with same income level. Third, age, household size, education level, self-employment and marital status had positive influence on beans consumption whereas household income and sex had negative influence on beans consumption in the households. The findings suggest that the efforts geared toward improving household food security and alleviating child malnutrition should place high priority on promoting consumption of beans among children below 5 years of age. Also, educational programs on the vital roles played by beans in consumers' diet should be organized in order to promote beans consumption at household level.

DECLARATION

I, Jackson Theodory Jaccob, do hereby declare to the Senate of Sokoine University of Agriculture that this dissertation is my own original work done within the period of registration and that it has neither been submitted nor being concurrently submitted in any other institution.

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(Supervisor)

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ACKNOWLEDGEMENTS

DEDICATION

This work is dedicated to the **ALMIGHTY GOD,** who makes me lie down in green pastures and leads me besides still waters. He leads me in paths of righteousness for his names' sake. Even though I walk through the valley of shadow of death, I feel no evil; for though art with me; thy rod and thy staff, they comfort me "***Psalms 23; 1-4***".

This work is also dedicated to my beloved mother Grace John (*Mama Msabila*) for her encouragement, support, prayers, sacrifice, love and inspiration provided to me during the whole period of studies. Thank you my mother for taking care of your beloved son and God bless you abundantly.

I am deeply grateful to my beloved wife, Theresia P. Kitungwa for her eagerness to take care of our family, moral support, indispensable prayers and innermost heart commitment to assist our beloved daughter Faith Jackson who was aged two months before I left her for my studies and she is now two years old with good health. It was real difficult but you made it happen, may the Almighty God bless and reward you abundantly.

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LIST OF ABBREVIATIONS AND SYMBOLS

BVCP	Bean Value Chain Project
CIAT	International Center for Tropical Agriculture
FAOSTAT	Food and Agriculture Organization Statistics
Kg/capita/year	Kilogram per person per year
LA-AIDS	Linear Approximate Almost Ideal Demand System
MLE	Maximum Likelihood Estimation
MMNL	Mixed Multinomial Logit
MNL	Multinomial Logit
NBS	National Bureau of Statistics
OLS	Ordinary Least Square
PIH	Permanent Income Hypothesis
PPP	Purchasing Power Parity
RUM	Random Utility Model
SSA	Sub Saharan Africa
UNESCO	United Nation Education, Scientific and Cultural Organization
UNICEF	United Nations Children's Fund
US $	United State dollar
VIF	Variance Inflation Factors
TZS	Tanzania Shillings

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background

In a field of applied micro-economics, the analysis of food consumption has been an important issue, especially in agricultural economics. Analysis of food consumption has attained special focus in recent years because of globalization and concern about food security (Ahmad *et al*., 2015). For the purpose of planning and monitoring policy impact on food security and nutrition in the households, an understanding of household food consumption and factors influencing change in it is necessity. Food consumption analysis help policy maker to identify appropriate policy interventions that improve nutritional status of individuals and households. It is also useful in designing food intervention strategies that must be pursued by the government and other stakeholders (Weliwita *et al*., 2003). In turn, this information feeds into sectorial policies such as household food security, nutritional and pricing policies.

Most of the recent health policies encourage people to consume a healthier diet: making a reduction in fatty, sugary and salty foods; eating more fibre-rich, fresh fruits, and vegetables. However, the situation is opposite in Tanzania as household food budget share is dominated by cereals; whereas the consumption of foods rich in proteins such as legumes, milk, meat, fish and eggs has been rare and low (Chongela *et al*., 2014); normally this leads into various health problems. For instance, Tanzania suffers from severe child malnutrition due to protein-energy deficiency (Weliwita *et al*., 2003). "Although there is relationship between higher national income and stunting, that link is not yet obvious for Tanzania; as stunting has remained high in spite of economic growth" (Kinabo, 2014). From figure 1, it can be observed that while Tanzania experiences

remarkable economic growth; insignificant growth has been recorded in reducing stunting rate.
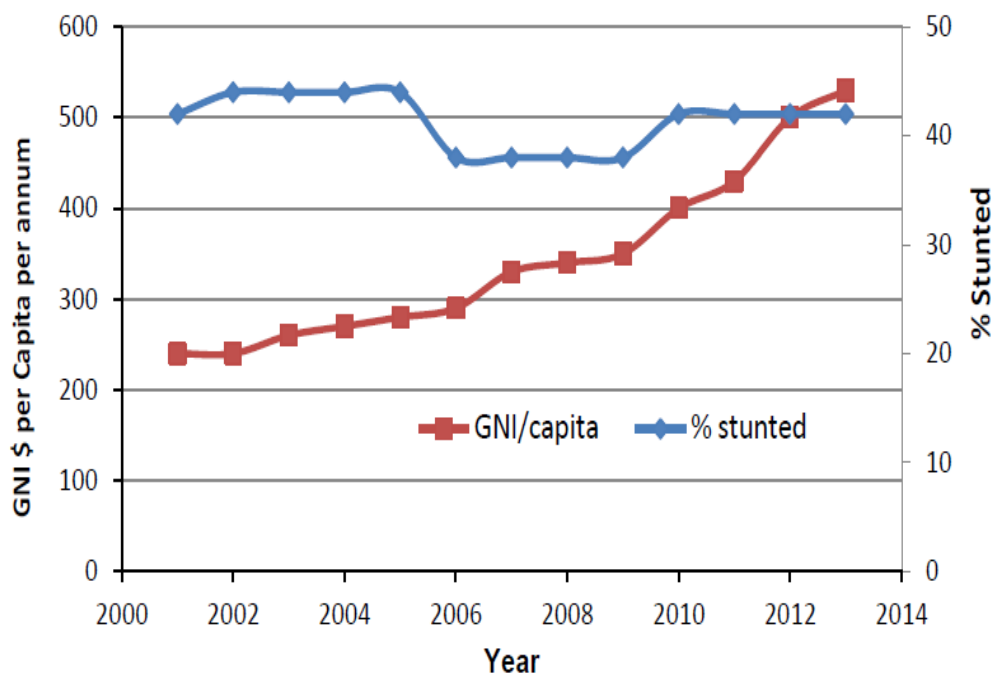
Figure 1: Gross national income and prevalence of stunting rate in Tanzania

Source: UNICEF State of the World's Children, 2013

Stunting among children below five years in *Tanzania* is reported to be 42% (NBS and IFC Macro, 2011); which is among the highest stunting rates in the world (Ilse de Jager, 2013). It has been further reported that "stunting rate in Tanzania has not been declining significantly; implying that the underlying causes of stunting have not been adequately addressed" (Kinabo, 2014). In addition, Tanzania is self-sufficiency in terms of food ratio over the past twelve years since 2000 (MoAFC, 2013); however, food surplus producing regions had high incidence of stunting (Figure 2).
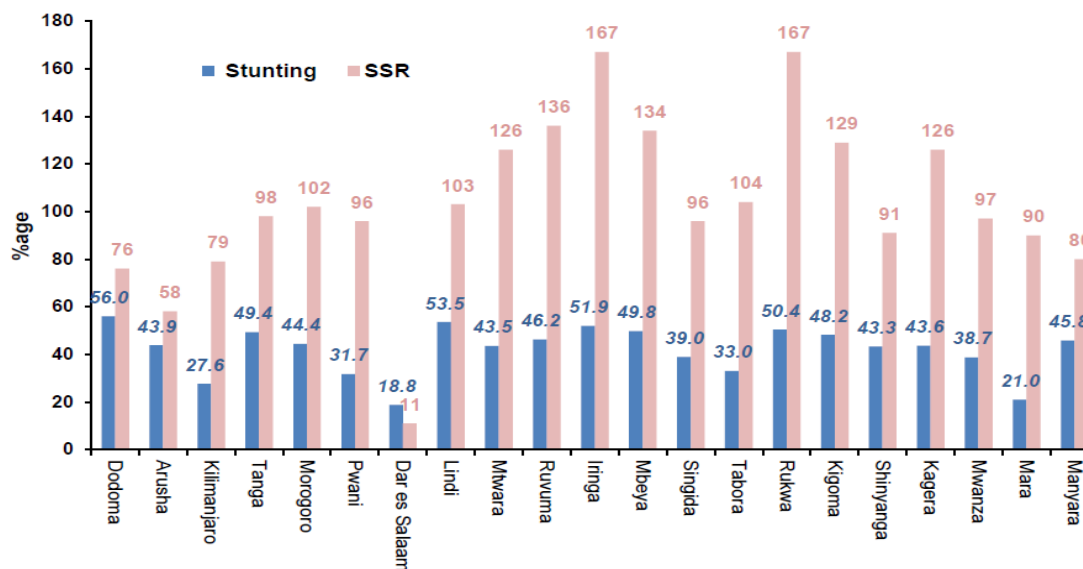
Figure 2: Prevalence of stunting and food self-sufficient (Maize) by regions

Source; *TDHS, 2011 (Stunting) and MAFC, 2010 based on 2009/2010 self-sufficient ratio (SSR) data*

From Figure 2, the regional variations in stunting rate exist whereby four regions; Dodoma, Lindi, Iringa and Rukwa regions experience peculiar stunting proportion exceeding 50%. A study by Semali *et al.* (2015), reported that high stunting rate in Dodoma is associated with young age of the mothers, young household heads, low education level and low income of household heads. All these factors lead into inadequate intake of foods rich in proteins, lack of child care, poor health care and sanitation resulting into high stunting rate. However, Dar es Salaam is exceptional as stunting proportion is lower than all regions. The plausible explanation is that, the purchasing power of population in Dar es Salaam is relative high compared to other regions. Hence, large portion of the population in Dar es Salaam can afford to purchase foods rich in protein for their home consumption.

The prevalence of stunting in Tanzania is mainly attributed to low purchasing power of food consumers. About 90% of Tanzanians live on less than purchasing power parity

(PPP) of US $1.25 per day (UNESCO, 2015). Since poor households do not produce adequate foods and do not realize enough income to buy extra food, a large portion of the population does not consume enough calories and proteins. As a result, about 15.7 millions' people are undernourished due to protein-energy deficiency (FAOSTAT, 2015). The problem of malnutrition in Tanzania can be linked to the system of food production, income distribution in an economy, decline in employment and rise in food price. These factors constrain poor households from consuming sufficient amount of foods rich in proteins. Although Tanzanian consumers obtain proteins on traditional foods which are suited to their social and ethnic backgrounds (Makweba, 2009; Chongela *et al*., 2014); traditional foods are not reliable sources of proteins. This is because they are scarce and their availability is seasonal and limited to a particular environment and location.

Limited availability and high price of animal based proteins such as meat, milk, fish, and eggs has caused dry beans to become the dominant source of protein for poor households (Margaret *et al*., 2014). It is estimated that over 75% of rural households in Tanzania depends on beans for their daily subsistence (Kalyebara, 2008). In terms of nutrition and food security, beans are good sources of dietary fibres, carbohydrates, unsaturated fats, vitamins and minerals (Mitchell *et al*., 2009; Margaret *et al*., 2014) and vital for bridging the food gap as they mature earlier than cereal crops such as maize which is a staple food in Tanzania (CIAT, (2012). Despite the health benefits of dry beans, production and consumption data revealed that domestic supply of dry beans in Tanzania outweighed their domestic demand in each year (Figure 3). In addition, empirical evidence from food expenditure studies indicates that consumption of beans in Tanzania is low (Weliwita *et al*., 2003; Kaliba, 2008; Chongela *et al*., 2014); for which the reasons are not clearly established.
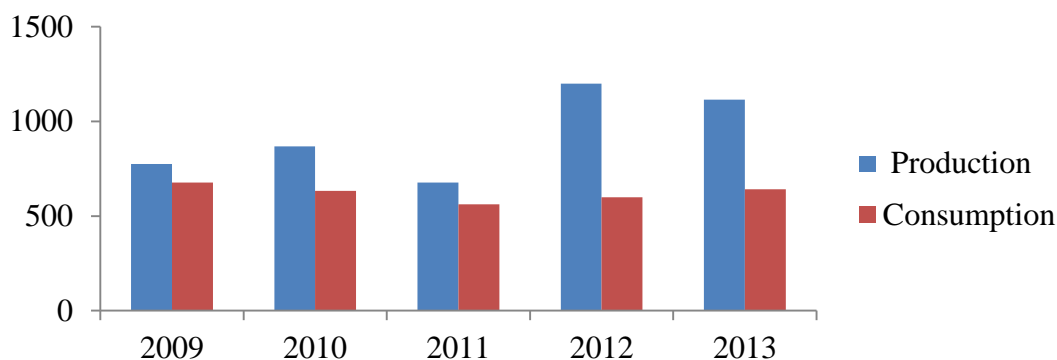
Figure 3: Production and domestic consumption of dry beans in Tanzania

Source: FAOSTAT, 2015 (the data are presented in 1000 tons)

Economically, poor households earn income when they sell surplus beans thereby boosting their abilities to meet other financial obligations such as purchasing other foods (Odendo *et al*., 2011). Hence, low consumption of beans reduces producers' income due to low beans sales. If this problem continues to persist for long time it becomes disincentive for increasing the scale of production. This is due to reason that one of the necessary conditions for bean producers to reap economic benefits from bean sector is provision of assured marketing outlets. In addition, low beans consumption will lead into increased households food insecurity and protein-energy deficiency among poor households. Given these situations, increasing beans consumption in consumers' diet is an important policy issue in the country.

1.2 Statement of Problem and Justification

Consumption of beans can benefit different categories of consumers including young, adults, men and women as well as rich and poor households. The evidence show that in some countries with low per capita income in East and Central Africa such as Burundi, Kenya, Uganda and Rwanda has high per capita consumption of dry beans (Blair *et al*.,

2010; Sibiko, 2012), ranging from 31 kg to 66 kg/year (CGIAR, 2012; Ugen *et al*., 2012), equivalent to 180g/capita/day. This is in contrast to the per capita consumption of beans in Tanzania in 2012 which was 7.62g/year (FAOSTAT, 2015). In general, per capita consumption of dry beans in Tanzania has been lower than the recommended level by FAO of 30g/day/person (Leterme, 2002 as cited by Mfikwa and Kilima, 2014). This implies that the consumption potential of dry beans in Tanzania has not yet been reached; creating opportunity for increasing their consumption at household level.

However, studies that document on beans consumption in Tanzania are limited. For instance Kalyebara, (2008), denoted on the impact of improved beans technologies on livelihood of rural farm households in the northern Tanzania. Also, a study of Mishili *et al*. (2009) assessed the impact of bean attributes on consumers' preference in Dar es Salaam and Morogoro regions. Furthermore, a study of Shenkalwa *et al*. (2013) documented on the cooked beans attributes that contributed to acceptability of beans by consumers in Kigoma region. Currently, there is no study that examined either dry beans consumption among different categories of consumers or factors influencing choice of beans in food purchasing decisions.

To fill the knowledge gap, this study examined dry beans consumption and factors influencing choice of dry beans in consumers' food purchasing decisions. The results from this study provide answers to questions "why" and "where" within consumers' categories the consumption of beans is low. The empirical evidence from this study will inform policy makers on the appropriate policy interventions that promote consumption of beans in the country.

1.3   Objectives of the Study

1.3.1 Overall objective

The overall objective of the study was to examine consumption of dry beans and factors influencing consumer's choice of dry beans in Dar es Salaam, Tanzania.

1.3.2 Specific Objectives of the Study

Specific objectives of the study include;

i.   To identify factors influencing choice of beans in consumers' food purchasing decisions.

ii.   To examine consumption of beans across different consumers' categories.

1.4 Hypotheses of the Study

Based on the study objectives, the following hypotheses were tested;

i.   Socio-demographic factors do not influence choice of beans in consumers' food purchasing decisions.

ii.   Beans consumption does not vary across different consumers' categories.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Review of Literature on Dry Beans Consumption in Sub-Saharan Africa

Studies on beans have acknowledged the importance of consumer preferences and the role it plays in bean value chain and in consumers' diet especially in improving food security and as a source of income to the poor households. For instance, Magreta and Jambo (2012) denoted that production costs and consumer demand are the most critical factors affecting pricing of a bean product in Malawi. Also, study revealed that colour of beans grains in the market is ranked highly as important characteristic that consumer sought. This is because grain colour affects its desirability by different consumers. For instance, dark red bean in Southern Malawi is preferred because it is believed to increase red blood cell levels in the body.

Sichilima *et al.* (2016) analyzed the drivers of common bean trade in Lusaka, Zambia by employing hedonic price analysis. The findings revealed that medium sized grain was important characteristic which significantly affected pricing of common beans. It was further revealed that yellow and white colour significantly affected price of beans received by traders. Other factors which significantly affected pricing of bean include age of trader, being retail trader and location of market. They suggested that breeders need to include bean traders and consumers as important actors whose knowledge can make resourceful impact in varietal development.

Akibode and Maredia (2011), assessed the global and regional trends in production, trade and consumption of food legumes. The study documented that bean is an ideal legume crop for simultaneously achieving three developmental goals in the targeted population;

reducing poverty, improving human health and nutrition, and enhancing ecosystem resilience. Also, Katungi *et al*. (2011), assessed the relative importance of common bean attributes and variety demand in drought areas of Kenya. The research findings revealed that varietal adaptation to environmental stresses should strive to reduce cooking time and enhancing quality of beans for better benefits of the poor.

Birachi *et al.* (2011) used Cobb Douglass model to analyze factors influencing smallholder farmers' bean production and supply to market in Burundi. The results revealed that levels of production and losses due to transport problems are the major constraints that affected the quantities of bean marketed by farmers. They suggested that, an increase in the quantity of bean produced and reduction in transport losses will increase the marketed quantities by 30 % and 12 % respectively. However, an increase in quantity of bean stored for food will decrease the marketed bean by about 19 %. This implies that storage of beans may not be targeted at the market but for food security purposes.

2.2   Review of Literature on Dry Beans Consumption in Tanzania

In Tanzania there are few studies that examined on beans consumption. For instance, a study of Kalyebara (2008) denoted on impact of improved bean technologies on livelihood of rural farm households in northern Tanzania. The results revealed that household food security and income was strengthened as a result of households having more dry beans output available for consumption and more income from bean sales.

Some studies in Tanzania denoted on bean attributes that are preferred by consumers. Mishili *et al*. (2009) assessed the impact of bean attributes on consumers' preference in Morogoro and Dar es Salaam regions by using hedonic price analysis. The study revealed that grains attributes such as grain colour, grain size and amount of grains damage

contributed to the discounting rate that traders received for their beans in the market. The results also revealed that, larger grains were preferred than small bean grains. Shenkalwa *et al*. (2014) documented on cooking time, flavour, smell, soup appearance, colour and textures of cooked beans as the contributing factors on acceptability of beans by consumers in Kigoma region.

Venance *et al*. (2016), used gross margin and the multiple regression analysis to analyze factors influencing on-farm profitability of bean farmers in Babati District in Tanzania. The results revealed that at farm level, gross margin for local and improved bean variety was TZS 133 710.20/= (US\$ 63.67) and TZS 307 283.70/= (US\$ 146.33) respectively. Hence, they concluded that dry beans are profitable and they play important roles in poverty reduction and enhancing food security in the households.

2.3 Literatures on Factors Influencing Consumers' Food Choices

Humans are faced with several food choices each day and make decisions on what food(s) to eat (Sobal *et al*., 2006). Food choice is a complex human behaviour that is determined by many interrelated factors. Shepherd (2005) divided these factors into three groups; first, food related factors including the sensory characteristics, product variety, nutrient contents, quality and quantity, second, consumer related factors including personality, social psychological factors and physiological factors, third; environmental related factors such as economic, cultural and social issues. However, Sharot *et al*. (2009) indicated that food preferences are mainly influenced by socio-demographic factors of individual. It is further reported that consumers' preferences and tastes affect consumers' food purchase decision (Sichilima *et al*., 2016).

Households' income influences food choices via availability of resources to purchase higher quality foods. It is expected that any changes in food costs and/or income will change the quantity and types of food products within consumer's basket (Mitchell *et al*., 2009). Consequently, low-income earners tend to consume own produced food and purchase cheap food. In relation to beans, consumption has been reported to be higher among low than high-income earners (Labadarios *et al*., 2011). Hence, it is expected that consumers with low income will prefer beans to more expensive sources of proteins.

Education level of households' head influences food choice via increasing awareness of nutritious alternatives. Mitchell *et al*. (2009) reported positive relationship between consumption of beans and education level of main decision makers. Also, household size has been found to be an important factor in explaining variation in household food consumption. Larger households require more foods than smaller households (Rehman *et al*., 2014). Hence, it is expected that households with large family are more likely to consume beans than those with small family due to economies of scale effect in large household. This is because larger households receive discounts as their quantity demanded is relatively high as compared to smaller households.

Food choice can also be influenced by age and sex of household heads. Literature suggests that adults consume more legumes compared to children (Lucier *et al*., 2000 as cited by Mfikwa and Kilima, 2014). Also, the purchasing decisions of food vary between males and females. In general, males tend to consume more dry beans than female due to their larger caloric intake requirement (Labadarios *et al*., 2011). It is expected that being female household heads decreases the probability of purchasing beans over other food items. Also, consumption of beans is particularly high when decision maker is married

(Folayan and Bifarin, 2013). It is expected that being married household head increases the probability of choosing beans over other food groups. This is because married ones are not constrained by time for preparing beans at their homes compared to single household heads.

2.4 Literature on Analysis of Consumers' Food Choice

Consumers are assumed to make rational food choice. They allocate their scarce financial resources among food items to maximize utility. The assumption of rational behaviour leads into discrete choice (Louviere *et al*., 2008). That is, consumer is expected to choose an alternative with the greatest level of utility from a finite set of alternatives. The choice is made based on probabilistic theory or choice probabilities to create random utility model (RUM). The RUM can be associated with theory of consumer proposed by Lancaster (1966). Based on assumption of rational behaviour of consumers, discrete choice models are used to analyse non-continuous dependent variables (Green, 2012). This is because in food choice independent variables can either be dichotomous, nominal, or ordinal.

In terms of application, RUM model could be specified as a logit model. The original form of logit model stems from Luce, (1959) and theoretical expression of its choice probabilities is derived from random utility maximization framework (Kropko, 2008; Train, 2003). When the RUM involves two alternatives of the product in a choice set, logit model can be used for analysis of the consumer food choice. But, when RUM is extended to more than two choices or product alternatives, other complex discrete choice model can be applied. Some of the complex discrete choice models include multinomial logit (Yayar, 2012), mixed logit (Hensher and Green, 2011), trivariate logit (Iyer and Seetharaman,

2008), multivariate logit (Yang, 2015), bivariate multinomial probit (Erdem and Sun, 2002), multivariate probit (Duvvuri *et al*., 2007) and conjoint analysis (Adekunle, 2015).

Among all discrete choice models, multinomial logit (MNL) model is regarded as the base model for modelling choices behaviour as it is simple when compared to other discrete models (Hensher *et al*., 2005). This is because it assumes an Independence of Irrelevant Alternatives (IAA), that is, ratio of choosing one alternative over another is unaffected by the presence or absence of additional alternative in choice set. MNL has been widely applied in Agricultural economics studies to analyse household food choice behaviour (Boniface and Umberger, 2012; Kohansal and Firoozzare, 2013; Yayar, 2012).

2.5 Literature on Analysis of Food Consumption

Different models can be applied to analyse food consumption in the household. For instance, some studies employed log-log model (Ahmad *et al*., 2015; Dawoud, 2014); other adopted Cobb-Douglass model (Oguoma *et al*., 2010) which was linearized into log-log model. These models can be used to estimate expenditure elasticity because it can easily be obtained directly from estimated equation as coefficients of parameters. However, when using this model it is important to assume that for every commodity all households face the same prices and each individual faces same utility function. Other adopted Permanent Income Hypothesis (PIH) (Aguiar and Hurst, 2005). In the light of the PIH, it is often argued that expenditures reflect not only what a household is able to purchase based on its current income, but also whether that household can access credit markets or household savings at times when the current incomes are low. Hence, expenditure is thought to provide a better picture of a household's long run standard of living than a measure of current income.

Some employed double-Hurdle model (Mfikwa and Kilima, 2014), the model which allows consumers to make participation and consumption decisions independently. The two decisions are separated due to the fact that participation decisions might be influenced

by factors other than those captured in consumption decisions. The first-hurdle differentiates between users and non-users where zero values are assigned for non-users only. However, might be zero values in second hurdle and these values may be result of abstinence, misreporting and infrequency of purchases (Yen, 2005).

Other studies used Linear Approximate Almost Ideal Demand System (LA-AIDS) models (Chongela *et al*., 2014). The LA-AIDS model is an analogy of Heckman two steps model to control for self-selection bias due to zero consumption. Although LA-AIDS do allow flexibility in price responses, they have expenditure share that are linear in logarithm of total expenditure (Banks *et al*., 1997). Some studies used quadratic Engle curve which is non-linear budget share function form. For instance, Meng *et al*., (2013) employed quintile regression approach to analyze the determinants of entire distribution of food expenditure and quantify their effects among Ghana's household subgroups. The results revealed that household income and education had positive effect on weekly food expenditure at any quintile.

2.6 Summary of the Reviewed Literature

The above literatures summarized researches which have been conducted in Africa, particularly in Sub Saharan Africa (SSA). These literatures highlighted key factors affecting food consumption behaviour in the households. It is evidenced that different models can be adopted in analysing food consumption and factors influencing food choice in the household. This study used multinomial logit model to analyze factors influencing choice of beans in consumers' food purchasing decisions. This is because food items are assumed to be independent and identically distributed and they are not ranked (Greene, 2012). The study also used quadratic Engel curve through application of quintile regression approach to analyze beans consumption. Quintile regression was used because

it was assumed that socio-demographic factors have different effects along various quintiles of foods' expenditure.

CHAPTER THREE

3.0 RESEARCH METHODOLOGY

3.1 Conceptual Framework of the Study

The conceptual framework presented in figure 4 is based on the premise that individuals are faced with several food choices each day and make decision on what food to eat. The purchasing decision on food is influenced by individuals' perceptions and attitudes towards a particular food product which ultimately influence individuals' food choice. Food choice can be determined by interaction between food related factors, consumer related factors and environmental related factors (Shepherd, 2005). The conceptual framework was derived and illustrated to show interaction between the factors which influence individuals' food choices.

Food factors
Sensory characteristics, product variety, quality and quantity, nutrients contents

Demographic factors Household size and composition, marital status, age, sex

Perception and attitude to: sensory properties, health, nutrition, price and value

Socio-economic factors; Income, price of food and accessibility of food, education level and employment status

Households' bean choice

Figure 4: Conceptual framework for the study

The interaction between these factors are mediated by individuals' perceptions and attitudes to sensory properties, health, nutrition, price and value which affect the purchasing decisions of individual and ultimately influence food choices. The "interaction" can be between individual and food related factors such as sensory

characteristics, product variety, nutrient contents, quality and quantity. Also the interaction can be between individual and socio-economic factors such as income, price of food, food accessibility, education level and employment status. Finally, the interaction can be between individual and demographic factors such as marital status, age and sex of household heads, size and compositions of the households.

Based on the consumer theory, household's characteristics influence consumers' preference and attitude toward food. Hence, influences consumers' eating habits and trends towards food and affects households' purchasing decisions on a particular food product which in turn influences households' food choice. Food choice behaviour predicts type of food consumed by individual in a household which in turn are closely associated with dietary nutrient intake.

This study examined consumption of dry beans and factors influencing dry beans choice in consumers' food purchasing decisions. In this study, socio-demographic factors hypothesized to influence household consumption of dry beans included income, age, sex, education level, marital and employment status of household heads as well as households' size and household compositions. It was assumed that household head is the main decision maker; hence influenced dry beans choice in the households' food purchase decisions.

3.2 Theoretical Framework of the Study

3.2.1 Food Choice Behaviour

This study is underlying the framework proposed by neo-classical consumer theory. That is, consumers typically purchase attributes which are embodied in goods, rather than purchasing goods for their own sake (Lancaster, 1966). This argument suggests that good are not direct objects of utility, but it is from their attributes that consumers derive utility.

It is assumed that an individual makes choice of a particular food that maximizes utility. In line with consumer theory, this study assumes that individuals make decisions to purchase food item(s) after careful consideration and choose the best from available set of food items. Consequently, some consumers may make decisions to purchase dry beans while others may not.

A theoretical basis in understanding consumers' behaviour with regard to food choice is provided by Random Utility Model (RUM). Following Louviere (2008) the RUM specifies that utility of each food item is a linear function of observed characteristics of a particular product plus the error term which can be written as;

$$U_{ij} = V_{ij} + \varepsilon_{ij} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (1)$$

Where; V represents systematic component observed by researchers, ε_{ij} represents part of utility that is not captured by model. The probability, P_{ij} that an individual i selects food item j is equals to probability that U_{ij} is larger than utilities U_{ik} for all other food items in choice set, which can be given as;

$$P_{ij} = \Pr(U_{ij} > U_{ik}) = \Pr(V_{ij} + \varepsilon_{ij} > V_{ik} + \varepsilon_{ik}) \ \forall \ k \ \neq j) \dots\dots\dots\dots\dots (2)$$

From equation (2) various discrete choice models can be derived. The model derived however depends on how the error component of utility is assumed to be distributed (Dow and Endersby, 2004). Since, this study applied multinomial logit (MNL) model to analyse factors influencing beans choice in consumers' food purchasing decisions; the random component of utility was assumed to be independent and identically distributed (Greene, 2012).

3.2.2 Analysis of Consumers' Food Purchasing Decisions

In order to describe MNL model, let y denote a random variable taking on the values (1, 2. . . J) for J as positive integer, and let X denote a set of conditioning variables. In this study, y denotes food items including dry beans, cereals, fish/sea foods, fruits/ vegetables, roots

and tubers, animal products or other foods (oils and salts). However, consumers are rarely concerned about nutritional contents of food they consume (Banterle *et al*., 2013). Hence, during analysis it was reasonable to assume that dry beans, animal products, fish/sea foods and vegetables/fruits are eaten together with cereals or roots and tubers hence they are likely to be substitutes. Following Green, (2012), the probability that an individual *i* choose an alternative *j* can be expressed as;

$$\Pr(y_i = j/X_i) = P_{ij} = \frac{\exp(X_i\prime\beta_j)}{\sum_{j=0}^{J}\exp(X_i\prime\beta_k)} = \quad j = 0,1, \dots \dots J \dots\dots\dots\dots\dots\dots\dots (3)$$

The model (3) is normalized by assuming $\beta_0 = 0$ (base category) then MNL can be expressed as;

$$\Pr(y_i = j/X_i) = P_{ij} = \frac{\exp(X_i\prime\beta_j)}{1+\sum_{j=1}^{4}\exp(X_i\prime\beta_k)} = \alpha_i + X\prime_i\beta_j \quad j = 1, \dots 4 \quad \beta_0 = 0 \dots (4)$$

Where; $\Pr(y_i = j/X_i)$ is the probability of choosing food item; fish/sea foods (1), vegetables/fruits (2), animal products (3) or other foods (4) with reference to dry beans (0), X_i is a vector of independent variables, α_i and β_j is a vector of estimated parameters. Parameters in a model (4) were estimated by comparing each food item with beans as reference food category. Then, an empirical model (4) was specified as:

$$ConsP_i = \beta_0 + \beta_1\text{AGE} + \beta_2\text{SEX} + \beta_3Edu + \beta_4MS + \beta_5HS + \beta_6HC + \beta_7IN +$$

$$\beta_8EMP + \varepsilon_{ij}\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots(5)$$

Where; dependent variable $ConsP_i$ is equal to $\Pr(y_i = j/X_i) = P_{ij}$ = probability of choosing food item with reference to dry beans. The factors that assumed to influence households' food choices include; age (AGE), sex (SEX), education (EDU), marital status (MS), household size (HS), household income (INC) and employment status (EMP). The coefficient estimates for β_j vectors that maximize log likelihood function in a specified model (5) were estimated by using STATA software through maximum likelihood

Estimation (MLE). This is due to its ability to provide efficient, unbiased and consistent estimators (Wooldridge, 2003).

Based on literature reviewed, the following are prior expectations of explanatory variables used in this study. It is expected that household income influences choice of dry beans negatively. As income increases, the probability of preferring dry beans to animal based proteins decreases since low-income earners tend to purchase cheap foods. Education level of household head is expected to influence dry beans choice positively since education increases awareness of nutritious alternatives. It was also expected that households with large families are more likely to purchase dry beans compared to households with small families due to economies of size effect. That is, within large household dry beans can be shared and the same serve their function without need to be replicated in relation to the number of individuals in the household.

Also, some literature documented positive relationship between age of household head and consumption of beans (Mfikwa and Kilima, 2014). Other documented that males consume more beans than female due to their larger caloric intake requirement (Labadarios *et al*., 2011). Therefore, it is expected that consumption of beans is low if decision maker is female and high if the decision maker is male. Moreover, it is expected that being a married household head increases probability of household head to purchase dry beans over the other food items; because single household heads are constrained by time for preparing dry beans at their homes. Employment status also determine household income, hence, it is expected that employed household heads are less likely to choose dry beans over the other food items compared to unemployed household heads.

3.2.3 Analysis of Food Consumption

Expenditure on food commodities is important in the household behaviour; as food is the basic nutritional ingredient for every human being (Ahmad *et al*., 2015). Based on classical consumer demand theory, household chooses its optimal food bundle to maximize its utility within budget constraints. The optimal household food bundle is determined by factors such as price, household income, and household preferences. Assuming that food prices are stable within the period of data collection, household preferences are hypothesized to influence household expenditure towards dry beans. Households' preference can determine the specific form of utility function and shape of indifference curve which in turn affects consumption of food (Meng *et al*., 2013). However, households' food preference is captured by socio-demographic factors including income, age, sex, education level, marital status and employment status of household heads, household size and household compositions.

In economic theory, relationship between the quantity purchased and income level is interpreted by income consumption curves (Engel curve). The curve that shows the influence of changes in consumer income on the quantity demanded. German statistician, Ernst Engel had established this relationship in the 19th century; since then household expenditure behaviour can be analyzed through Engel curve (Sadoulet and Janvry, 1995). Hence, the Engel curve has been an important tool in understanding the dynamics of households' welfare (Kedir and Girma, 2007).

In estimation of Engel curve, it is important to specify function form for proper policy implication. Many studies employed Working-Leser model in which the budget shares are assumed to be linear functions of log total expenditure and the food share curve is monotonic in the total expenditure (Kedir and Girma, 2007; Deaton and Muellbauer, 1980;

Leser, 1963). However, Bank *et al*. (1997), showed that if analysis involves many commodities there is increasing evidence that the Working-Leser in the linear form does not provide an accurate picture of the individual behaviour. Hence, Bank *et al*. (1997), proposed nonlinear Engel curve (Quadratic Engel curve) which found to be more flexible than the linear Working-Leser specification. The model found to be appropriate for developing country due to problems of measurement error (Kedir and Girma, 2007). Therefore, this study applied nonlinear Engel curve (Quadratic Engel curve) to analyze consumption of dry beans across different consumers' categories.

3.3 Data Source

The study used data collected by Bean Value Chain Network during a survey that was conducted in 2015 in Dar es Salaam. The objectives of the survey were; first, to understanding the role of beans in consumers' diet; second, to develop better understanding of how people make food choices. Dar es Salaam was selected for the survey because is the major food consumption centre with diverse ethnic groups, high urban population in Tanzania and wide range of income earners.

The data were collected based on monthly food expenditure whereby structured questionnaires (Appendix 1) were used to collect data from a random sample of 754 households. The questionnaire was designed to collect information on; (a) socio-demographic factors including household expenditure, household size, household composition, age, sex, education, marital status and employment status of household head, (b) consumers' purchasing frequency and beans consumption patterns and (c) factors which influence consumption of dry beans.

3.4 Specification of the Empirical Model

The empirical model that was used to examine the consumption of dry beans across different consumers' categories was given as;

$$w_j = \alpha + \alpha_1 * logY + \alpha_2 * logY^2 + \beta_1 Age + \beta_2 Sex + \beta_3 ED + \beta_4 MS + \beta_5 HS +$$

$$\beta_6 HC + \beta_7 EMP + \varepsilon_{ij} \text{ .... (8)}$$

Related to this model, consumers' categories which hypothesized to affect dry beans consumption were age (AGE), sex (SEX), education (EDU), Marital Status (MS), household size (HS), household composition (HC), income (INC) and employment status(EMP) of household head. Selection of independent variables was based on the consumer theory and the empirical findings from the previous consumers' studies.

3.5 Data Analysis Procedure for Dry Beans Consumption

The budget share Engel curves was used to estimate beans consumption across different consumers' categories. Budget share Engel curves depicts how the share of household expenditures on specific goods or service changes with variation in income (Chai and Moneta, 2010). The Engel curves takes many forms and exact specification to be used in this study is non linear Engel curve known as quadratic Engel curves, which is expressed as;

$$w_j = \alpha + \alpha_1 * logY + \alpha_2 * logY^2 + X' * \beta_i + \varepsilon_j \text{ ....(6)}$$

Where; w_j is the budget share for commodity j; Y, is monthly total expenditures; X' is a vector of consumers' categories includes income, age, education level, sex, marital status and status of employment of household heads as well as household size and household composition, α and β_i are parameters of model and ε_j is the error term. The share of monthly household food expenditure was computed as;

$$w_j = p_j q_j / Y \text{ ....(7)}$$

Where; q_j is the quantity of food purchased and p_j is its corresponding prices

In estimation of the budget share Engel curve, monthly households' beans share was computed and the budget shares obtained was used as dependent variable. Analysis was conducted using STATA software through application of quintile regressions. This study does not enforce assumption that consumers' categories have exactly the same effect on every point of households' beans expenditure distribution. For this reason, an ordinary least square (OLS) may be of limited value in capturing food distribution hence quintile regression approach is preferred (Meng *et al.*, 2013).

Quintile regressions were applied at 5th, 25th, 50th, and 75th quintile to examine the impact of consumers' categories on dry beans consumption. The parameter for each factor which assumed to influence beans consumption was obtained and the marginal effect for each factor was computed from estimated parameters. The marginal effect indicates the change in budget share devoted on beans per month due to slight change in one of the consumers' category holding other consumers' categories fixed.

CHAPTER FOUR

4.0 RESULTS AND DISCUSSIONS

4.1 An Overview

This chapter presents and discusses results of the analysis of beans consumption in the study area. Specifically, the results presented rely on the information obtained from the sample households in Dar es Salaam and examined by using descriptive statistics and econometric models. A sample size of 747 households was used during data analysis instead of the collected sample of 754 households. Seven households were dropped since were missing monthly household food expenditure values. Thus, inclusion of these samples would result into computation errors during analysis and inconsistencies of the results. The remainder of the sub-sections discusses the results from descriptive statistics analysis. Finally, the section winds-up with the discussions of the empirical findings from Multinomial logit and Quintile regression analysis.

4.2 Households Food Expenditure Shares per Month

The findings show that households' food budget in Dar es Salaam was dominated by cereals which occupied the largest share of food expenditure of 32% per month whereas the budget share for dry beans was 11% (Figure 5). It is evident that beans are given little priority in consumers' food purchasing decisions in urban areas of Tanzania as a result their consumption in households is low.

bean -11%

fish/sea food-16%

vegetable and fruit-11%

cereal-32%

root and tuber-6%

animal products-14%

other food-10%
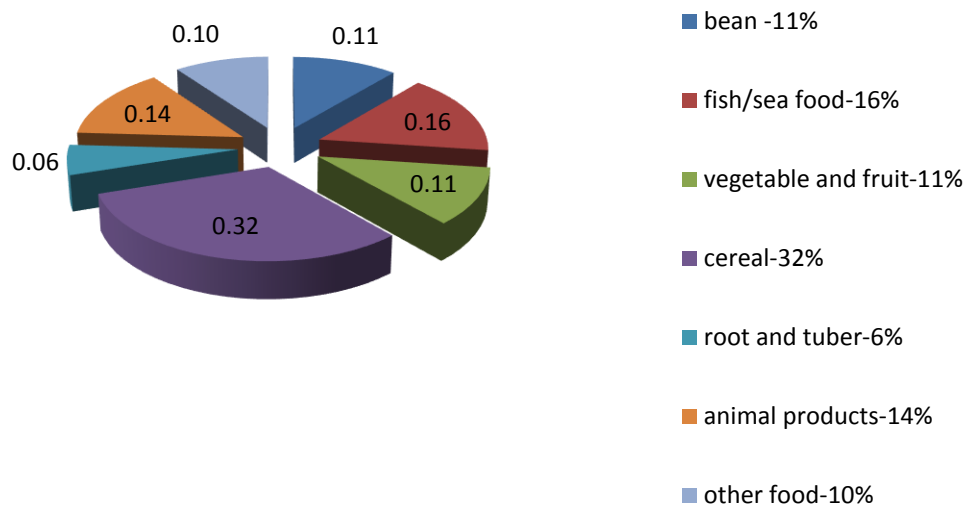
Figure 5: Households food expenditure shares per month

4.3 Share of household Beans Consumption in Dar es Salaam

Household consumption expenditures were divided into four quartiles; the first quartile Q1, second quartile Q2, third quartile Q3, and fourth quartile Q4 which were equivalent to 150 000TZS, 210 000 TZS, 300 000 TZS and 500 000 TZS respectively. Figure 6 shows the relationship between monthly household beans share and household wealth (Quintile) which differs significantly at 5% level across quintile. The findings suggest that the share of dry beans decreased as the household income increases. For instance, the poorest quintile Q1 spent about 0.13 whereas the richest households Q5 spent about 0.08 of their monthly total food budget on purchasing dry beans. Thus, level of household income determines proportional share of dry beans to consume.
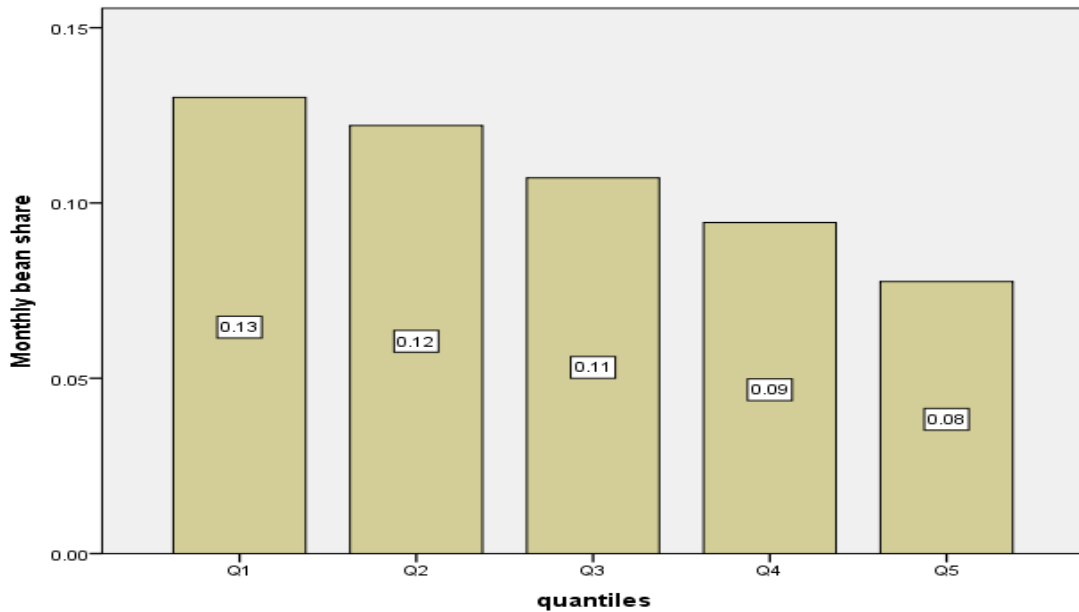
Figure 6: Monthly share of household dry beans consumption

4.4 Frequency of household Dry Beans Consumption by Wealth Quintile

Figure 7 shows frequency of household beans consumption by household wealth (quintile) at significant level of 5% across quintiles. The results revealed that frequency of dry beans consumption per month was lower among poor quintile (Q1) at 19.8% compared to Q2 at 30.8%. This stresses that medium income household consume more beans than low income household. In other words income constrains poor households from consuming more beans. However, the consumption frequency of beans reaches maximum for households belonging to the second quintile Q2 and then decreases as the wealth of household increases. This implies that consumption of beans is low among high income households since rich households are able to purchase other alternative sources of protein.
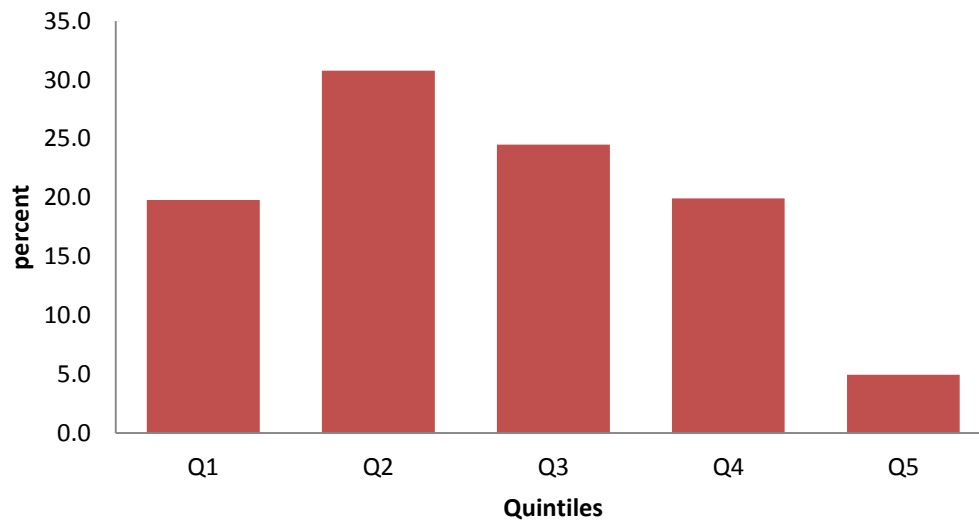
Figure 7: Monthly household bean consumption in Dar es Salaam

4.5   Socio-demographic Characteristics

Socio-demographic characteristics hypothesized to influence beans consumption includes; age, sex, education level, marital status, income and Employment status of household head as well as size and household composition of the household. The descriptive statistics for the Socio-demographic characteristics are presented in Table 1 and Table 2. From Table 1, it can be observed that majority of sample household heads had less than 45 years. Similar results were found in a study by Mfikwa and Kilima, (2014) that majority of respondents were young with age less than 45 years. A plausible explanation concerning this statistics is that majority of the population in Dar es Salaam consists of young persons (NBS, 2013). Therefore, there is high possibility of having more young persons in the sample since households were randomly selected from the population.

Apart from age, household size is meant to capture the nature of household composition in relation to food expenditures (Babalola and Isitor, 2014). The findings suggest that majority of the respondents had household size with less or equal to 4 persons whereas household with more than 4 persons were few. A plausible explanation concerning this

statistic is that household size in Dar es Salaam is 4.0 persons per household (NBS, 2013). In terms of education level, the results in Table1 show that about 91.6% had attended formal education and 8.4% did not attend formal education. These statistics are consistent with that found by Mfikwa and Kilima (2014) that majority of the respondents had attained formal school. The fact that most of the respondents had attended formal school, partly implies that majority of the sample household heads had adequate knowledge for making rational decisions during food purchasing in the households.

Based on the results from Table 1, it is clear that majority of the respondents fell in medium income category while few respondents fell in high income category. This result indicates that 31.2% of respondents were classified as low income categories (earned income less than 150 000 TZS per month). About 64.8 % of samples were classified as medium income categories (earned monthly income between 150 000 TZS and 500 000 TZS). About 4.0% of sampled household was classified as high income category (earned more than 500 000 TZS per month). Under *ceteris paribus* conditions, these results suggest that households in the study area were in a better position to allocate their scarce financial resources to maximize their utility during food purchasing decisions.

Table 1: Age, Household size, Education and Income of household heads

Variable	Age (Year)		Household size (Number)		Education (Year)		Income (TZS) (x 1000)		
	≤ 44	> 44	≤ 4 person	> 4 person	none	Formal	Low (<150)	Medium (150 - 500)	High (>500)
Frequency	579	168	403	344	63	684	233	484	30
Percent	77.5	22.5	53.9	46.1	8.4	91.6	31.2	64.8	4.0

Source: Research Findings (*Classification of income was based on Quartiles classification*)

Table 2 shows that majority (87.4%) of the respondents were female. Similar result was reported by Kohansal and Firoozzare (2013) when analyzing the major factors affecting

choice of consumers in food purchasing that female constituted large part of the sample. By having large number of female in our sample could provide a good overview of food purchasing decisions in the household. The results in Table 2, further shows that majority of respondents were married/ cohabited. Moreover, about 35.9% of respondents were unemployed (students), 47.2% were self-employed and 16.9% worked in government or civil department. The results suggest that majority of the respondents were self-employed. This might be due to fact that Dar es Salaam is a major business city which has many investment opportunities. As a result, many people are encouraged to engage more in the entrepreneurship instead of being permanently employed.

Table 2: Sex, marital and Employment status of household heads

Variable	Sex		Marital status			Employment status		
	Male	Female	Single	Married	Divorced	None	Self	Salaried
Frequency	94	653	127	527	93	268	353	126
Percent	12.6	87.4	17	70.5	12.5	35.9	47.2	16.9

Source: Research Findings

4.6 Multinomial Logit Results on Factors Influencing Beans Choice

4.6.1 Test for multicolliniarity and autocorrelation problems

The data were tested for multicolliniarity and autocorrelation using variance inflation factor (VIF) and Durbin Watson test respectively (appendix 2). The VIF for all independent variables were less than 10, indicating that, multicolliniarity was not a serious problem in the model. Similarly, the value of Durbin-Watson (D-W) test was less than 2.5 confirmed the absence of autocorrelation.

4.6.2 Marginal effect results for MNL model

The marginal effects for independent variable were computed and reported in Table 3. In all cases estimated coefficients should be compared with dry beans as reference category.

The results in the table clearly show that age, household size (HS), education level (EDU), marital status (MS), income (INC) and employment status (EMP) of household heads were statistically significant and the predicted probability of consuming food items in the households. For instance, coefficients of respondent's age had positive sign and were statistically significant as it was expected. The results suggest that as age of household head increased by one year, the probability of selecting dry beans over other food items increased by 3.54%, 3.18% and 7.35% for the household heads aged between 25-45 years, 45-65 years and above 65 years respectively. A plausible explanation for the results is that old household heads tend to have lower purchasing power since most of them are retirees, *ceteris paribus*. This factor may force them to opt for cheaper source of protein. Another, possible explanation for these results is that as person become old household size increases, *ceteris paribus*. Hence, old household heads tend to opt for cheaper source of protein such as beans compared to animal based proteins such as meat, fish and milk.

As expected, the coefficient of household size for particular type of food items is in agreement with the hypothesized *a priori* sign. The results in table 3 indicate that as household size increased, the probability of household heads to choose beans over other food items increased by 3.38%, while the probability of choosing fish/sea foods, animal products and other food over beans decreased by 1.06%, 13.36% and 12.31% respectively. This suggests that large households are more likely to rely on cheaper sources of proteins such as beans than small households. This is because beans can be shared within large household and the same serve their function without needing to be replicated in relation to the number of individuals within households. Therefore, larger households receive discounts as their quantity demanded is relatively high than smaller households. This finding supports the finding of Kohansal and Firoozzare (2013) that during food

purchasing decisions crowded households are more interested in price of foods than small households.

Likewise, increase in one year of schooling for the household head increases the probability of choosing beans over fish/sea foods, fruits/vegetable and other foods by 0.01%, 0.09% and 3.73% respectively whereas the probability of choosing animal product over beans increased by 1.99%. A plausible explanation of these findings is that as household heads attain high education level; knowledge for making rational decisions during food purchasing is enhanced. Hence, educated household heads are more likely to anticipate nutrition value of dry beans during food purchasing decisions. This finding is positive considering several researchers emphasize on the vital roles of beans in sustaining health and reducing risk of critical health problems (Heller, 2011; Ilse de Jager, 2013).

Being a married household head decreases the probability of choosing dry beans over other food items by 2.85%. Also, the probability of choosing dry beans over fish/sea foods and animal products decreased though not significant by 0.7% and 15.58% respectively, whereas the probability of choosing beans over vegetables and other foods increased by 0.27% and 4.84% respectively. In some ways these results were unexpected. The expectation was for married-headed households to be more likely to purchase dry beans than other food items since they have time for preparing beans at their home. Nevertheless, these results make more sense as they are consistent with the general food purchasing behaviour that female prefer more fish and animal products to beans. The results concur with that of Zamasiya *et al*. (2014) that the decision to consume food varies between males and females based on whether the purchasing activity is perceived as a 'males' or 'females' obligation. Since majority of the sample households consisted of female who in most cases are decision makers in the household with regard to food

purchasing decisions; it is obvious that dry beans were less preferred to fish/sea foods and animal products, *ceteris paribus*.

As expected, the coefficient of household income was statistically significant and agrees with *a priori* expectation. These results suggest that a unit increase in income of household decreases the probability of choosing beans over other food items. For instance, the marginal effects of income variables-INC4 indicate that high-income household heads were less likely to choose beans over fish/sea foods, fruits/vegetables, animal products and other food by 4.03%, 5.59%, 50.88% and 58.24% respectively. A plausible explanation of this finding is that household income provides a sound reflection of households' purchasing power and therefore influences the quality and quantity of food consumed in households. Consequently, households who have low income level are more likely to purchase beans than households having high income, due to food price being the major factor for households with low-income.

The results in Table 3 also reveal that being self-employed/permanent employed household head, decrease the probability of consuming dry beans over animal products and other foods by 18.19% and 21.83% respectively, whereas that of fish/sea foods and vegetables/fruits decreased though not significantly by 0.37% and 1.25% respectively. This result was expected because self-employment/ permanent employment can be associated with increase in household income which results into increase in the purchasing power of households.

However, the results indicate that household heads with permanent employment were less likely to purchase beans over animal products and other foods compared to self-employed household heads. A plausible explanation for these results is that self-employed household

heads are assumed to have flexible working schedule which gives them adequate time to purchase and prepare dry beans at their homes compared to permanent employed household heads, *ceteris paribus*.

Table 3: Marginal effects results for Multinomial logit (MNL) model

Variable	Fish/ sea food Coefficients	Fruits/ vegetables Coefficients	Animal products Coefficients	Other foods Coefficients	Dry beans Coefficients
Constant	1.9513***	2.9647***	5.4444***	6.9677***	0.9928***
25-44 years	0.0134	-0.0232	-0.2121*	-0.0077	0.0354***
45-64 years	0.021	-0.0320*	-0.2535*	0.0358	0.0318*
above 65	0.0491*	0.0085	-0.3332	0.3889*	0.0735***
HS	-0.0106*	0.0031	-0.1336**	-0.1231**	0.0338***
SEX2	-0.0005	-0.0023	-0.1848	-0.1159	-0.0099
EDU	0.0001	-0.0009	0.0199*	-0.0373***	0.0017
MS2	0.0077	-0.0027	0.1558	-0.0484	-0.0285**
INC2	0.0330**	0.0547***	0.4340***	0.5985***	0.0191
INC3	0.0441***	0.0571***	0.3550***	0.5996***	0.0018
INC4	0.0403**	0.0559**	0.5088***	0.5824***	-0.0118
INC5	0.0508*	-0.0083	0.6187**	0.6067***	-0.0236
EMP2	-0.0007	0.0052	0.1615	-0.0979	-0.0079
EMP3	0.0037	0.0125	0.1819**	0.2183*	-0.0074

*** *Significant- 1%, ** Significant- 5% and * Significant-10% probability level*

4.7 Marginal Effect for Different Consumers' Categories

The study findings are presented in Table 4 and it can be deduced that education level attained by household heads influenced bean share positively at any quintile and was significant at 50th quintile. It is assumed that an additional of 1000TZS on monthly income at 50th quintile increases household beans share at decreasing rate by 23.5TZS, 9.4 TZS, 1.5TZS and 3.0TZS for household heads attended primary, secondary, vocational training and university education respectively. Implying that, an additional income to household heads attended to primary and secondary education would increase more consumption of dry beans than their counterparts. In Tanzania, education is a proxy of permanent

employment which enables household heads to earn fixed monthly income hence consumes dry beans as planned.

Age of household heads was positively correlated with monthly bean share at 5th, 25th and 50th quintile. From Table 4, it is assumed that for household heads at 5th quintile, 1000 TZS increase for household heads aged between 25 to 44years, 45 to 64 years and above 64 years would increase dry beans share per month at increasing rate by 18.1TZS, 22.0 TZS and 27.1 TZS respectively. This stresses that older household heads consumed more beans when compared to household heads that are young or middle aged. However, age is negatively correlated with monthly beans share at 75th quintile due to income effect. That is, as income increases people tend to substitute beans with other alternative sources of proteins such as meats, fish, milks and eggs.

Marital status had positive effect on household beans share at any quintile and was significant at 5th and 25th quintile. This implies that married couples consumed more beans compared to single household heads. From Table 4, it is assumed that, addition of 1000 TZS to married couples' income per month would increased bean share by 8.1 TZS, 1.4 TZS, 0.4TZS and 3.2 TZS at 5th, 25th, 50th and 75th quintile respectively. The findings concurs with the argument that consumption of legumes is high when decision maker is married (Folayan and Bifarin, 2013). Low income households (at 5th and 25th quintile) with large family spent more on purchasing dry beans than small family. From table 4, it is assumed that an addition of 1000 TZS to poor households with large family at 5th and 25th quintile would increase bean share by 10.6TZS and 8.2TZS respectively. The findings stresses that poor households with large family consume more dry beans than small households, *ceteris paribus*. This is due to fact that larger households receive discounts as their quantity demanded is relatively high compared to smaller households. However, this

does not hold for the households with relative high income (at 50th and 75th quintile); whereby beans share is reduced as household income increased.

Sex of household heads influenced dry bean share negatively at any quintile and was significant at 50th quintile. From Table 4, it is assumed that being female household heads, an addition of 1000 TZS to household income per month would decrease the monthly bean share by 7.6TZS, 11.8TZS and 11.3TZS and 5.2TZS at 5th, 25th, 50th and 75th quintile respectively. The findings are consistent with an argument of Labadarios *et al*., (2011), that female tends to consume less beans than male because of different in their body requirement. In some cases, additional 1000TZS may influence female to consume other protein sources such as fish, animal products.

Household composition had positive impacts on dry beans share at any quintile and found to be significant in adult compared to children below 5 years. For instance, in table 4, an addition of 1000TZS in households would increases beans share in adults by 6.2TZS, 4.3TZS, 10.3TZS and 13.1TZS while for children below 5 years increased by 1.8TZS, 0.9TZS, 3.9TZS and 7.0TZS at 5th, 25th, 50th and 75th quintile respectively. Implying that, adults consumed more dry beans compared to children below 5 years. From Table 4, employment status of household heads at 25th and 50th quintile affect household bean share positively. However, self- employed household heads found to consume more beans than permanent-employed household heads.

It is assumed that addition of 1000TZS to household heads that are self-employed would significantly increases consumption of dry beans at 25th and 50th quintile by 10.9TZS and 15TZS respectively, compared to 0.84TZS and 1.12TZS respectively for permanent-employed household heads. However, this does not hold at 75th quintile due to income

effect whereby an addition of 1000TZS to household income would decreases dry beans share for both self and permanent-employed household heads by 10.4TZS and 6.3TZS respectively. Another plausible explanation is that, self-employed household heads experience income fluctuations which lead to consume more dry beans when income is low but reduce amount of dry beans when income rises. This is contrary to permanent employed household heads that earn fixed monthly income then consume dry beans as planned.

Table 4: Marginal effect results for Quintile regression on bean consumption

Bean share	Qo= 0.05		Q1= 0.25		Q2= 0.5		Q3= 0.75	
Variable	Coef.	Std Err	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.
constant	0.0274	0.8046	0.7260	0.8030	-1.1680	0.9249	-1.2563	1.1052
$\log Y$	0.0099	0.3164	-0.2005	0.3121	0.5685*	0.3646	0.6330*	0.4311
$\log Y^2$	-0.0040	0.0312	0.0131	0.0304	-0.0637*	0.0360	-0.0702*	0.0422
EDU1	0.0136	0.0171	0.0159	0.0180	0.0235*	0.0169	0.0088	0.0195
EDU2	0.0121	0.0104	0.0176*	0.0130	0.0094**	0.0130	0.0141	0.0145
EDU3	0.0063	0.0106	0.0054	0.0135	0.0015	0.0135	0.0117	0.0157
EDU4	0.0045	0.0144	0.0102	0.0202	0.0030	0.0244	0.0058	0.0288
AGE1	0.0181*	0.0120	0.0085	0.0173	0.0135	0.0213	-0.0123	0.0251
AGE2	0.0220*	0.0131	0.0059	0.0162	0.0095	0.0210	-0.0109	0.0246
AGE3	0.0271**	0.0127	0.0060	0.0160	0.0122	0.0215	-0.0059	0.0265
MS2	0.0081*	0.0054	0.0014*	0.0063	0.0004	0.0081	0.0032	0.0100
HS2	0.0106**	0.0064	0.0082*	0.0052	-0.0016	0.0146	-0.0085	0.0146
SEX2	-0.0076	0.0071	-0.0118*	0.0094	-0.0183*	0.0117	-0.0052	0.0107
INC2	0.0011	0.0061	-0.0094	0.0102	-0.0326***	0.0115	-0.0417***	0.0162
INC3	-0.0031	0.0075	-0.0173*	0.0103	-0.0245**	0.0123	-0.0320***	0.0143
INC4	-0.0088	0.0112	-0.0063	0.0135	-0.0145**	0.0175	-0.0407***	0.0179
INC5	-0.0146	0.0167	-0.0156	0.0166	-0.0287	0.0252	-0.0305	0.0302
adult	0.0062***	0.0021	0.0043*	0.0030	0.0103***	0.0043	0.0131***	0.0043
less 5yrs	0.0018	0.0028	0.0009	0.0032	0.0039	0.0061	0.0070*	0.0050
5to12yrs	0.0106**	0.0063	0.0053*	0.0034	0.0118***	0.0045	0.0140***	0.0051
13to17yrs	0.0017	0.0058	0.0036	0.0057	0.0086**	0.0052	0.0068*	0.0049
EMP2	0.0015	0.0050	0.0101*	0.0074	0.0166*	0.0095	-0.0103	0.0116
EMP3	0.0017	0.0079	0.0084	0.0107	0.0112	0.0098	-0.0063	0.0154

*Note: *, ** and *** denote significant at 10%, 5%, and 1% levels, respectively. Standard errors are bootstrap estimates based on 1000 replications*

CHAPTER FIVE

5.0 CONCLUSIONS AND RECOMMENDATIONS OF THE STUDY

5.1 Conclusions of the Study

In a nuTZSell, this study provides comprehensive picture of beans consumption behavior in urban households, which is remarkably useful in forecasting the future trends of beans consumption. Public sectors need to capture the entire distribution of beans consumption in order to formulate new or adjust current policy to reduce prevalence of malnutrition in the society. This study examined consumption of dry beans and factors influencing dry beans choice in households' food purchasing decisions. The study used the data collected by Legume Innovation Lab Project in Dar es Salaam in 2015 from random sample of 754 households whereby analysis was done by using Multinomial logit model and Quadratic Engel curve through quintile regression approach. Three major findings emerge from the study:

i. The proportion of dry beans in consumers' diet in Dar es Salaam was relative low. The findings revealed that household budget share in Dar es Salaam are dominated by cereals (32%) whereas the share of dry beans was low (11%). It is evident that dry beans are given little priority during consumers' food purchasing decisions in urban areas of Tanzania.

ii. Socio-demographic factors influences dry beans consumption behavior in urban households. Study findings revealed that age, household size, educational level, marital status and self-employment of household heads influenced consumers' food purchasing decisions positively whereas household income and sex had negative influence on food purchasing decisions.

iii. Adults consumed more beans compared to children below 5 years. That is, the share of dry beans was low among children below 5 years of age compared to adults within the household with the same level of income.

5.2 Policy Recommendations of the Study

This study provides some new information about consumers' purchasing decisions towards dry beans. Hence, it provides clear picture on consumption behaviour of dry beans in urban area of Tanzania. The research findings are quite consistent with expected bean consumers' behaviour in Tanzania. The empirical findings from this study have important implications and strategies for bean producers and bean consumers. It is hoped that the findings from this study will be useful for the government and other stakeholders in Tanzania for designing pricing, promotion strategies and other marketing strategies to promote beans consumption. Based on the major findings of this study, the following can be recommended;

i. The efforts geared towards alleviating child malnutrition should place high priority on promoting dry beans consumption. Policy makers need to focus on enhancing bean value chain through increasing consumption of beans whereby more emphasize should be given to poor households. The income profile of poor households can be the basis to target them so that they can benefit from the policy interventions.

ii. Educational programs on vital roles played by beans in the consumers' diet should be organized to promote their consumption. One way of ensuring this would be for the government and other beans stakeholders to establish some low cost effective system as an incentive for bean retailers to advertise and promote their dry beans and beans products at relatively affordable costs. The main focus should be on

low-income households, educated households and household with large family. In order to achieve this, government should arrange with media such as televisions or radio so that food nutritionists and agricultural economists can be invited to explain nutritional benefits and economic importance of dry beans.

iii.   Efforts geared towards improving household food security and alleviating child malnutrition should place high priority on promoting beans consumption among children below 5 years of age. This is because children below 5 years are the most vulnerable group to protein-energy deficiency in Tanzania. Therefore, sufficient consumption of dry beans could be an alternative strategy for improving household food security and reduce malnutrition among children below 5 years old.

5.3 Contribution of the Study

The study mainly focused on uncovering the domestic barriers for increasing beans consumption as an important strategy to improve household food security and reduce malnutrition. It is recognized that malnutrition is complex phenomena that depends on many factors including food availability, health, care and sanitation (Kinabo, 2014). However, understanding household behaviour with regard to beans consumption is an important step in understanding the occurrence of malnutrition among poor households hence establishing alternative strategies to fight against malnutrition.

This study contributes to governments' efforts in reducing occurrence of stunting in the society in the following ways: Firstly, unlike previous studies most of which reported only low consumption of beans, this study is extended to provide answers to questions "why" and "where" there is low consumption of beans. Secondly, the study provides evidence that consumption of dry beans among children below 5 years is low and this might be the

reason for prevalence of stunting in Tanzania. Thirdly, the study provides evidence that females consume fewer beans compared to males hence influenced bean choice negatively.

5.4 Limitation of the Study

The findings derived from this study are based on households' food expenditure in Dar es Salaam. However, with regard to these findings it could not be possible to infer for the whole population of Tanzania since the findings from Dar es Salaam differ with other cities and municipals due to income differential. In order to infer for the whole population, this study should be expanded to cover other regions and capture the data at district levels. Hence, the models used in this study could then be used to test the hypothesis that increased household expenditure on dry beans reduces the probability of stunting.

5.5 Suggestion for Further Research

This study has managed to identify low consumption of dry beans to both female headed households and households with children aged below 5 years. However, the reasons for low consumption of beans for these consumers' categories are not clearly known. It is therefore suggested that in order to improve households' food security and reducing stunting in the household, future studies need to take into consideration of these groups of consumers. This will broaden an understanding on the reasons that constrain children below 5 years and female household heads from consuming dry beans. Also, this will enable policy makers to have better understanding of how to design and implement nutrition-programs, especially those that focus on agriculture or food systems to ensure the best nutrition in the households.

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APPENDICES

Appendix 1: Questionnaire

BEAN CONSUMPTION SURVEY: A CHOICE EXPERIMENT APPROACH

THIS SURVEY IS BEING CONDUCTED BY THE BEAN VALUE CHAIN RESEARCH NETWORK, A COLLABORATIVE RESEARCH INITITATIVE COMPRISING LILONGWE UNIVERSITY OF AGRICULTURE AND NATURAL RESOURCES, SOKOINE UNIVERSITY OF AGRICULTURE, UNIVERSITY OF ZAMBIA AND KANSAS STATE UNIVERSITY WITH FUNDING FROM THE LEGUME INNOVATION LABORATORY, A USAID-FUNDED INITIATIVE

THIS INFORMATION IS STRICTLY CONFIDENTIAL AND IS USED FOR STATISTICAL PURPOSES ONLY

City/Town & Country		EA	

Interview Location	Home	Work	Other

Interview Date:	

A16. In which province is your hometown?		Northern		Central		Southern

M1. Respondent's Gender (X):	Male			Female	

INTRODUCTION BY ENUMERATOR

E.1   *The purpose of this survey is to collect data to help us develop better understanding of how people make food choices and the role beans play in their food options. We would also like to know how the attributes of certain foods influence consumption decisions. Your responses will help inform how plant breeders and the upstream production chain makes decisions to enhance the nutrition status of consumers. All your answers are confidential and will only be used in ways that do not allow any trace back to you, ensuring your anonymity.*

Your selection to participate in this survey was purely random and you are under no obligation to participate. However, your participation will be extremely helpful for the research objective. There is no penalty for your refusal to participate.

C1. Do you consent to participate in this survey?	Yes			No	

If the respondent agrees to participant in the survey, proceed to Module A, with the following introduction

E.2   *You have consented to participate in this survey. Before we start with the survey, do you have any questions or is there anything which I have said on which you would like further clarification? {Wait for respondent response. Answer any questions respondent may have. Upon satisfying the respondent, continue with interview}*

E.3   *May I proceed with interviewing you and/or your spouse (if available and willing)?*

A.   **MODULE A: HOUSEHOLD ROSTER**

A1. How many people, including yourself, live permanently in this household?	

A2. How many of the people permanently living in your household are 18 years or older?	

A3. For all household members under 18 years, please indicate the number in each of the following age categories.					
Under 5 Years		5-12 Years		13-17 Years	

A4. Which of the following best describes your marital status	Single/Never Married		Married/Cohabiting		Divorced/Separated		Widowed	

A5. What is your highest level of education current or completed	None		Primary		Secondary		Technical/Vocational		College/University	

A6. How old are you (in years?)	

A7. Please provide an estimate of your total household income (in local currency).	$		Weekly		Monthly		Annually	

A8. Please select the employment type that best describes your situation.

Salaried (Full-time)		Salaried (Part-time)		Self-employed (Full-time)		Self-employed (Part-time)		Unemployed	

A9. If you indicated being married/cohabiting, could you please which of the following best describes your spouse's situation?

Salaried (Full-time)		Salaried (Part-time)		Self-employed (Full-time)		Self-employed (Part-time)		Unemployed	

A10. Please indicate how many of the following items are available in your household. If none, indicate 0

Radio	TV	Satellite TV Service (e.g., DsTV)	Mobile Phone	Smart Phone	Computer	Tablet (e.g., iPad)	Bicycle/Motorcycle	Automobile

A11. If you indicated having a computer and/or a tablet, please indicate whether you have access to the internet in your home.		
No, I don't have internet at home	Yes, I have internet at home through a modem ad a service provider (e.g., DsTV)	Yes, I have internet at home using my mobile/smart phone

A12. Which of these kitchen appliances do you have in your kitchen or have access to in your house? (Check all that apply)												
Electric stove		Gas stove		Charcoal brazier		Pressure cooker		Microwave		Refrigerator		Washing Machine	

A13. Which of the following best describes your housing situation?							
Own my house/flat		Rent House/Flat		Living with someone (relative/friend)		Others (Please Specify)	

A14. Taking all things together, which of the following would you use to describe your current situation?	Very Unhappy	Unhappy	Happy	Very Happy

A15. All things considered, how satisfied are you with your life as a whole these days?	Very Dissatisfied	Dissatisfied	Satisfied	Very Satisfied

A16. Please indicate which of the following you would use to describe your own economic condition.	Poor	Working Class	Middle Class	Upper Middle Class	Rich

E.4   We are now going to focus on your food consumption decisions in the next section of this conversation. We will begin from the general and work to the particular choices and decisions you make with respect to beans and bean products.

B.   **MODULE B. FOOD CONSUMPTION DECISIONS**

B1. Which of the following people typically influence food-purchasing decisions in your household? (Select all that apply)						
Self	Spouse	Parent or Other Relatives	Children	House Help	Friends	Other (Please Specify)

B2. In the past 7 days, indicate which of the following people have contributed to food preparation in your household. (Select all that apply)						
Self	Spouse	Parent or Other Relative	Children	House Help	Friends	Other (Please specify)

B3. How frequently do you eat major meals (breakfast, lunch or dinner) outside the home?									
B31	Breakfast	Never		Seldom (A few times/year)		Often (Once or twice/month)		Frequent (Once or more/week)		Daily	
B32	Lunch	Never		Seldom (A few times/year)		Often (Once or twice/month)		Frequent (Once or more/week)		Daily	
B33	Dinner	Never		Seldom (A few times/year)		Often (Once or twice/month)		Frequent (Once or more/week)		Daily	

B4. How much does your household spend on all food purchases in a <u>typical month</u>?	
B5. What proportion of this expenditure would you typically spend on food eaten away from home in a <u>typical month</u>?	
B6. What proportion of the food consumed by your household in <u>a typical month</u> is purchased?	

B7. If you do not purchase all the food consumed in your household in a typical month, please indicate the sources of the food you do not purchase in a typical month	You own home gardens or farm	Friends and family	NGO, Church or other charitable organization	Government

B8. Do you eat beans and/or bean products?		YES		NO	

B9. If yes, please indicate where you eat beans and/or bean products.		Yes	No
B91	**At home**		
B92	**Outside of the home**		

B10. Please rank the importance of the following food categories to your household's food nutrition security. (1 = Critical to our food security, i.e., will always buy it; 6 = Have least effect on our food security, i.e., can afford to forgo it)

	Food Product	Rank
B101	Legumes (Dry Beans and Pulses)	
B102	Fish and Seafood	
B103	Fruits and Vegetables	
B104	Cereals (Maize, rice millet, sorghum, bread)	
B95	Roots and Tubers (Cassava, sweet potato, Irish potato, yams, etc.)	
B97	Animal products (Meat, milk, eggs, etc.)	

B11.	In a typical month, what proportion of your household expenditure on food would you spend on each of the following food product?					
Food Product		**Amount**	**Food Product**			**Amount**
B111	Legumes (Dry Beans and Pulses)		B115	Roots and Tubers (Cassava, sweet potato, Irish potato, yams, etc.)		
B112	Fish and Seafood		B116	Animal products (Meat, milk, eggs, etc.)		
B113	Fruits and Vegetables		B117	Other foods (oil, salt, etc.)		
B114	Cereals (Maize, rice, millet, sorghum, bread)			Total (must equal no more than household food expenditure)		

NOTE: If the expenditure on legumes is 0% (i.e., B111=0), skip to Question B20.

E.5   For the rest of our conversation, I am going to focus on your household's consumption of beans and bean products.

B12. How frequently does your household consume each of the following beans and bean products? (Response codes below)					
Variety/Product		**Frequency Code**	**Variety/Product**		**Frequency Code**
B121	Dry beans, brown		B127	Dry beans, mottled	
B122	Dry beans, yellow		B128	Dry beans, mixed (e.g., yellow/white)	
B123	Dry beans, red		B129	Bean flour	
B124	Dry beans, purple		B1210	Baked beans	
B125	Dry beans, black		B1211	Canned whole beans	
B126	Dry beans, khaki/cream		B1212	Other processed bean products (Specify below)	

Frequency	**Never**	**Less than once per month**	**Once per month**	**Once every two weeks**	**Once or more per week**
Code	0	1	2	3	4

TIP: If the frequency of the variety or product is NEVER (i.e., frequency=0), then you may omit food product option in the subsequent tables (B12, B13, B14, B15, B17)

B13. Please specify the other bean products consumed in your household if you checked the "other" category above.

B14. Over the past 30 days, please estimate the quantity of bean products purchased or consumed in your household.							
Variety/Product		Quantity	Unit	**Variety/Product**		Quantity	Unit
B141	Dry beans, brown			B147	Dry beans, mottled		
B142	Dry beans, yellow			B148	Dry beans, mixed (e.g., yellow/white)		
B143	Dry beans, red			B149	Bean flour		
B144	Dry beans, purple			B1410	Baked beans		
B145	Dry beans, black			B1411	Canned whole beans		
B146	Dry beans, khaki/cream			B1412	Other bean products (As specified above)		

B15. Over the past 30 days, please estimate your expenditure on bean products purchased or consumed in your household.

Variety/Product		Expenditure	Variety/Product		Expenditure
B131	Dry beans, brown		B137	Dry beans, mottled	
B132	Dry beans, yellow		B138	Dry beans, mixed (e.g., yellow/white)	
B133	Dry beans, red		B139	Bean flour	
B134	Dry beans, purple		B1310	Baked beans	
B135	Dry beans, black		B1311	Canned whole beans	
B136	Dry beans, khaki/cream		B1312	Other bean products (Specify)	

B16. Please indicate (X) your typical source of beans and bean products. Select the source used most often for each product.

	Product/Variety	Own Farm	Gift	Donations from Church, NGOs, Gov't	Open Market	Supermarket
B161	Dry beans, brown					
B162	Dry beans, yellow					
B163	Dry beans, red					
B164	Dry beans, purple					
B165	Dry beans, black					
B166	Dry beans, khaki/cream					
B167	Dry beans, mottled					
B168	Dry beans, mixed (e.g., yellow/white)					
B169	Bean flour					
B1610	Baked beans					
B1611	Canned whole beans					
B1612	Other processed beans (Specify)					

B17.	Please indicate the typical roles of the different types of beans and bean products in your household meals. Select all that apply.				
	Product/Variety	Main Dish	Complement to Main Dish (e.g., stew/soup)	Side Dish	Ingredient
B171	Dry beans, brown				
B172	Dry beans, yellow				
B173	Dry beans, red				
B174	Dry beans, purple				
B175	Dry beans, black				
B176	Dry beans, khaki/cream				
B177	Dry beans, mottled				
B178	Dry beans, mixed (e.g., yellow/white)				
B179	Bean flour				
B1710	Baked beans				
B1711	Canned whole beans				
B1712	Other processed beans (Specify)				

E.6   Let us now turn our attention to the characteristics of beans that influence your purchasing and/consumption decisions.

B18.	Please indicate which of the following factors influence your decision to purchase any of the bean products you consume. Select all that apply.					
	Product/Variety	Price	Grain Size	Gravy Quality	Cooking Time	Tradition/Culture (Part of my/our diet)
B191	Dry beans, brown					
B192	Dry beans, yellow					
B193	Dry beans, red					
B194	Dry beans, purple					
B195	Dry beans, black					
B196	Dry beans, khaki/cream					
B197	Dry beans, mottled					
B198	Dry beans, mixed (e.g., yellow/white)					
B199	Bean flour					
B1910	Baked beans					
B1911	Canned whole beans					
B1912	Other processed beans					

B19. Please indicate which of the following food groups you would pair with beans and bean products in your household.		Yes	No
Food Group			
B201	Cereal (maize, rice, millet, sorghum, etc.)		
B202	Cereal products (bread, etc.)		
B203	Plantains and Bananas		
B204	Roots and Tubers (cassava, sweet potato, Irish potato, yams, etc.)		
B205	Groundnuts		
B206	Meat (beef, chicken, pork, etc.)		
B207	Fish (fresh, dry, tinned, etc.)		

E.7   Skip the next session and go to the experiment for respondents indicating they are bean and/or bean product consumers. NOTE: If the expenditure on legumes is greater than 0% (i.e., B111>0), skip to Module D.

E.8   The following few questions are for those who do not currently consume any beans in their households.

B20. Why don't you eat beans and/or bean products? (Select all that apply).		Check (X)
Reason		
B221	It is an inferior food product in my community (e.g., only poor people eat beans)	
B222	Health reasons (allergies, stomach aches)	
B223	Religion, faith or cultural taboo	
B224	Price (too expensive)	
B225	Risk of social embarrassment (flatulence factor)	
B226	Preparation inconvenience (Takes too long to prepare)	
B227	Someone (spouse, child, self, etc.) in my household doesn't like beans so we all avoid them	
B228	Never been a part of my household's meal options and never considered it	
B229	Don't know how to prepare it	
B2210	Don't believe beans are healthy for me and/or my family	
	Other (Specify):	

B21. How would you respond to the following statements about persuading you to eat beans and/or bean products?		Unsure	Never	Probably	Definitely
Change Event					
B241	If you found out that people you respect (athletes, celebrities, etc.) love eating beans and bean products				
B242	If you found out that beans are highly nutritious				
B243	If you found out that beans are extremely rich in protein				
B244	If you understood that beans were a much more economical source of protein than animal source				
B245	If bean had faster cooking time				
B246	If you found out that beans has very good health benefits (e.g., reduce "bad" LDL cholesterol, inflammation, blood pressure, etc.)				
B247	If eating beans reduced your risk of getting cancer				
B248	If eating beans enhanced your social status				
B249	If there was no social embarrassment risk associated with eating beans				
B2410	If you found out that consuming beans improved your ability to absorb iron, vital for health of reproductive-age women				
B2411	Improved options in how beans and bean products may be included in the diet				
B2412	If your income increased by 10%				
B2413	If your income increased by 30%				

E.9 Those who do not currently consume any beans and/or bean products have completed the survey at this point. Thank them for their time and responses. The interview is now completed.

MODULE D: Income Effect on Bean Consumption

E.10 In this section, we are going to explore the effect of changes in your income on your consumption of beans and bean products.

B22.	Please indicate the extent to which the quantity of beans and bean products consumed in your household would likely change under each of the following income scenarios. Select the one that seems most feasible and reasonable to you.	
Statement		**Response**
B2511	Current annual income increased by 5%	
B2512	Current annual income increased by 10%	
B2513	Current annual income increased by 20%	
B2514	Current annual income increased by 50%	

Possibly in a dropdown menu

Response	No change	Less than the change in income	Same change in income	More than the change in income
	0	1	2	3

MODULE C: CHOICE EXPERIMENT

Four different dry bean attributes – color, size, cooking time and the gravy quality – have been determined to influence consumers' dry bean preferences. Color has four levels (purple, yellow, mottled, mixed), size has three levels (small, medium and large), two levels of cooking time (slow and fast), and two levels of gravy quality (poor and good). We are going to present you with different combinations of these attributes and levels for you to choose whether you would purchase dry beans with these characteristics. Your choices in each situation are as follows: **YES, I will purchase it; NO, I will not purchase it.**

The enumerator presents each of the choice tasks to the respondent. The choice tasks are blocked so that each respondent sees only a segment of the full choice tasks. Taken together, the total number of blocks ensures all the choice tasks are covered by the respondents so we have a complete balanced experiment. As they complete the choice tasks, the program develops a table similar to the one below with the choices to which they indicate "YES". Once they complete the choice tasks, we move to Module D.

MODULE D: CHOICE RANKING

The enumerator now gives the respondent a small cash note and begin the final section of the survey.

Now, this is the final step in the survey. I am going to give you a small amount of money. I will also present you with the choices you have made from the options that were presented. I want you to "spend" your money on the different choices you made until you have exhausted it. You can choose to spend it all on a single choice or distribute it among all your choices based on how you feel about the different combinations. So, let us do the allocations.

	Choice Descriptions	Amount
	Color, Size, Cooking Time, Gravy Quality	
D1	*If answered "Yes" to being willing to purchase the bean with the certain attributes stated in the DCE for Decision (Module C), then the bean's attributes will automatic populate this cell (e.g., yellow, large, slow, poor) If answered "No", then this cell will be left blank.*	
D2		
D3		
D4		
D5		
D6		
	Total	@sum

E.11 Those who currently consume any beans and/or bean products have completed the survey at this point. Thank them for their time and responses. The interview is now completed.

MODULE D: CHOICE RANKING

The enumerator now gives the respondent a small cash note and begin the final section of the survey.

Now, this is the final step in the survey. I am going to give you a small amount of money. I will also present you with the choices you have made from the options that were presented. I want you to "spend" your money on the different choices you made until you have exhausted it. You can choose to spend it all on a single choice or distribute it among all your choices based on how you feel about the different combinations. So, let us do the allocations.

	Choice Descriptions	Amount
	Color, Size, Cooking Time, Gravy Quality	
D1	If answered "Yes" to being willing to purchase the bean with the certain attributes stated in the DCE for Decision (Module C), then the bean's attributes will automatic populate this cell (e.g., yellow, large, slow, poor) If answered "No", then this cell will be left blank.	
D2		
D3		
D4		
D5		
D6		
	Total	@sum

E.11 Those who currently consume any beans and/or bean products have completed the survey at this point. Thank them for their time and responses. The interview is now completed.

Appendix 2: Test for multicollinearity and autocorrelation

Variable	Tolerance	VIF
AGE2 25- 44 years	0.624	1.604
AGE3 45-64 years	0.632	1.582
AGE4 above 64 years	0.853	1.173
HS Household size	0.821	1.218
SEX2 female decision maker	0.935	1.070
EDU education attained by household head	0.839	1.191
INC2 150 001 to 210 000	0.748	1.337
INC3 210 001 to 300 000	0.669	1.496
INC4 300 001 to 500 000	0.721	1.387
INC5 500 000	0.864	1.158
EMP2 self -employed	0.716	1.396
EMP3 Permanent-employment	0.710	1.409

Dependent Variable: Monthly household expenditure, R Square= 0.876 and

Durbin-Watson=1.926