MARKET PARTICIPATION OF BEAN SMALLHOLDER FARMERS IN ZAMBIA: A GENDER BASED APPROACH

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MARKET PARTICIPATION OF BEAN SMALLHOLDER FARMERS IN ZAMBIA: A GENDER BASED APPROACH

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LIST OF ABBREVIATIONS

CAM Crop Marketing Authority

OLS Ordinary Least Squares estimation

FHH Female-headed Households

FNDP Fifth National Development Plan

HH Household Head

MACO Ministry of Agriculture and Cooperatives

MMH Male-headed Households

NAP National Agriculture Policy

NGP National Gender Policy

SSA Sub-Saharan Africa

UNDP United Nations Development Programme

UNZA University of Zambia

ZARI Zambia Research Institute

ABSTRACT

Market Participation of Bean Smallholder Farmers in Zambia: A Gender Based Approach

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In its bid to diversify the agricultural sector, the Zambian government has embarked on increasing the production of several crops including beans, which has a number of favorable characteristics that merit its high production among smallholder farmers. As such, using nationally representative data from the third (2008) supplemental survey to the 1999/2000 post harvest survey of small and medium scale (smallholder) farmers, this paper assess the factors influencing market participation of smallholder bean producers in the country using a gender based approach. The participation decision is modeled and estimated using a two stage model involving a probit and a truncated regression.

Model results show that the market participation decision among producers is a function of area planted, yield, wealth, alliances, transportation availability on the farm, location, age and education level, suggesting that production, market access and demographic factors play a key role in participation decisions. These results also suggest that production and market access challenges are a major hindrance to participation. Female producers are influenced by similar factors as other producers, with additional influence coming from price and income. Further, results show that price does not provide an adequate incentive for producers to participate in the market and thus price policies may be inadequate as a tool in increasing farmer participation.

CHAPTER ONE: INTRODUCTION

1.1 Background

The importance of agriculture in economic growth cannot be overemphasized and given Zambia's abundant natural resource base, agriculture offers great potential for generating economic growth, increasing employment and alleviating poverty. Most agricultural production in the country is carried out by smallholder farmers who constitute 52 percent of the total farming population (Chipokolo, 2006). They are found in the rural areas, and their main occupation, and source of income is farming. Although they carry out the bulk of agricultural production, smallholder farmers are usually very poor (Bigsten and Tengstam, 2008), making up a third of the nation's hungry and poor (Chipokolo, 2006.). If government is to achieve its goal of developing an efficient, competitive and sustainable agriculture sector, in order to assure food security, increase incomes, reduce poverty and ensure stable economic growth (NAP, 2004., FNDP, 2006), much attention needs be paid to the challenges facing smallholder producers. This includes developing agricultural markets, arguably considered as one of thekey ingredients to economic development (Bellemare and Barrett, 2004., Abdula et al, 2007).

In the government's bid to develop the agriculture sector, one of the specific objectives of the National Agriculture Policy (NAP) that was supposed to be implemented between 2006 to2010 was promoting diversification in the sector, taking into account comparative advantage in crops, livestock and fisheries production. Among the crops targeted for increased production was mixed beans, a crop produced mainly by smallholder farmers. According to the National Crop Forecast Surveys (CFS) for the 2006-2007 farming season, smallholder farmers carry out about 97 percent of mixed beans production in the country.

A number of favorable characteristics merit this high production; a ready demand, high nutritional value, low costs of production, minimal input requirements, the natural ability to maintain and enhance soil fertility, and the drought tolerant characteristic. Zambia has

been experiencing an increasing intensity, frequency and duration of droughts resulting in wide spread poverty and food security problems for both rural and urban areas because most farmers rely on rainfall for production. As beans is drought tolerant, and does relatively well in areas of low rainfall, it's a suitable food and nutrition security crop that farmers all over the country can grow for food and nutrition security purposes.

High poverty levels also make beans an important component in the diets of many people in the country. The high cost of alternative sources of protein leads many families to rely on beans as a protein source in order to have a balanced diet. On average, a Zambian family consumes over 2kg of dry beans per month as relish (MACO, 2004), with additional domestic demand coming from large institutions like hospitals, boarding schools and prisons. With regards export markets, there is great potential for bean production in the future because demand in sub-Saharan Africa is expected to rise from 20,000 metric tons per year to an excess of 40,000 metric tons over the next 10 years (Muimui, 2010). Increased demand is also expected to come from the rising canning industry in Zambia and in the neighboring countries (Kayama, 2010).

Considering that beans is one of the major food crops grown in Zambia, women are expected to be highly involved in its production. Women are at the centre of providing the majority of the labour used in agriculture, particularly for food crops (such as beans) and increasingly cash crops (UNDP, 2006). Indeed, the role of women in the agriculture sector as a whole cannot be overlooked. In Sub-Saharan Africa (SSA), women undertake 60% of all marketing, and at least half of all tasks related to food storage and raising livestock (Mehra and Hill-Rojas, 2008). They also provide 67% of the world's working hours and in Zambia, women provide 70 percent of the labor towards the agriculture sector (NGP, 2000). Studies however show that women are disadvantaged in the agriculture sector as compared to their male counterparts (Blackden, 1993., Ongile, 1998.,Chikuvire et al, 2006., NGP, 2000), because considering all other challenges, women lack equal access to resources such as information, credit facilities, inputs, land, technology and decision making power. Tiruneh el at (2001) insist that these differences

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have negative implications for the productivity levels and technology adoption capacities of women, and as such market participation among female producers is expected to be lower than among male producers.

Muimui (2010) points out that marketed beans is important in improving farmers' livelihoods in the country and is a key contributor to smallholder farm income, especially for women, but also admits that though there is a strong bean growing culture among farmers, and an increasing bean demand in the country (quantity and specific markets), supply is still very low. In general, smallholder market participation in Zambia is very low. Some authors have attributed this low participation to, among other things, limited access to inputs and markets, poor agricultural infrastructure, and exploitative pricing (Muimui, 2010., Mwanaumo, 1999., Nijhoff et al, 2003, Bigsten and Tengstam , 2008., Kayama, 2010., FNDP 2006-2010). Kayama (2010) further contends that poor access to bean markets is a result of limited knowledge on market opportunities, poor organization to access markets, inability to compete effectively at all market levels, Infrastructural limitations, and poor linkage to other key players such as transporters, processors and exporters.

However, scientific knowledge on the role of gender and farmer capabilities and characteristics (demographics) on market participation of bean producers is quite insufficient. Such information is important because farmer characteristics directly and indirectly impact on transaction costs, which are key in determining market participation decisions. A farmer will only participate in a market if they can cover the transaction costs and get a positive return. Market failure (in this case when producers fail to supply to the market) occurs when the cost of transacting through a market exchange creates disutility greater than the utility gain that it produces. It is household specific and not commodity specific (Janvry, Fafchamps and Sadoulet, 1991). Thus, the specific characteristics of a household affect supply participation decisions and currently, scientific knowledge on the role of demographics such as age, household size, income, gender, education level and wealth on bean supply participation in the country is lacking.

1.2 Problem Statement

A farmers' decision to produce either strictly for sale, or to participate in a market by selling off what remains after consumption depends on many factors other than the price of a commodity. It is very important that such other factors are explored to know of their effect on the participation decision. For Zambia, scientific knowledge on factors affecting the participation of producers in the beans market is lacking as there is very little scientific research that has been done on the subject matter.

Past studies done on beans in the country, mostly by the Zambia Research Institute (ZARI) and the University of Zambia (UNZA) Crop Science Department have concentrated on the agronomic aspects of the crop, including developing and marketing of new and improved bean varieties. Kayama (2010) and Muimui (2010) looked at the bean markets in Zambia and brought out a number of opportunities and challenges faced by bean producers in marketing their output. However, these findings were not based on scientific research.

Some research regarding crop marketing in the country has been carried out in the maize markets. Tembo et al (2003) found that the decision of whether and how maize buying and selling households participated in the maize marketing system was a function of demographic, market access and agro-ecological factors. However this study modeled the participation decision of the household using Ordinary Least Squares estimation (OLS) regression, and failed to capture the factors that affect the discrete decision of the farmers to participate in the market. Literature, Straus (1984) and Goetz (1992), emphasize that while variables affecting the amount to sell may be the same as those affecting the discreet decision of whether to participate or not, the opposite is not true, as there are fixed cost type variables that affect the discrete decision to participate and not the extent of participation.

Nijhoff et al (2003) studied maize marketing of smallholder producers, focussing on policy, and considered how a new Crop Marketing Authority would affect the food market performance in Zambia. Mwanaumo (1999) also studied the Zambia agriculture markets, focusing on the effect of policy reforms on marketing. However, both of these studies did not account for factors influencing market participation and extent of participation at producer level.

A number of studies outside Zambia (Goetz, 1992., Bellemare and Barret, 2004., Abdula et al,2007, Asfaw et al, 2010., Ongile, 1998.,) have been done on market participation of smallholder farmers in Africa. However, none of the studies took a gender based approach in analyzing factors influencing market participation. Even though gender was included as a demographic, scientific knowledge on the factors specifically influencing female participation in the supply chains was not determined. Although gender is important, many studies have neglected its role in agriculture. Most research has not taken adequate account of women's responsibilities, participation and priorities in their specific local conditions, which has led to negative effects on women and families (NAP, 2004., Chikuvire, 2006., Ongile, 1998., Blackden, 1993).

Thus, in order to comprehensively understand the factors influencing bean producer market participation as well as extent of participation, the paper modeled and estimated the participation decision of bean small holder producers in Zambia using a two stage model involving a probit and a truncated regression. A gender based approach was taken to account for any inherent differences among male and female producers.

1.3 Objectives

1.3.1 General Objective
The general objective of the study was to determine the factors influencing market channel participation of Zambian smallholder bean producers using a gender based approach.

1.3.2 Specific Objectives

Specifically, the study intended to;

1. Describe the characteristics of bean producers in Zambia
2. Determine the role of demographics on participation of producers in the bean supply chains.
3. Identify the factors influencing female farmers operating further downstream in the bean supply chain
4. Assess the extent to which horizontal alliances affect participation.

1.4 Rationale

This study was the first to scientifically determine the factors influencing market participation of bean producers in the country. It is therefore a significant addition to the body of knowledge on beans marketing, which is currently very limited. Beans is one of the crops marked for increased production and productivity by government (NAP, 2004), and it is important that as much information as possible is available on the crop so that proper interventions and development strategies in the sector can be prepared. Availability of information will stimulate investments to enhance bean production, and facilitate the transformation of production in rural areas from subsistence to commercial oriented systems.

The paper also provides base line information necessary for the study of the bean value chain. Value chain development is very critical in improving the income levels of bean producers, reducing poverty and enhancing rural livelihoods. Conducting value chain analyses for bean based products at national level will help in effectively linking smallholder farmers to other key players. It will also enhance the capacities of value chain actors to respond to market demands and effectively participate in domestic, regional and international markets.

The Zambian government acknowledges that the goal of sustainable household food security and poverty alleviation can only be achieved through successful integration and main streaming of gender, by operationalizing it into specific goals, objectives and action plans (NGP, 2000). Therefore, this study is important because determining the factors that influence women market participation decisions will lead to the formulation of strategies that will carter specifically for enhancing their participation.

The study also provides information on factors influencing smallholder producer participation in the market. This will help to improve the food markets in the country which are currently underdeveloped. Increasing supply chain participation will result in higher incomes for producers, availability of the product to consumers, stable prices, increased nutritional food security and a healthier population (labor force). A spillover effect is expected.

Finally, the paper provides information on how horizontal alliances affect participation. This is important because when alliances are present and working well they reduce transaction costs, increase farmer market access and enhance market participation.

1.5 Organization of the Report

This paper begins with chapter one which highlights the background information about the subject. It covers the problem statement, objectives, and rationale of the study. Chapter two focuses on literature review in which the key terms are defined, the conceptual framework on market participation is given and a comprehensive synthesis on relevant past findings on the subject matter are presented. Chapter three looks at the methodology that was used to carry out the study, including the models, data used and data analysis procedures. Chapter four highlights the results and interpretations of the study findings, while chapter five gives conclusions and recommendations based on the study findings.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

Market participation is both a cause and consequence of economic development (Abdula et al, 2007). In order to develop their economies, many SSA countries were using market-led paradigms and widespread liberalization during the 1980's to 1990's as engines for development and structural transformation in their economies, including the agricultural sector. In order for agrarian and rural transformation to occur, and result in economic development, households must transition from a subsistence mode to a market engagement mode, were most of the inputs and outputs are not provided and consumed internally but are purchased and sold off the farm. This can only happen when farmers participate in markets, by trading most of their output to gain income for purchasing inputs and other needs.

However, since market liberalization in Zambia, smallholder farmer participation in markets has been low (Muimui, 2010., Mwanaumo, 1999., Nijhoff et al, 2003, Bigsten and Tengsten, 2008., Kayama, 2010., FNDP 2006) and this has been the trend in many SSA countries as well, with some households moving out of agriculture altogether, rather than moving from subsistence agriculture into commercialized agriculture (Mazmudar 1987, Lucas 1994). This has become a matter of concern because smallholder farmers produce the bulk of both food crops and staple crops in many African countries and their low market participation contributes greatly to wide spread poverty and food insecurity among rural and urban populations.

Many studies have been done on the subject matter. This chapter reviews relevant literature on market participation decisions of rural households. We start by defining the key terms, after which the theoretical framework underlying the current study and a synthesis of relevant past studies are presented.

2.2 Definition of Key Terms

Demographics describe the characteristics of a human population and population segments. They are the specific characteristics and capabilities of each household. Commonly used demographics include gender, race, age, sex, family size, income, disabilities, mobility, educational attainment, home ownership, employment status, and even location (Wikipedia, 2010). As demographics are inherent characteristics of a household, they are expected to impact market participation decisions of suppliers, as well as extent of participation.

Supply is a fundamental economic concept that defines the total amount of a specific good or service that is available to consumers. It is the amount that producers are willing and able to sell at a given price all other factors being held constant. Some of the more important factors affecting supply are the goods own price, the price of related goods, production costs and expectation of sellers (Wikipedia, 2010). Many other factors will affect the supply of specific commodities. In Agriculture for example, such factors will include government policies, population demographics, values and beliefs, available technology and type of farmer (either smallholder or commercial). In Zambia, supply is further influenced by agriculture's contribution to the national economy in both agricultural and non-agricultural inter-linkages (Nyairo and Backman, 2009).

A market defines a situation in which buyers and sellers can negotiate the exchange of some product or products. This process involves a series of business activities that enables the flow of goods and services from the point of initial production until they reach the ultimate consumer. There are two sides to the marketing process. One half consists of the buying, selling and title-transferring activities which coordinate the series of these events. The other consists of the physical handling of goods in this movement, such as transportation and storage (Kohls and Downey, 1972). A marketing system organization defines the behavior and relations of agents involved in moving products from producers to final consumers (Branson and Norvell, 1983) while a market channel is

a set of practices or activities necessary to transfer ownership, and move goods from point of production to point of consumption (Wikipedia, 2010).

Households can participate in a market as buyers, sellers or both, for a particular commodity. Households that do not participate in the market for a commodity are autarkic in nature. This paper is concerned with household market participation as sellers.

2.3 Theoretical Framework

According to Abdula et al (2007), a simple model can be used to capture the role of demographics and gender on the market participation decision. Considering a household that maximizes profits (π). Suppose the household earns its income from the production and possible sell of a crop like beans (C), and from off-farm sources (Y), i.e. both earned and unearned.

Production of the crop is a function of services provided by privately held assets including land, labor (both quality and quantity as reflected in education experience), livestock and other productive technologies, reflected in the vector (A). Public goods and services (such as extension services and farmer groups providing inputs and information) represented by the vector (G) may likewise affect output.

When concerned with whether or not a smallholder household participates in the market as a seller, the variable of interest can be represented by the indicator variable N_s which takes on a value of 1 when the household participates and a value of 0 when it does not. This choice is guided by net returns to market participation. Positive net returns result in participation while negative net returns lead to non-market participation. Transaction costs will determine the net returns from participation, and are therefore fundamental in determining whether a household participates or not.

The household faces a parametric price for the crop (P), and transaction costs, $\tau(Z,G,A,Y)$ that may depend on public goods and services (such as broadcast of prices and extension information service) reflected in the vector (G), household specific characteristics (demographics) such as distance to the market, education attainment, gender and age reflected in the vector (Z), its assets like land and labor reflected in vector (A) and its income or liquidity which may be earned or unearned (Y). The households' choice problem can thus be represented as

$$Max\ f(\pi)$$

Where $f(\pi) = PC - \tau(Z,G,A,Y)$ (1)

Subject to the constraints presented by household characteristics, public goods and services, asset endowments and available cash on the farm.

Transaction costs are major impediments and determinants of market participation. A market fails when the cost of transaction through market exchange creates disutility greater than the utility gain that it produces (de Janvry et al 1991). Nonexistence of a market is the extreme case of market failure, more generally the market exists, but the gains for a particular household maybe below or above cost, with the result that some households will use the market while others will not. The definition of market failure is thus household specific and not commodity specific as the same commodity can be a tradable for one household while being a non-tradable for another.

The factors influencing the participation decision can be classified into two broad categories; public goods and services and specific household characteristics (demographics). These two factors together determine the transaction costs faced by a particular household.

Strauss (1984) and Goetz (1992) in an attempt to analyze agricultural households' marketed surplus decisions in West Africa postulate the following model to represent the reduced form of marketed surplus;

$$q_i = q_i (\rho, \alpha, \varphi,) \equiv q_i (x_i^q) \tag{2}$$

Where;

q_i = output sold

ρ = vector of prices

φ = vector of farm characteristics including fixed inputs and a vector of production technology parameters

α = exogenous income

They postulate that failure of households to participate in commodity markets is as a result of transaction costs and that variables affecting the amount to sell (x_i) are the same as those affecting whether to participate in the market as a seller(z_i). The opposite is not true however: there are fixed cost type variables τ_i affecting the participation decision, but not the extent of participation. Consequently, (x_i) is a proper subset of $z_i = (x_i, \tau_i)$.

Thus, households face a two stage decision problem. The first decision is whether or not to trade and the second is how much to trade, conditional on participation as a seller (Goetz, 1992., Bellemare and Barrett, 2004., Abdula et al, 2007., Asfaw et al, 2010). The first decision is discrete and depends on fixed costs such as transport costs and vendor licenses, while the second one is continuous and is conditional upon the decision to participate. This model of household marketing behavior explicitly assumes sequential choice: Initially, the household decides whether or not it will participate in a market, and then decides on volumes to sell, conditional upon having chosen market participation. Others, by contrast, have implicitly modeled the household as making the discrete market

participation decision simultaneously with the continuous volumes sold (Tembo et al, 2003).

2.4 Review of Past Studies

2.4.1 The Role of Markets in Economic Development

Markets play an important role in economic growth. Availability of markets for commodities allows for specialization of production, which in turn increases productivity and efficiency. Well-functioning markets lead to efficient allocation of scarce resources and maximization of the general welfare of society. The proper functioning of a market will only occur when enough markets exist for the trade of all produced output, and there is a large number of buyers and sellers such that no single entity can individually influence the price of goods. As such, it is important for households to participate in markets, both as sellers and buyers, so that markets are competitive and functioning efficiently.

Reliance over the past decade or so on markets as the foundation for development strategies especially in the Developing Countries has increased. However for developing countries, market participation in the rural areas by smallholder farmers is still quite low, and market based development strategies fail to facilitate wealth creation and poverty reduction. In the rural areas of developing countries, significant market frictions commonly impede market participation, dampening households' capacity to take advantage of market opportunities and governments' capacity to influence microeconomic behavior through changing market incentives (Bellemare and Barrett, 2004).

Most governments have concentrated on price policies as an incentive to encourage market development and participation by farmers. However, recent empirical findings in Somalia, Rwanda, Senegal, Mali and Zimbabwe raise serious questions about the use of food price policy, even when combined with input distribution programmes as an

instrument for raising short- run marketed surplus and rural welfare (Goetz, 1992). In Zambia, Tembo et al (2003) found that maize excess demand was inelastic with regard to own consumer-producer price ratio, and any price support policies that altered the price ratio would have limited effects on the market behavior of farmers. Nijhoff et al (2003) also had a similar finding in their study, noting that the use of price policy to encourage production and sell of maize was not in the best interest of long term food security and smallholder welfare. Hence a further look at other factors that can influence market participation decisions of rural households is necessary.

2.4.2 Transaction Costs

Many researchers have attributed lack of market participation among rural households in Africa as being caused by high market transaction costs.

According to de Janvry, Fafchamps and Sadoulet (1991) a households decision to be a seller or buyer in a given market is determined by a price band which depends on transportation costs to and from the market, mark-ups by merchants, the opportunity cost of time involved in selling and buying (search, recruitment and supervision costs), risk associated with uncertain prices and a variety of other transaction costs that are largely household specific. The poorer the infrastructure, the less competitive the marketing systems, the less information is available, and the more risky the transactions, the greater is the size of this band. As long as the households' shadow price for a commodity falls within the price band, market participation will not occur and the household will be autarkic. Goetz (1992) too shows empirical findings that explain that many households failed to participate in coarse grain markets because of transaction costs. These costs drive a wedge between the selling and purchase price, and bring in the concept of goods being nontradable.

In the case of the effects of fixed costs on participation, better information, cart ownership and market access variables play an important role in sellers' market participation decisions. Janvry, Key and Sadoulet (1999) in their study on Mexican corn

producers found that existence and type of transaction costs had profound implications on total supply response of households. This study indicated that fixed and proportional transaction costs both played an important role in explaining households' market behavior, with proportional transaction costs being more important in the selling rather than the buying decision. Thus to increase market participation, policies need to be aimed at reducing the transaction costs involved.

Other than direct transaction costs, household specific characteristics and capabilities also contribute to determination of market participation.

2.4.3 Other Contributing Factors

Household asset holdings have been recognized as key determinants of market participation. This is because assets determine the quantity of output produced and have a strong association with smallholder market entry opportunities, helping farmers overcome market entry barriers and thus increasing market access. Private household assets, especially land, but also livestock, labor and equipment, are strongly positively associated with crop market participation. Literature (Abdula et al, 2007., Asfaw et al,2010., Goetz, 1992.) shows that households need a minimum asset threshold in order to escape from poverty and participate in the market. Lack of assets may result in the exclusion of producers from new and remunerative market opportunities. Assets enhance the capacity of smallholder farmers to access, and take advantage of market opportunities, and they complement public goods in stimulating broad based crop supply expansion.

Horizontal alliances in the form of farmer groups or cooperative associations also increase the market supply participation of households as they improve market access and lower fixed transaction costs by providing information (Abdula et al, 2007). Products of various households can be marketed together, reducing transportation costs. Market discovery costs are reduced because this fixed cost is shared or distributed among all participating households. Information availability increases, as once a member of an

alliance gets hold of information quickly pass it on to others and it is used for marketing decisions. Alliances also give high bargaining power to suppliers of a commodity. This prevents exploitation by traders and other agents in the supply chain.

While admitting that prices and transaction costs are important in encouraging market participation, Goetz (1992) showed empirical evidence in his study of a significant parabolic relationship between age and participation. This is also true for the maize markets in Zambia (Tembo et al, 2003), crop markets in Mozambique (Abdula et al, 2007) and also food markets in Tanzania and Ethiopia (Asfaw, 2010). Age affects supply participation in that older heads of households have more experience and greater contacts allowing for trade opportunities to be discovered at lower costs. Age also indicates increased trust between trading partners through repeated exchange with the same party. The relationship between participation and age is parabolic indicating that beyond a certain age, farmers produce less (they grow older and get past their productive age) and participation in the market reduces. Age and education not only enhance production, they also mitigate transaction costs as they increase the ability of farmers to obtain market information.

Asfaw el al (2010), in their study of small holder producer participation in Tanzania and Ethiopia found that human capital, measured in years of schooling had a positive impact on entry to markets and marketed surplus, suggesting that a higher level of education increases productivity and provides a greater opportunity of producing a marketed surplus. Education also reduces transaction costs and market entry barriers as it enables farmers to obtain and process market information, and gives them better negotiation skills. Further, the study found that household size negatively affects market participation, as larger families consumed much of farm output. This could have also been an indication the inefficiency of smallholder farm labor.

In the studies reviewed, some of the household characteristics affecting the quantities supplied did not affect the discrete decision to participation, which is in line with the

theory on how households make participation decisions. For grain markets in Goetz's (1992) study, these included; availability of transformation technologies, household size and equipment ownership and in the study for livestock market participation (Bellemare and Barrett, 2004), wealth and income did not affect the discrete participation decision. While these variables were not significant in affecting the decision to participate, they were significant in affecting the quantities that the household decided to either purchase or sell. This conclusively suggests that the decision to participate and the volume to trade conditional on participation are affected by different variables. However, the overall participation of the household in a market depends on the factors that affect both the discrete and continuous decision because a household can make the discrete decision to participate but face high variable costs that given the quantity of output it has prevents it from accessing the market. In this case, though the household initially made the decision to participate, it will not due to negative returns.

2.4.4 Women Market Participation

Women in SSA are disadvantaged because of unequal distribution of resources as well as cultural barriers (Blackden, 1993., Ongile, 1998, Chikuvire et al, 2006., NGP, 2000). Many societies in the rural areas do not allow women to associate equally with their male counterparts. At village meetings or any other social gathering, it is still taboo in some societies for a woman to make a contribution, more especially if they have a differing opinion on the matter. This hinders women participation further downstream in the supply chain, and reduces overall earnings from their production activities. Studies consistently show that gender is a significant determinant of market participation, with female-headed households (FHH) being significantly disadvantaged in terms of both participation and level of earnings from markets (Tiruneh el at, 2001). FHH are more likely to be autarkic than to be net sellers, and are more likely to be net buyers than to be autarkic (Bellemare and Barrett, 2004). Thus, it is highly unlikely that women will participate in a market as sellers but instead it is more common for them to participate as buyers.

2.4.5 Conclusion

Among the reviewed studies, no single study was taken entirely to find out factors influencing market participation of bean producers. Also though most of the studies included gender as an independent variable, none focused on empirically estimating factors that affect female producers, even though are they are inherently different from male producers in terms of access to resources. It is possible that female producers could face different challenges in participation as they are not homogenous with male producers. It should be noted that household characteristics and capabilities, as well as access to resources are important in market participation decisions because not only do they determine the nature and structure of the market at producer level but they also impact on the occurrence of transaction costs incurred by the household. They determine the market entry barriers faced by each household. For example an educated older farmer is expected to have easier market access due to both skill and experience as compared to a young uneducated farmer.

This paper therefore focused on empirically determining the effect of demographics on supply chain participation. Demographics included all household characteristics and capabilities. The paper further looked at the participation of female producers in the supply chain to establish the role of gender on participation, and the challenges that women producers face. The paper intended to find out the demographics affecting female participation and the extent of female participation further downstream in order to test the hypothesis that female farmers received lower incomes for their produce because they did not sell their output further along the supply chain.

The presence of horizontal alliances among farmers producing beans was also studied to understand their role on market participation decisions.

CHAPTER 3: METHODS AND PROCEDURES

3.1 Introduction

This chapter presents the methods and procedures that were used to find out the factors influencing market participation decisions of bean smallholder farmers. It gives the model employed, the data used and the methods of analysis.

As the decision to participate involves two decisions, i.e. the discrete decision of whether to sell or not and the continuous decision of how much to sell conditional on participation, a two stage model was used to find out the factors influencing market participation.

3.2 The Probit Model

When faced with a situation where we seek to explain a variable using a set of explanatory variables, and this variable of interest is a discrete variable that can only take values of 0 and 1, OLS becomes inappropriate for estimation. This is because OLS estimates variables with real values that run from positive infinity to negative infinity. If OLS is inappropriately applied in this situation, the estimates from this linear probability model will be inconsistent.

The decision to participate in a market is a discreet variable that takes the value of 1 if a household participates and a value of 0 if it does not. In this case we are interested in the households that participate in the market by selling their output.

In the model, we assume that participation, a latent or unobserved variable y^* is generated from the model;

$$y^* = \beta' x + e \tag{3}$$

Where β is a K-vector of parameters and x is a vector of explanatory variables and $e \sim N(0,1)$

We observe $y = 1 \; if \; y^* > 0 \; or \; y = 0 \; otherwise$

It is possible that there is a threshold level of y^*, such that if y exceeds y^* the household will participate, otherwise it will not. This threshold is not observable, but if we assume it is normally distributed with the same mean and variance, it is not only possible to estimate the parameters of y^* given by the above equation but also to get some information about the unobservable index itself.

Given the assumption of normality, the probability that y^* is less than or equal to y can be computed from the standardized normal CDF as;

$$P = P(y = 1|x) = (y^* \leq y) = (Z \leq \beta_1 + \beta'x = F(\beta_1 + \beta'x) \tag{4}$$

Thus the probit was used to model the discrete participation decision.

3.3 Truncated Regression

A truncated regression fits a regression model on a sample drawn from a restricted part of the population. Under the normality assumption of the whole population, the error terms in a truncated regression model have a truncated normal distribution, which is a normal distribution that has been scaled upward so that the distribution integrates to one over the restricted range.

If x has a normal distribution, with mean μ and standard deviation σ, the density of the truncated regression is

$$f(x|a < x < b) = \frac{f(x)}{\Phi\left(\frac{b-\mu}{\sigma}\right) - \Phi\left(\frac{a-\mu}{\sigma}\right)}$$

$$= \frac{\frac{1}{\sigma}\phi\left(\frac{x-\mu}{\sigma}\right)}{\Phi\left(\frac{b-\mu}{\sigma}\right) - \Phi\left(\frac{a-\mu}{\sigma}\right)} \tag{5}$$

Where Φ and ϕ are the cumulative distribution and probability density functions of the standard normal distribution. Truncation reduces variance compared to the variance in the untruncated distribution.

Thus the truncated regression model (with the lower left truncation equal to 0) was used to determine factors influencing quantities sold to the market, conditional upon participation.

The dependent variable in the probit model was whether or not a farmer participated in the market by either selling or bartering bean output. In the truncated regression model it was the quantities sold or bartered.

The explanatory variables hypothesized to explain production, market participation and marketed surplus from theory, empirical findings and intuition, including their expected influence are presented in the following table;

Table 1: Expected Signs for Explanatory Variables

VARIABLE NAME	EXPECTED SIGN	COMMENT
Intercept	?	
price	+	higher price, more quantity supplied as it is a positive incentive to producers
Livestock ownership	+	Ownership indicates more wealth, transportation and animal traction, increased yield and market access
Distance to vehicular transport	-	Longer distance, higher transportation costs and reduces market access
Wealth value	+	Reduces market entry barriers for smallholder producers
Transportation technology	+	Ownership increases market access by reducing transaction costs
Production technology	+	Increases yield
Total farmland cultivated	+	More land available thus less competition among alternative uses
Age of household head in years	+	Older producers are more experienced, have established contacts, market access
Age squared	-	diminishing marginal effect as age rises
Hectares owned	+	More ha, higher volume of production and excess marketed surplus
House hold size adult	+	More adults in the household offer more available family labor for farming activities
Off farm income	+	Increases market access and reduces entry barriers
Yield	+	low costs of production resulting in more production
education dummy, higher level	+	The more educated, the better the negotiation skills and better able to use available information
Gender dummy, male	+	more advantaged as they are comparatively more resource endowed
Alliance dummy, belongs to	+	Reduces transaction cost, increases market access
Radio ownership	+	Avails information on prices, enhancing market access
Price information	+	reduces search costs and exploitation of farmers
Province dummy	?	

Source: Author

The model was applied on all bean producers and separately on female bean producers.

3.4 Data Analysis

This study used nationally representative data from the third (2008) supplemental survey to the 1999/2000 post harvest survey of small and medium scale (smallholder) holdings. The data was collected by the Central Statistical Office (CSO) with financial and technical support from the Food Security research Project (FSRP). The total sample size of the survey was 8,094 households, of which 1048 were bean producers.

Data was analyzed using STATA11 and Microsoft Excel. Running of the model (probit and truncated regression) and generation of descriptive statistics was done using STATA11, while generation of graphs, tables and charts were done using Microsoft Excel 2007. Only data relating to bean producers was used in the study. The data was analyzed at household level with the unit of study being the household head.

The variables of interest were grouped in four main categories; demographics, market access proxies, production variables, and public goods proxy variables. The demographic variables were; gender, level of education, adult household size, and distance to selling point. A variable for age squared was included in order to also account for the parabolic effects of age on production.

Among the production variables were; hectares of beans grown, the kilograms of beans harvested, the yield per hectare and the production technology available on the farm. The dummy variable for production technology included any household that owned any of the following; an ox-drawn plough, a disc plough, a harrow, a cultivator, a ripper, or a tractor.

The market access proxies included; alliance which indicated whether a producer belonged to any farmers' forum or group, wealth which was measured by the total value of the households' assets, using the market price. Income per household was measured by

adding cash remittances to the household and wages actually received by the household. A dummy variable for radio ownership was included to represent information availability to the household. Finally, a dummy for transportation means available on the farm for any household owning a truck, a lorry, a van, a car or motorcycle was included.

The public goods proxy variables were; land cultivated (this is because smallholder farmers rarely own land, most of it is communal land), availability of price information on different commodities to the household, distance from roads that a vehicle can use (indicating the infrastructure of the roads).

Other variables included a provincial dummy as well as the parametric price faced by each household.

CHAPTER FOUR: RESULTS AND INTERPRETATION

4.1 Bean Production

The distribution of bean production in the country was such that; Northern Province was the highest producing province, with about 60 percent of production taking place there, while Lusaka and Western Province were the lowest producing provinces, each producing less than 1 percent. The rest of the provinces produced less than 10 percent each, as is shown in the figure below:

Figure 1 Percent Production by Province
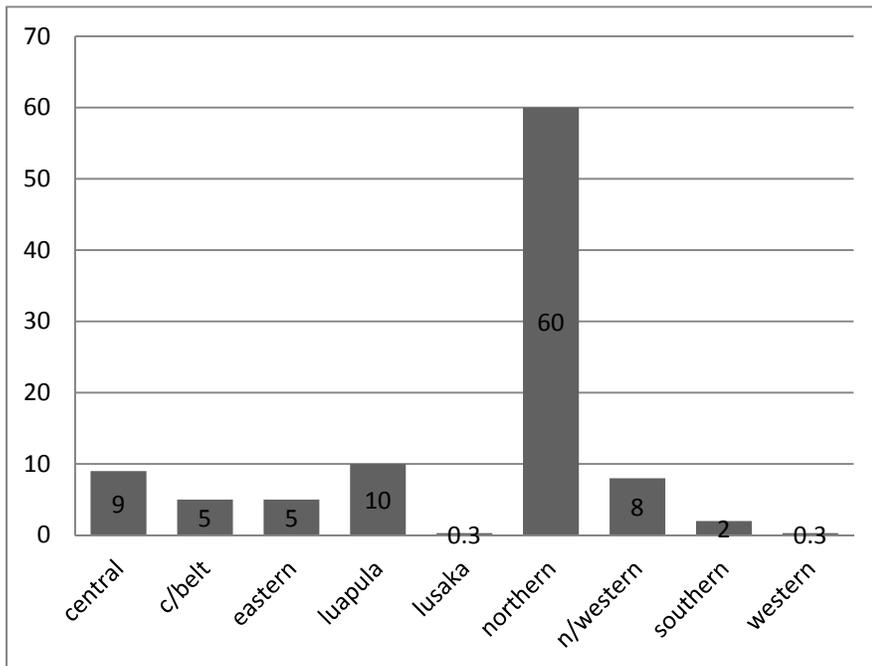
Source: 2008 Supplemental Post Harvest Survey

Production at household level was quite low. Although households cultivated an average of 4 hectares of land, they only used about of 0.4 hectares for bean production, producing an average of 213Kilograms per household. As a result, average sales volumes were low,

with each household only selling about 106Kilograms of beans. Average yields were also quite low as can be seen from table 2.

Table 2 Household Production Characteristics.

Variable	All producers (mean)	Male Producers (mean)	Female producers (mean)
Bean production (kg)	213	223	173
Bean sales (kg)	106	112	85
Bean land cultivated (ha)	0.4	0.5	0.2
Total farmland cultivated (ha)	5	5	3
Yield (kg/ha)	580	571	565

Source: 2008 Supplemental Post Harvest Survey

While male and female producers showed a similar pattern of production characteristics, male producers produced and sold more beans compared to female producers.

4.2 Demographics

In the sample, 80 percent of production was done by MHH while 20 percent was done by FHH. The mean age of bean producers was 48 years showing that on average, bean producers were still in their prime production age. MHH showed a lower average age (47 years) compared to FHH (54 years).

A look at the education attainment of the household head showed that majority had attained some primary education, with only 10 percent having no formal schooling at all. The education attainment level for all producers is presented in figure 2.

Figure 2 Education Attainment of Household Head
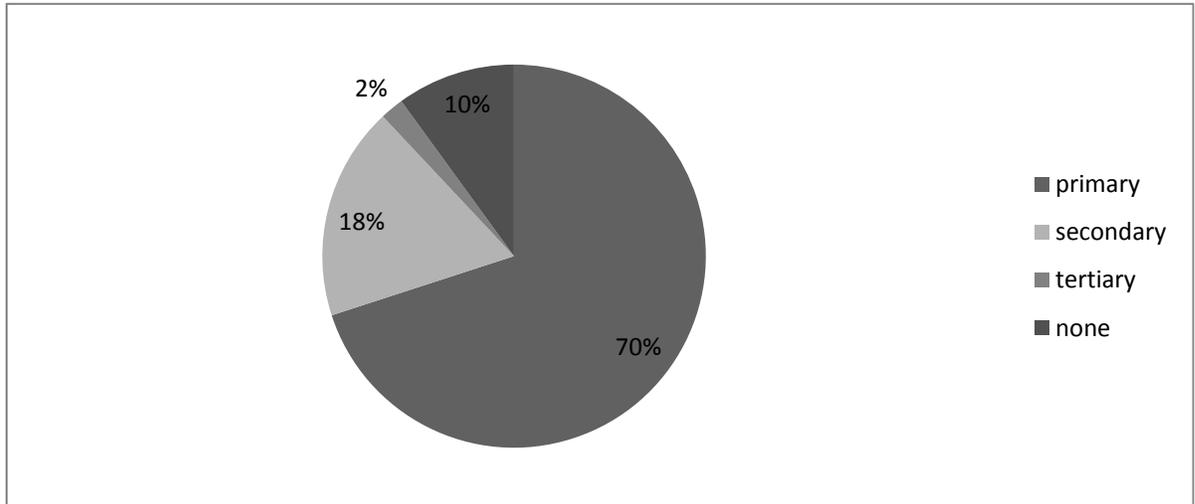
Source: 2008 Supplemental Post Harvest Survey

While the MHH followed a similar distribution of education level attainment, there was a higher level of no formal schooling among FHH (25 percent) and only less than 1 percent had attained tertiary education.

4.3 Market Access Characteristics

Asset value estimating the total wealth of the bean producers was K900,000 on average while total income from remittances and salaried employment was K640,000.15 percent of the producers received a salaried wage, and 40 percent received cash remittances. In total only 50 percent of the households receiving some form of off-farm income (both earned and unearned). A separate analysis of MHH and FHH showed that on average, MHH had more wealth and access to income compared to the FHH.

When asked if they owned a radio, 64 percent of the MHH and 42 percent of the FHH agreed. Over 70 percent of both MHH and FHH accessed price information, mostly from

traders or marketers. With regards alliances, 9 percent of MHH and 11 percent of FHH admitted to belonging to a radio listening group or a farmer's forum. Most producers lacked access to production technology, with less than 10 percent of producers admitting to owning some form of production technology. On the other hand, about 70 percent of farmers owned at least some form of transport technology, this is presented in the table below;

Table 3 Household Market Access Characteristics

Variable	All producers (%)	Male Producers (%)	Female producers (%)
Radio ownership	64	87	42
Price information	84	87	78
Alliance	9	9	11
Production technology	8	9	3
Transport availability	70	78	42

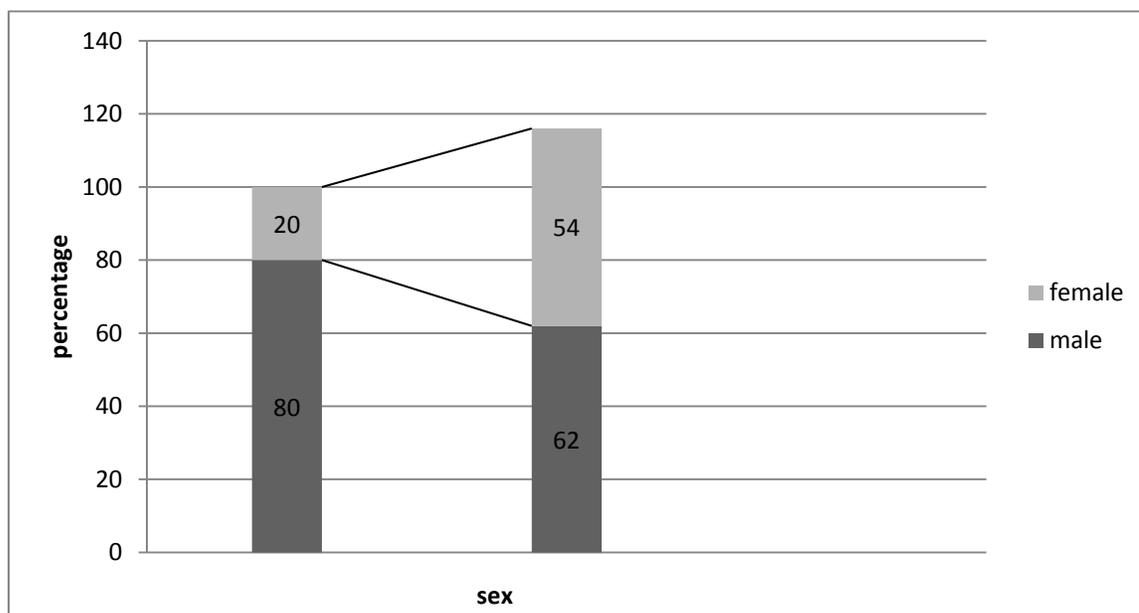*Source:* 2008 Supplemental Post Harvest Survey

On average, bean producers were located 14Km from vehicular transport (i.e. usable road infrastructure) while the average distance they sold their product at was 11Km.

4.4 Bean Sales

The average bean price facing producers was K2,200. Sales followed a similar pattern as production, with Northern Province taking the lead. 60 percent of total bean producers participated in the market by either selling or bartering their output. 80 percent of these where male while 18 percent where female.

However, this distribution was similar to that of production by gender in the sample (80 percent male and 20 percent female). To determine who participated more, male producers were analyzed separately from female producers. Figure 1.3 shows market participation by gender.

Figure 3 Market Participation by Gender

Source: 2008 Supplemental Post Harvest Survey

The analysis revealed that of the 80 percent MHH who produced beans, 62 percent participated in the market, and of the 20 percent FHH who produced beans, 52 percent participated in the market. This showed that over 50 percent of both male and female producers of beans participated in the market by either barter or selling.

In looking at the extent of participation further downstream among producers, the data showed that the majority of producers sold at the local level to private traders i.e. within the village but to private traders. Over 60 percent of all bean producers sold their output within the village to private traders, with only 5 percent selling outside of the district. The following table shows the extent of participation of the total sample, and by gender.

Table 4 Producer selling point

Variable	All producers (%)	Male Producers (%)	Female producers (%)
Within Village	19	28	18
Within Village, private	61	54	63
Within District, rural	5	3	6
Within District, urban	7	9	7
Outside District	5	4	6

Source: 2008 Supplemental Post Harvest Survey

A separate look at male and female producers showed a similar trend in extent of participation, with 63 percent of MHH and 54 percent of FHH selling to private traders within the village, while only 6 percent of MHH and 4 percent of FHH sold outside the district. This indicates that most producers wait for traders to follow them instead of transporting their output to main markets or trading centers were they can fetch a higher price.

4.5 Econometric Results

4.5.1 Model Results for All Producers

Probit results for all bean producers showed that in influencing a household's discrete decision to participate in the market; hectares of beans cultivated, yield, location and age were strongly significant at 0.01 significance level: ownership of transport technology by the household and education attainment were significant at 0.05 significance level. All the variables assumed their expected signs, except for education and transportation availability which assumed negative signs, when they were expected to positively affect participation. This could be because beans is not considered a commercial or cash crop and so those who are educated and endowed with various technologies do not consider it a viable crop to grow. The location dummy variable showed that producers in other

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provinces were more likely to participate in the market compared producers in Lusaka Province, this is perhaps due to low production in the province.

Marginal effects at the mean value of the explanatory variables showed that a 1 hectare increase in bean production would on average increase the probability of a producer to participate in the market by 29 percent, and a 1 kilogram increase in yield would increase participation probability by 0.01 percent. The probability of someone who had attained tertiary education to participate in the market was 30 percent lower relative to one with who no formal schooling and those who owned transport technology were less likely to participate in the market by 9 percent relative to those who did not own some form of transportation.

The truncated regression results showed that hectares of beans cultivated and yield (at 0.01 significance level), wealth, and belonging to an alliance (at 0.05 significance level), and producing from Northern Province at (0.1 significance level) all had positive effects on the quantities of output sold to the market, while availability of transportation technology, total farmland cultivated and producing from Copperbelt Province (at 0.1 significance level) had a negative relationship with quantities of output sold. The results show that a 1 hectare increase in area of beans planted would increase quantity supplied by 861kilograms, and producers from Northern Province sold 767.9kilogroms more, other things being equal, relative to producers from Lusaka. Producers belonging to an alliance sold 576kilograms more relative to those who did not belong to one.

Hectares of beans cultivated and yield have a strong positive impact on market participation, indicating the critical role of land and productivity in promoting market entry and extent of participation. This also suggests that production constraints are a major barrier to participation .The positive effects of Wealth and alliance might indicate the importance of market access variables in determining participation as well as marketed surplus of producers. Age had a negative effect on market participation due to

its marginal diminishing effects on production as it rises, hence confirming the lifecycle hypothesis.

4.5.2 Model Results for Female Producers

Probit results revealed the following variables as being significant in influencing the participation decision of female producers; hectares of beans cultivated, yield and location (at 0.01 significance level), availability of production technology on the farm (at 0.05 significance level) and production technology (at 0.1 significance level). All the other variables affected female producers in a similar way to how they affected total bean producers. However, for female producers, age and education level were not significant in influencing the participation decision. Further, production technology had a significant positive association with the female participation decision, but it was not significant for male producers.

Marginal effect at the mean values of the explanatory variables showed that a 1 hectare increase in area planted by female producers would increase the probability of participation by 59 percent, while a 1 kilogram increase in yield would increase participation by 0.3 percent. On the other hand, those who owned farm transportation were less likely to participate by 16 percent, relative to those who did not own. These results suggest that production and market access constraints are a major barrier for female producer participation in the markets.

Truncated regression results indicated that quantities supplied by female producers were considerably affected by area of beans planted, yield, price, transport availability on the farm, location and age (at 0.01 significance level), and, alliance, location and income (at 0.05 significance level). These results showed that a 1 hectare increase in area of bean planted would increase quantity supplied by 1390kilograms, and a 1 kilogram increase in yield would increase marketed surplus by 0.34 kilograms. Those belonging to an alliance supplied 326kilograms more relative to those who did not. Model results are presented in table 5.

Table 5 Model Results

Variable name	Model Results for all Bean Producers			Model Results for Female Producers		
	Probit coefficients	Marginal effects	Truncated regression Parameter estimates	Probit coefficients	Marginal effects	Truncated regression Parameter estimates
Price	31.58	10.75	-4053	-138.201	-44.17	-3017***
	(56.27)	(19.17)	(8428)	(191.8)	(60.85)	(69089)
Dist-vh	.0022	.0007	-5.017	.0158	.0005	1.424
	(.0018)	(.0006)	(5.186)	(.0040)	(.0012)	(1.858)
Livestock1	-.0829	-.02823	115.5	0.156	.0500	79.39
	(.1060)	(.0361)	(152.2)	(.2366)	(.0754)	(115.2)
Wealth	.0070	.0023	20.01*	-.1887	-.0603	-61.58
	(.0096)	(.0032)	(11.29)	(.1404)	(.0443)	(47.68)
Transtech1	-.2736**	-.0931	-622.9*	-.5195**	-.1660**	-334.1***
	(.1103)	(.0377)	(336.4)	(.2281)	(.0714)	(94.04)
Prodtech1	.0947	.0322	-337.6	1.717*	.5489*	257.2
	(.1979)	(.0673)	(286.7))	(.9759)	(.3023)	(310.8)
Land	.0012	.0004	-5.690*	-.0093	-.003	12.26
	(.0036)	(.0012)	(3.172)	(.0185)	(.0059)	(8.405)
Hectares	.8626***	.2937	861.0***	1.831***	.5854***	1390.7***
	(.2898)	(.0937)	(155.1)	(.5907)	(.1759)	(136.2)
Adult hhsize	.0267	-.0091	-0.982	.0491	.0157	12.56
	(.0195)	(.0066)	(35.21)	(.0501)	(.0158)	(20.41)
Age	-.0005	-.0002	2.146	.0123	.0039	-6.176*
	(.0031)	(.0010)	(6.302)	(.0081)	(.0025)	(3.155)
Income	-.0193	-.0065	5.886	-.1294	-.0413	-218.1**
	(.0231)	(.0078)	(23.19)	(.0873)	(.0274)	(102.6)
Yield	.0004***	.0001	.9597***	.0010***	.0003***	.3491***
	(.0001)	(3.81E-05)	(.2212)	(.0002)	(7.56E-05)	(.0630)
Age-2	-4.33e-35***	-1.47E-3	9.51e-31	-3.73E-30	-1.19E-3	4.18e-27*
	(9.31e-35)	(3.39E-36)	(1.75e-30)	(2.66E-30)	(8.42E-31)	(2.41e-27)
Edulev1	-.1568	-.0534	196.6	-.1629	-.0520	93.53
	(.1496)	(.0509)	(327.5)	(.2570)	(.0820)	(122.5)
Edulev2	-.0399	-.0135	260.2	.0751	.0240	175.6
	(.1716)	(.0584)	(328.5)	(.4166)	(.1331)	(211.3)
Edulev3	-.8924**	-.3039	452.8	.	-44.17	(12.83)
	(.3728)	(.1254)	(649.2)		(60.85)	276.7

Significance: *=0.1 significance level; **=0.05 significance level; ***=0.001 significance level, robust standard errors in parenthesis

Source: Authors analysis

Table 5 continued

Variable name	Model results for all bean producers			Model results for female producers		
	Probit coefficients	Marginal effects	Truncated regression Parameter estimates	Probit coefficients	Marginal effects	Truncated regression Parameter estimates
Gender1	.0849	.0289	80.41	-	-	-
	(.1138)	(.0387)	(220.7)			
Alliance1	.0394	.0134**	576.8**	.1671	.0534	326.1**
	(.1517)	(.0517)	(247.6)	(.3595)	(.1148)	(140.3)
Radio1	-.0999	-.0340	-109.3	.0346	.0110	-174.0
	(.1002)	(.0342)	(157.9)	(.2354)	(.0752)	(138.6)
Priceinfor1	.1747	.0594	144.7	-.0308	-.0098	113.4
	(.1241)	(.0422)	(212.9)	(.2466)	(.0788)	(132.7)
Central	5.061***	1.723***	371.4	5.099***	1.630***	-2125***
	(.2569)	(.0984)	(330.3)	(.5591)	(.1891)	(677.2)
Copperbelt	5.175***	1.762***	-1229*	5.438***	1.738***	-1523**
	(.2897)	(0.1063)	(680.9)	(.5848)	(.1950)	(652.1)
Eastern	4.925***	1.677***	76.00	6.208***	1.984***	-1465**
	(.2651)	(.0994)	(359.9)	(1.041)	(.3188)	(660.6)
Luapula	5.207***	1.773***	-401.8	5.410***	1.729	-1769**
	(.2742)	(.0988)	(478.6)	(.5511)	(.1798)	(695.1)
Northern	5.179***	1.763***	767.9*	5.232***	1.672***	-1889.9***
	(.2509)	(.0975)	(421.2)	(.5021)	(.1732)	(692.9)
N/western	5.724***	1.949***	-1153	5.877***	1.878	-2301***
	(.2778)	(.1013)	(891.0)	(.5990)	(.1892)	(645.3)
Southern	4.049***	1.378***	-3974	6.376***	2.038	-
	(.3859)	(.1408)	(2616)	(1.308)	(.4377)	
Western	4.714***	1.605***	-	-	-	-
	(.7067)	(0.246)				
_cons	-5.473***	-	-2746***	8.046***	-	1524**
	(.3967)		(977.4)	(1.33)		(589.7)
Observations	1023	1023	618	204	204	109
Joint tests of significance	.0000	.0000	.0436	.0000	.0000	.0045
Pseduo R2	.1203	.1203	.	.1877	.1877	.

Significance: *=0.1 significance level; **=0.05 significance level; ***=0.001 significance level, robust standard errors in parenthesis

Source: Authors analysis

CHAPTER FIVE: CONCLUSIONS AND RECCOMMENDATIONS

The following are the conclusions based on the findings from the study and the recommendations that follow from them.

5.1 Conclusions

The study shows that the bulk of bean production in the country is done in Northern, Luapula and Central Province, with the lowest production occurring in Lusaka and Western Province. Sales also follow a similar pattern, with Northern Province taking the lead.

Contrary to available literature in the country that bean producer participation in the market is low, the findings show that participation is relatively high, with more that 50 percent of both male and female producers either selling or bartering their output. However, bean production among the smallholder farmers is low, due to the limited land that must be used for various crops, with beans being given low priority as it is considered a food crop. Farmers only allocate an average of 0.4 hectares of land for its production.

Although bean supply is high among producers, the supply chain is not well developed. Bean supplier participation further downstream is generally low for both male and female producers, with more than 60 percent selling within their villages to private traders. As most producers sell their output within their villages to private traders, they miss out on the higher income that they could gain if they sold their output at main trading centers in the urban areas where beans demand is high.

Empirical findings show that price does not provide significant positive incentives for producers to supply their output to the market, in fact, for female producers price is negatively associated with market participation. Instead, it is the factors associated with

production and market access that strongly influence bean producer supply chain participation. Empirical findings also show that participation of producers is strongly influenced by the yield and hectares of each household. Increasing the area of beans planted increases the probability of market participation by 29 percent for all producers, while increasing the marketed quantities by 861 kilograms. These household specific characteristics are therefore key in determining whether a household participates or not.

The quadratic age variable is also significant in determining the decision of households to participate in the market, showing a negative relationship with the participation decision and thus indicating diminishing marginal returns to participation. This is consistent with the life cycle hypothesis because as producers grow older, they experience increasing returns to participation because they establish contacts, gain experience and cut down on search costs. However, as they grow older, and get past their active productive life, production reduces and so does supply chain participation.

Education is seen to negatively influence market participation of producers, as those who have attained tertiary education are 30 percent less likely to participate relative to those with no education at all. This may be because farmers consider beans a food crop and not a cash crop, so they do not grow it on a commercial basis. This may also be because the value chains for beans are not well developed.

Market access proxies; wealth and belonging to an alliance have a positive significant effect on the decision of bean producers to participate in markets, showing the positive and significant role of information and transaction costs on market participation. Wealth helps farmers in breaking market entry barriers as households must be above a minimum asset threshold to participate in a market. Alliances among farmers help them learn new production methods, get information on prices and available markets, as well as reduces transaction costs when farmers decide to transport their output together, or to sell their output as one, giving them a stronger voice. Availability of information also helps farmers make informed decisions and stops farmer exploitation by traders. This factor is

especially important for bean producers since they sell much of their output within the village to private traders and they face a higher risk of being exploited. Producers belonging to an alliance sold 576kilograms more relative to those who did not

In the study, female and male producers were significantly influenced in the same way by the household characteristics affecting the participation decision (i.e. yield, hectares cultivated, age and alliance). The empirical differences observed were that while production technology was positively associated with participation, and, price and income were negatively associated with participation, for female producers, they were not significant for all producers. Also, for female producers, a 1 hectare increase in area of beans planted increased the probability to participate by a larger extent (58 percent) compared to male producers (29 percent).

Even though gender was not significant in determining market participation in this study, it is important to point out that the male dummy variable showed a positive coefficient in the probit model for all bean producers, indicating that male producers are more likely to participate in the market as compared to female producers. The data also shows that male producers are more resource endowed than female producers, making them better able to produce more beans. Empirical findings show that market participation is strongly influenced by hectares of beans cultivated by each household, and on average, male producers cultivate 0.5 hectares of beans, while female producers only cultivate 0.2 hectares.

5.2 Recommendations

There are four main recommendations that can be made based on the study findings.

There is need to encourage bean production among farmers across the country. This is because beans has a lot of favorable characteristics and can be grown everywhere in the country. Currently, production is concentrated in the Northern Province, with all other provinces producing less than 10 percent each. If other provinces can increase their

production, the country will be on its way to solving some of the current food security problems it is experiencing.

There is need to strengthen gender equality in the rural areas so as to encourage more production and market participation of female producers. The study shows that market participation is strongly influenced by production characteristics (area planted and yield) and yet female producers have low access to land (3 hectares on average), cultivating less than 0.2 hectares of beans. In most cases women in the villages are considered last during land allocation, getting the worst land to do their production. This must be stopped if women are to participate in the market and contribute positively to poverty eradication at household level. Though government has taken up the mandate to enhance gender equity, more needs to be done, especially in rural areas.

Secondly, there is need to focus attention away from using price incentives as a way of stimulating market participation among rural households. This is because participation is more strongly affected by production and market access factors as compared to prices. In order to increase market participation of farmers, more land must be cleared for farmers and more production technologies must be made available to increase farmer's productivity. Alliances among farmers must also be encouraged. Currently, very few farmers belong to an alliance and yet they are a major factor in positively influencing market participation.

Finally, more research must be done that will provide information on bean production, the value chain and potential markets. Availability of such information will enable more farmers to produce and sell beans. Improving the value chain for beans will enable farmers to participate at a higher level in the supply chain and thus improve the incomes that producers earn from beans. Developing the value chain for beans will also encourage farmers to produce it on a commercial scale.

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