IMPACT OF CASH CROPPING ON SMALLHOLDER FARMING HOUSEHOLDS' FOOD SECURITY IN SHAMVA DISTRICT, ZIMBABWE

Theresa Tendai Rubhara

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Doctor of Philosophy (Food Security),

School of Agricultural, Earth and Environmental Sciences,

College of Agriculture, Engineering and Science

University of KwaZulu-Natal,

Pietermaritzburg

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DEDICATION

To Tinashe, Trinity and Tiffany with love.

DECLARATION OF PLAGIARISM

I, Theresa Tendai Rubhara, declare that:

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2. This thesis has not been submitted for any degree or examination at any other university.

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As the candidate's supervisor, I agree to the submission of this thesis

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Dr M. Mudhara (Supervisor)

DECLARATION 2- DRAFT PUBLICATION MANUSCRIPTS

The following manuscripts (under review) form part of the research presented in this thesis.

Publication Manuscript 1 Chapter 4

Rubhara T.T. and Mudhara, M. Commercialisation and its determinants among smallholder farmers in Zimbabwe across different land tenure regimes (*under review: Land Policy*)

Publication Manuscript 2 (Chapter 5)

Rubhara T.T. and Mudhara, M. Impact of cash cropping on smallholder farmers' household food security (*under review: Food Security*)

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ABSTRACT

Over 1.5 million Zimbabweans were food insecure in the 2015/2016 season, with the majority being in the rural areas. Land reform programmes have been implemented to improve the livelihoods of smallholder farmers. Smallholder farmers now constitute over 90% of farmers. There is a drive to commercialise small-scale agriculture by increasing the smallholder farmers' involvement in cash crop production. However, despite those efforts, food insecurity remains high in the smallholder farming sector. As farmers shift towards cash crop production, an understanding of the implications of this shift on the household food security level is required.

The objective of the study was to analyse factors determining cash crop production choices at the household level and the impact of such choices on household food security status. The research was conducted in Shamva district, Mashonaland Central Province of Zimbabwe. Data was collected in 2016 through a survey of 281 randomly selected households. Data was analysed using the SPSS and STATA. Analysis of Variance (ANOVA) and independent t tests for mean area under different crops were used for analysis of crop production patterns guided by the Sustainable Livelihoods Framework. The Tobit regression models were used to measure determinants of commercialisation and impact of cash cropping on food security in chapters four and five respectively. The independent t-test was used to test for significance in average monthly income and expenditure between male-headed and female-headed households. The Ordinary Least Squares (OLS) was also used to model the determinants of household food expenditure.

Maize and groundnuts were the main food crops grown in the area. About 95% of the sampled households grew maize in the 2015/2016 season and used about 61% of the total cultivated area. Tobacco covered 17% of the area and was the main cash crop. Male-headed household had more access to markets ($p<0.1$) and extension services ($p<0.05$) than female-headed households. Statistically significant differences between male-headed and female-headed ($p<0.01$) were observed in cash crops production with female-headed households planting less tobacco than male-headed households do. The average yield per hectare of maize ($p<0.01$) and tobacco ($p<0.01$) was significantly higher in A1 resettlement than communal farmers.

The household commercialisation index, a ratio of marketed output to the value of crops produced captured the level of cash cropping. The average household commercialisation level was 0.45 implying that farmers sell less than half of the value of their produce. Household

characteristics such as the age of household head ($p<0.01$) and gender of household head ($p<0.05$) influenced commercialisation. Furthermore, resource endowments such as labour ($p<0.1$) and number of cattle ($p<0.05$) also positively affected farmers' decision to commercialise. Non-far income ($p<0.05$) was negatively associated with commercialisation. The target group for commercialisation interventions should be smallholder farmers with fewer sources of income as they are likely to be motivated to grow more cash generating crops. Descriptive statistics showed low levels of access to agricultural finance (6.76% of households had access to finance), albeit, its importance in improving production and commercialisation levels. Since communal land holding was negatively associated with commercialisation future land redistribution should continue to decongest smallholder farmers and provide them with support. Communal farmers with increased support are more likely to commercialise.

Household Food Insecurity Access Scale (HFIAS) measured food security. The mean HFIAS was 1.89 implying a higher level of food security. Cash crop production had a significantly positive ($p< 0.01$) impact on food security. A unit increase in the proportion of cash crop resulted in an increase in food security by 4.3 units. This implies Cash crop production ensures that farmers can have more income that can be used for purchasing of food at the household level, thus improving their diet quality. Cash crop production only should not be regarded as a panacea to food security as quantity of maize harvested ($p<0.05$) had a direct positive impact on food security. Policies that target food crop production only as a means for ensuring food security maybe unsustainable in the end. Therefore, there is need for combining both cash and food crops. Other variables significantly positively influencing food security included non-farm income ($p<0.05$), access to markets ($p<0.1$) and access to draft power ($p<0.05$). However, household size ($p<0.1$) was negatively associated with food security. The main sources of farm income were cash crop sales, food crop sales and livestock sales, contributing, 64% of the annual household cash income. Food expenditure constituted the main expenditure category and accounted for over 60% of total expenditure. The variables household size ($p<0.01$), dependant ratio ($p<0.05$) and income ($p<0.01$) positively affected household food expenditure.

The study revealed that improved cash crop production may be an option for improving food security as it provides an immediate source of farm income. There is need for further research to derive optimum combinations of cash and food crops in the crop mixture for smallholder farmers to achieve food security. Stakeholders including government and marketing firms should promote commercialisation by improving access to services such as finance and extension. Furthermore, opportunities for off-farm livelihoods options should be developed

since non-farm income was also positively significantly associated with food expenditure and food security.

LIST OF ACRONOMYS

ANOVA	Analysis of Variance
ESAP	Economic Structural Adjustment Programme
FTLRP	Fast Track Land Reform Programme
GMB	Grain Marketing Board
GOZ	Government of Zimbabwe
GNU	Government of National Unity
HCI	Household Commercialisation Index
HDDS	Household Dietary Diversity Score
HFIAS	Household Food Insecurity Access Scale
HIES	Household Income and Expenditure Survey
IFAD	International Fund for Agriculture
OLS	Ordinary Least Squares
OR	Old Resettlement
SPSS	Statistical Package for Social Scientist
TIMB	Tobacco Industry and Marketing Board
VIF	Variance Inflation Factor
ZimVAC	Zimbabwe Vulnerability Assessment Committee

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CHAPTER 1 INTRODUCTION

1.1 Background and Justification

Until the past decade, most of the smallholder farmers in Zimbabwe, based on family farms, have produced crops for food with surpluses for sale. The smallholder farmers form the backbone of the country's food security and provide about 70% of its staple crop (Zimbabwe National Statistics Agency 2012). Smallholder farmers play a fundamental role towards sustainable food and nutrition security of the country through the production of local nutritious food. Various studies proved that investment in smallholder agriculture promotes sustainable development and the inclusion of the poor in the rural areas in developmental projects (Juana and Mabuku 2005, Bhaipheti and Jacobs 2009). All rural and urban people in developing countries count heavily on the efficiency of their local smallholder farmers to satisfy their food needs (Von Braun and Kennedy 1986, Nwachukwu et al. 2014).

Following various developmental programmes, such as the 2000 land reform in Zimbabwe, which saw many smallholders getting access to additional land, most of the smallholder farmers are now involved in the growing of other cash crops such as tobacco. Large-scale commercial farmers dominated tobacco production. For instance, in 1999, the total number of LSC farmers was just over 2000 but they accounted for 87% of the land cultivated under tobacco. Smallholder farmers though their number was more than 13 000 they only contributed 1.5% of the total crop (FAO 2000, TIMB 2011). With the increase in land ownership after the year 2000, more smallholder farmers ventured into tobacco production for instance in 2013 the number of smallholder tobacco farmers had increased to over 64 000 (Zimstats 2013). After the land reform, the Government of Zimbabwe (GOZ) in collaboration with the Ngo sector implemented many programmes as well to support the small-scale farmers in areas of input credit and extension. Programs such as 'Maguta of 2009', champion farmer, the Agricultural Support and Productivity Enhancement Facility (ASPEF) and farm mechanisation were aimed at increasing accessibility of inputs by the small-scale farmers (MOA 2013). The period 2003-2011 saw an increase in training for government extension workers to provide agricultural extension services to the farmers. Government provided approximately 90% of the extension services and private companies were mainly involved in cash crops which were under contract farming (Foti et al. 2013).

According to the census report of 2012, the population of Zimbabwe is around 13 million with 65% of the population living in the rural areas. Almost 70% of the rural population is involved in farming as a livelihood (FAO 2012). The country has an agro-based economy with agriculture contributing about 19% to the GDP of the economy (FAO 2012). Agriculture provides more than 60% of raw materials and one of the largest export earning sector besides mining, contributing about 40% of total export earnings (Zimstat 2012). Despite such a large contribution to GDP from the agricultural sector, it is estimated that around 30% of Zimbabweans were food insecure in the year 2012 (FAO 2012) and over 1.5 million are expected to be food insecure in the 2015/2016 consumption year (WFP 2015). Food security is maize based, therefore; there is no promotion of other foods to diversify food security sources (Mango et al. 2014). Maize availability is the main factor considered when assessing the food security situation in the country. The vulnerability assessment report of 2014 on food security by World Food Programme (WFP) in Zimbabwe revealed that there has been an increment in rural poverty from 63% in 2003 to 76 percent in 2014 (Zimvac 2014). Furthermore, there has been a considerable decline in maize production due to such factors as drought, technical and technological constrains for smallholder farmers (Mutanda 2014). There is also lack of a properly articulated policy on food security in the country.

The grain marketing policy of 2000 stipulated that the marketing of grain was controlled by the parastatal Grain Marketing Board (GMB) and private operators were required to declare their holding of grain, or government would confiscate it (Ndlela 2007).The GMB was tasked with maintaining strategic grain reserves and had the sole right to import and export maize (Watson 2003). However, the new grain policy of 2009 allowed millers and other private operators to buy grain directly from farmers. The parastatal is no longer effective in carrying its mandate as a strategic grain reserve a condition, which has contributed much to the food insecurity situation in the country (Mutanda 2014).

Cash cropping is the production of crops solely for cash rather than food as in contrast to subsistence cropping whereby farmers grow crops for food and only sell surplus (Sign 2002). Smallholder farmers are farmers owning small-based plots of land on which they grow subsistence crops and one or two cash crops relying almost exclusively on family labour (FAO 2012). The definition of smallholder differs between countries and agro ecological regions. However, in Zimbabwe it describes the indigenous black farmers (Masvongo et al. 2013). In Zimbabwe, the main cash crops grown by small holders are either industrial crops such as cotton and tobacco or other cash crops sold locally such as soybeans, sunflower and

groundnuts. Food security exists when all people have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences to maintain an active and healthy life (FAO 1996). The definition of food security embraces the four dimensions, which are physical availability, economical accessibility, utilization of food and the stability of the other three over time. Other concepts used in food security and agriculture will be further discussed in the literature review.

1.2 Problem Statement

Even though many factors have contributed to the food insecurity situation in Zimbabwe, one of them was poor maize production (FAO 2013). Maize, which used to be a government-controlled commodity as far as its marketing was concerned, has faced a constant decline in production since 2009. The GMB sets the base price. For example, for 2013-2014 the price per tonne was US$379/tonne, which the Farmers Union of Zimbabwe felt was far much below farmers' expectations of $450/tonne. Furthermore, the GMB paid farmers four months later, making it difficult for maize farmers to purchase inputs for the next farming season (FAO 2015). This could have contributed to a decrease in total area cultivated under maize as more farmers opted for crops such as tobacco where farmers receive payment upon delivery (Zimstats 2013). There has been an increase in the number of new smallholder farmers joining the tobacco-growing sector in Zimbabwe. For instance, in comparison with the 2012 growing season, the number of tobacco growers registered in the 2013 growing season increased by 22,000 from 42 570 to 64,775 (TIMB 2013). Studies have revealed that there are many socio-economic benefits associated with cash cropping. One major benefit being an increase in income. The increase in income helps to provide cash so that food becomes economically accessible to those households not directly producing their own food (De Schutter 2011). There is limited empirical evidence on the direct effect of the shift from food to cash cropping on food security. According to Devereux et al. (2003), it is not always the case that an increase in income inevitably results in an increase in food security as there are many other uses of income at the household level, besides purchasing food (Brown and Kennedy 2003).

Whilst there are several recent studies in Africa to determine factors affecting food security in farming households (Gebre 2012, Muhoyi et al. 2014, Mango et al 2014), most of the empirical evidence on the impact of cash cropping is old (Von Braun and Kennedy 1986, Von Braun et al.1991, Govereh et al. 1999) and not sufficient to explain the current situation. According to the study by Gebre (2012) on determinants of food insecurity in Ethiopia, socio-economic factors such as gender, household size, and farm sizes were among the factors affecting food

security levels in households. There is inadequate information on how farming decisions affect the level of household food security. Whether farmers pursue cash crop production or food crops, an understanding of the implications of cash cropping on the household food security level is missing. The problem, therefore, is inadequate information on how the cash crop producing farmers meet or fail to meet their household food needs and the determinants thereof. This will allow derivation of recommendations to improve food security at the household level**.**

1.3 Objective

The objective of the study is to analyse factors determining production of cash crops at household level and the impact of such choices on household food security status.

Specific objectives

1. To determine the household crop production patterns among smallholder farmers.
2. To determine the household socio-economic factors influencing cash crop production decisions.
3. To determine the impact of cash crop farming on household food security.
4. To identify the uses of household income and the factors determining the use.

1.4 Organisation of the thesis

The thesis is organised into seven chapters including this introductory chapter. The next chapter is the literature review, which provides definitions for key concepts and empirical evidence on farm decision making and impact of cash cropping on food security Chapter 3 provides empirical evidence on the cropping patterns of smallholder farmers in Shamva District. Chapter 4 gives empirical evidence on determinants of commercialisation. Chapter 5 presents empirical evidence of impact of cash crop production on food security. Chapter 6 analyses the household income-expenditure patterns and determinants of food expenditure in smallholder farming households. Finally, chapter 7 presents the conclusion, policy implications, limitations and suggestions for further study.

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CHAPTER 2 LITERATURE REVIEW

2.1 Introduction

In this chapter I present the contextual framework and empirical evidence on cash cropping and food security. The Chapter is organised as follows: Section 2.2 operationalises the concepts used in smallholder cash crop farming and food security. This includes definition of terms and the conceptual framework of analysis. The evolution of smallholder production in Zimbabwe describes how farmers make decisions on whether to pursue cash crop production or food production is in Section 2.3. Section 2.4 provides the empirical evidence on the impact of cash cropping on food and the main theories explaining smallholder farmers' production decisions. Section 2.5 presents the summary of the literature review and shows the main research gaps addressed in this study.

2.2 Operationalizing cash crop farming and food security

This subsection defines the key concepts of food security and smallholder farming. It focuses on the use of the term food security at the household level and the contextual meaning of smallholder farmer in Zimbabwe. The section also outlines some of the methods that used to assess food security with their strengths and limitations

2.2.1 Definition of terms

Food security is a situation that exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life (World Food Summit 1996). Consequently, food insecurity is thus defined as a condition when individuals have an uncertain or limited access to food through socially acceptable channels (Tawodzera, 2011). The definition of food security embraces the four dimensions of food security, which are Food Availability, Accessibility, Utilisation and Stability of these three over time

Physical Availability Food availability addresses the "supply side" of food and is determined by the level of food production, stock levels and net trade.

Economic and Physical access to food is the ability to acquire sufficient quality and quantity of food to meet all household members' nutritional requirements for productive lives.

Utilization, in the context of food security, refers to the individual's biological capacity to make use of food for a productive life (Bilinsky and Swindale 2007). Sufficient energy and nutrient intake by individuals is the result of good care and feeding practises, food preparation, and diversity of the diet and intra-household distribution of food.

Stability of the other three dimensions relates to the fact that one should have an adequate intake of food throughout the year and any anticipated shortages or anxieties about food classifies one as being food insecure. Even if one's food intake is adequate today, one is food insecure if one has inadequate access to food on a periodic basis, risking a deterioration of the nutritional status. Adverse weather conditions, political instability, or economic factors (unemployment, rising food prices) may have an impact on one's food security status (FAO, 2012). Household food security, therefore, goes beyond the availability of food by production but ways and means, which families use to put food on the table (Smith and Sumbadoro, 2007). Food security analysts have categorised food insecurity into two that is transitory and chronic food insecurity. Transitory food insecurity emanates from the concept of seasonality of food (in) security. It occurs when there is a cyclical pattern of food insecurity, which may be a result of climate, cropping patterns and labour demands (Coates et al. 2007). Chronic food insecurity exists when people are not able to meet their minimum food requirements over a sustained period of time (FAO, 2008)

Smallholder farmers are defined in various ways depending on the context, country and even ecological zone (Mutami 2015). Often the terms 'smallholder' 'small-scale', 'resource poor' and sometimes 'peasant farmer' are used interchangeably. The term smallholder farmer is used more generally to describe rural producers who mainly use family labour and derive their income from on farm activities and in Zimbabwe, it has been generally used to define indigenous black farmers with small land holdings (Masvongo et al. 2013*)*. Smallholder farmers have been characterised with low hectrage, however, this differs with regions. For instance, in high potential areas, it can be as low as one hectare and in semi-arid areas, as high as 10ha (FAO, 2012). Landholdings for smallholder farmers in Zimbabwe range from 1,5ha to 8ha (Zimstats 2013).

A cash crop is a crop grown for direct sale rather than for subsistence (Arcgherbosch, 2014). The distinction between a cash crop and a food crop lies in the purpose for which it is grown. Whilst the purpose of cash crop farming is to generate a profit, subsistence production focuses on production for consumption. The term 'commercialisation' is closely associated with cash crop farming. Studies dealing with the commercialisation of smallholder agriculture also

analysed the shift from food crops to cash crops (Umar 2013, Shumba and Whingwiri 2006). Increased commercialisation can be due to purchasing high value inputs to generate surpluses for food crops or increasing production of high value cash crops.

A commercialisation index can be measured by the degree of market participation. Von Braun (1994) postulated three main ways of measuring commercialisation. The first is the output-input specialisation, which is the measure of agricultural output sold to the market and input acquired from market as a proportion of the value of agricultural production (Ele et al. 2013). The second index is the extent of household integration into the cash economy measured by the value of goods and services acquired through market transactions to the total household economy (Jaleta 2010). The third index extensively used in crop commercialisation studies, is the proportion of volume of crop marketed by a household. The index is computed the ratio of the gross value of all crop sales per household per year to the gross value of all crop production (Kiriti-Nganga and Tisdell 2002, Govereh and Jayne 2003, Ele et al. 2009, Kamoyo et al. 2015, Osman and Hassain 2015). A commercialisation index value of zero implies complete subsistence and if it is closer to one, it implies a higher degree of commercialisation. Many smallholders practise some degree of commercialisation (Shumba and Whingwiri, 2006). There are a few cases where smallholders concentrate on a narrow range of crops just for the market. Other definitions of commercialisation have focused on degree of crop intensification in terms of increased use of input to increase the output (Van Braun and Kennedy, 1986). The major cash crops grown by smallholders in Zimbabwe are tobacco, cotton, sunflower and soybeans (Zimstats, 2012).

2.3 The conceptual framework

The Sustainable Livelihoods Framework (SLF) was applied to conceptualise how smallholder agriculture evolved in Zimbabwe as influenced by history, context and trends. The SLF implores that households use available resources (assets) to pursue certain livelihood outcomes (Allison and Ellis 2001). The context provides a background on how smallholder farming evolved in Zimbabwe as affected by different policies and structures, which supported or hindered farming households towards the production of certain crops. The primary characteristic of smallholder agriculture in semi-arid developing countries is its diversity in space and time (Rukuni et al. 2006). The context comprises the history, trends in production, market forces and international economic environment. Farmers face a series of unpredictable changes originating at global levels. These include increased competition for natural resources

(for example land, water and forestry), changes in global markets, rising cost of production (rising fuel prices and inputs) and climate change (IFAD, 2013).

2.3.1 Transformation of the smallholder agricultural sector in Zimbabwe

Central to understanding of smallholder agriculture in Zimbabwe is the policy framework, history, context and trends in the sector. Though the Land Policy had been central to agrarian change, there are other broad macroeconomic policies, which have shaped the production trends in the agricultural sector (Moyo 2011). Some of the policies and programmes include Economic Structural Adjustment Programme (ESAP) and Dollarization. Post-independence (1980-1999), under the Lanchester house agreement, land reform was based on willing buyer willing seller mechanism (Moyo et al. 2000, Juana 2005, Sachikonye 2005b). The GOZ was required to purchase land for resettlement of the communal farmers, however, due to high land prices and absence of international fund to support land purchases, the programme did not achieve its redistributive objective. The GOZ acquired 3 498 444 hectares of land and resettled 71 000 under family under this first land reform during the period 1980-1999. Under this programme, settlements are Old Resettlements (OR) (Sachikonye 2005b). During this period, government of majority rule shifted focus towards promotion of smallholder farmers (Rukuni et al. 2006). The new Government's focus was to increase productivity in the smallholder sector while maintaining production in the commercial sector. Food crop production dominated the smallholder sector (Moyo 2011). Cotton was the most popular smallholder cash crop in the rural areas due to its drought tolerance capabilities (Govereh et al. 1999). Favourable market prices, accessibility of output and input markets, research and extension offered by the government led to the increase in production by smallholder farmers (Dekker 2009).

In (1994), the GOZ adopted an international policy called ESAP, which promoted free market forces in allocation of resources. The result was privatisation of many parastatals including marketing boards and scrapping of subsidies for farmers'. ESAP was a prohibitive policy in smallholder production, as most of the communal farmers could not afford the costly agricultural inputs at market prices. The GOZ in 2000 implemented the FTLRP that had both positive and negative impacts on the agricultural sector and the economy. The programme ensured resettlement of 127 192 A1 farmer on 3.7 million hectares of land and 7260 A2 on 2.2 million hectares of land (Sachikonye 2005b). The unintended effects of the FTLRP include the displacement of farm workers and reduction in national agricultural productivity, For example, maize declined from 1.7million tonnes in the 1990s to about 9.5million in 2000-2004. Cash

shortages and the hyperinflationary environment led to the characterised the economy of Zimbabwe until the formation of the Government of National Unity (GNU)

In 2009, the Government of Zimbabwe (GOZ) in collaboration with the Ngo sector implemented many programmes to support the small-scale farmers in areas of input, credit and extension. Programs such as 'Maguta of 2009', champion farmer, the Agricultural Support and Mechanisation were aimed at boosting national agricultural production. After 2010, the GNU adopted the use of multicurrency, with some recovery in the economy agricultural inputs became economically accessible. Smallholder farmers also started to venture into crops such as tobacco after the fall of cotton prices on the international markets. Agricultural production has increased substantially from 2010. Chamunorwa (2010) found out that the productivity of cash crops varied between A1 farmers and communal farmers in Mashonaland west province of Zimbabwe. A1 farmers grew more cash crops on relatively larger piece of land than their communal counterparts did. Mutami (2015) also realised that maize dominated the crop mix of smallholder farmers in Mazowe district. Furthermore, the cash crops tobacco and soybeans have been on the rise since 2010.

2.3.2 Assets, livelihoods strategies and livelihoods outcomes

IFAD (2013) defines livelihood assets as the resources that are available at household's disposal in pursuit of livelihood strategies. These are termed household capital. Five common types of capital/assets are noted. These are social, physical, human, natural and financial /economic. Studies on food security have shown that farmers with high resource endowments tend to be more food secure (Gebre 2012, Muhoyi et al. 2014). Human resources refer to the skills, knowledge, ability, and work. According to Mubanga et al. (2015), the labour requirements are one of the determinants of choice of the crop, as households tend to shun from labour intensive crops such as tobacco when they do not have adequate labour. Social capital refers to social connections that the household have. The physical capital refers to the basic infrastructure, which is available to the household. These include roads networks, storage facilities, and livestock (when used for draught power). In Zimbabwe, there has been a negligence on public economic infrastructure for the past decade. This is characterised by poor road networks, non-functional railway lines, power cuts, non-functional telephone infrastructure and obsolete irrigation equipment (Anseeuw et al. 2012).

Financial capital represents the economic base including cash, credit/debit, remittances, savings, and other food stocks, which are important in the pursuit of any livelihood strategy. Financial capital as characterised by access to credit, was one of the determinants of food security in Ghana as households with greater access to agricultural credit being more food secure than their counterparts. Natural capital is the natural resource stocks from which resource flows and services useful for livelihoods resources. These include soil, water, forestry and ecological service. Based on the resources available (assets they can access), taking account of the context they are in and supported or obstructed by policies and processes households pursue different livelihoods strategies (Ellis 2000). Livelihood strategies include production activities, investment strategies and reproductive choices. The major characteristic of rural livelihood strategies is that they are dynamic and households follow a diverse income generating activities at the same time (Ellis 1988). For instance, a household might be cultivating both cash and food crops, with some of its members providing off farm labour and doing petty trade at the same time.

2.3.3 Methods used to assess food security

The complexity of the definition of food security makes it almost impossible to find one universal indicator for food security (Nord et al. 2007). There are various methods which are used to measure food (in)security depending on the dimension one wants to measure (availability, accessibility or utilisation). Despite the fact that previous decades' measurements were based on supply side measurements of food production and availability there has been tremendous development towards assessment of accessibility and utilisation since 2000 (Bilinsky and Swindale 2007). The methods can be qualitative for example the Household Food Insecurity Access Scale (HFIAS) or quantitative for example the Household Expenditure Survey (HES), however, literature show that most of these methods have elements of both qualitative and quantitative measurements since food security is a complex and dynamic concept (Nord et al. 2007, Coates 2007).

Anthropometric indicators such as height, body mass index can also be used to measure food utilisation indirectly based on the World Health Organisation. Using these methods people showing signs of stunting, wasting, underweight or obesity are considered food insecure. One set back of such measurements is that poor nutritional status does not always reflect food

insecurity and could be the consequence of health and environmental factors too (Coates, 2007).

The Household Income and Expenditure Survey (HIES) report estimates food consumed within a specified period. Therefore, such measurements can compute diet quality and economic vulnerability. One common proxy indicator derived from the HIES is the Dietary Diversity Score (DDS) which gives the number of different food groups consumed over a given reference period and this method has been used in food security analysis programmes in Zimbabwe (Tawodzera, 2011, Mango et al. 2014). Different food groups emerged as providing essential nutrients making it possible to estimate food utilization assuming that a highly diversified diet will contain almost adequate quantities of nutrients (Blinksy and Swindale, 2007).

Household Food Insecurity Access Scale (HFIAS**)** is a qualitative approach, which measures people's perceptions and attitude towards food accessibility. Based on the answers from the Food and Nutrition Technical Assistance (FANTA) project, 18 questions questionnaire, a distinction is between food secure and food insecure people across different cultures (Coates et al. 2007). The basis of the HFIAS is that, universally, households respond in a similar way when they experience certain food insecurity experiences (Swindale and Blinksy 2006). The three major domains of food insecurity covered by the questions are: anxiety or uncertainity, insufficient quality and insufficient quantity (Castell et al. 2015). In order to catergorise households according to the severity of food inacess the householud prevalence of food inacess is used. Four categories of food (in) security are developed: food secure, mildly food insecure, moderately food insecure and severely food insecure (Coates et al. 2007). This categorisation is important for targeting of interventions. The extensive use of the HFIAS lies in its easiness to use and affordability in terms of costs compared to other anthropometric indicators which requires highly trained personal to collect data (Hoddinot 1999, Swindale and Blinksy 2006). The major drawback is that it mainly measures food access and neglects utilisation. However, strong correlations between HFIAS and other anthropometric measurements (indirectly measuring food utilisation) such as Body Mass Index and mid upper arm circumferences have been identified in other studies (Nord et al. 2002, Decock et al. 2013, Kadiyala and Rawati 2013). The HFIAs will be used to measure food security in this study as it have been shown to be a stable, robust and reliable food access measurement tool (Chege et al .2015, Carlletto et al. 2017)

2.4 Smallholder Agriculture and Food Security Empirical Evidence

Smallholder farming is the backbone of African agriculture and food security (FAO 2012). The majority of the farmers residing in rural areas are smallholders. The effects of commercialisation on income, consumption, food security and nutrition are very multifaceted in nature and hinge on household preferences and intra household allocations (Von Braun 1994). Devereux et al. (2003) established that, the decision to grow a particular crop is in consideration of certain factors. The debate on whether farmers should pursue cash cropping or food crop has been on-going (Govereh et al. 1999). This subsection, therefore, focuses on the empirical evidence on determinants of food security at household level, determinants of farmers' production decisions, determinants of expenditure and the effects of cash cropping on food security. Several theories are examined independently to analyse household food security and households' production behaviour.

2.4.1 Economic theories to explain smallholder farmers' production behaviour.

Ellis (2000) highlighted the four farm household economic theories that seek to explain peasant economic behaviour under risk and uncertainty. These theories assume that households or farmers behave rationally. A view carried out by neoclassical economists and sometimes referred to as the Economic Rational Theory. Of particular concern in this research is the utility maximisation theory and Risk aversion theories. Farming (especially smallholder) is characterised by a production uncertainty that the amount and quality of output is unknown with certainty given a bundle of inputs. This is because uncontrollable elements such as natural disasters and price fluctuations play a fundamental role in agricultural production (Allison and Ellis 2001).

The utility maximization theory, developed from Schultz (1964), hypothesises that farm households in developing countries are 'poor but efficient". Schulz's positive theory was based on several assumptions, for instance, the household is treated as a farm firm, defined in a context of perfect competition. The utility is taken to be solely a function of income; thus, utility maximization coincides with profit maximization. Therefore, farmers are likely to invest intensify use of inputs in crops which fetch higher prices on the market. The higher the market prices, the more the inputs put into production (Ellis 2000). This theory has been criticized heavily for treating farming households as a homogeneous unit yet the different conditions and contexts in which the household thrive in exhibits heterogeneity in the household as firms

(Rukuni et al. 2006). The use of the microeconomic theory of farm household utility theory, which recognises the households as both producer and consumers, addresses some of the shortfalls of the utility maximization theory.

The Risk Aversion Theory

The primary characteristics of smallholder agriculture in semi-arid developing countries are its diversity in space, its variability through time, and its multidimensionality in terms of the ways it operates and survives (Mendola, 2005). Farming especially smallholder is inherently risky and farmers operate under extreme levels of uncertainty. According to Jaleta et al. (2009), the uncertainty emanates from natural hazards (climate change, drought, pests and diseases), market fluctuations and social uncertainty). Farmers are therefore cautious under those risky conditions. The farmer's risk aversion can be conceptualised by either the standard expected utility theory or the disaster avoidance approach. The risk aversion theory focuses on trade-offs between profit maximisation and risk aversion. Smallholders are reported to exhibit risk aversion in their decision making and to be risk averse out of necessity because they have to secure their household needs from their current production or face starvation (Umar 2013, Mbukwa et al. 2014).

2.4.2 Determinants of crop production choices

Few studies have been carried out in Africa recently on factors affecting farmer's choice of crop (Mudzonga and Chigwada 2008, Mubanga et al. 2015); however, many studies focused on one or two factors or adoption of a certain innovation for example conservation farming (Chamunorwa 2010, Adijah et al. 2013, Zamasiya et al. 2014). Based on the SLF the decision to produce certain crops is influenced by household assets and supporting structures. Using the Tobit regression, Ele et al. (2013) identified that off farm income, age, household size, gender, level of education and membership of an association were positively associated with the commercialisation of food crops in Cross River state, Nigeria. Justus et al. (2016) also found farm size together with agricultural services such as extension, markets and credit being positively associated with commercialisation in Rwanda. When assessing the impact of cooperatives on commercialisation, Bernarda et al. (2008) found group membership to be positively associated with commercialisation. Kabiti et al. (2016) found out that commercialisation of maize in smallholder farmers of Munyati area, Zimbabwe was positively affected by labour, age and off farm income. However, communal land holding was found to negatively influence commercialisation in the same study.

According to Mubanga et al. (2015), availability of markets can be regarded as one of the core factors affecting choice of crops as evidenced by farmers in Zambia where regardless of late erratic rains in 2012/2013 season most of the farmers went on to grow maize since it had a readily available market than other cereals such as sorghum. This is also in line with Greg (2008), who singled out availability of the markets as one of the determinants of agricultural production decisions. According to Martey (2012), accessibility of credit is expected to link farmers with modern technology, ease liquidity and input supply constraint thereby increasing agricultural productivity and market participation. Therefore, farmers with greater access to finance are likely to grow more cash crops than those failing to access credit. Other socio economic factors include gender, age and education level of household head (Kiriti-Nganga et al. 2003, Akaakohol and Aye 2014, Alderman 2014). Smallholder production of cash crops in Africa have been influenced by household characteristics of (gender household head, age of household head and household size) and household resources and endowments .These include farm income, labour and access to extension, markets and draft power (Von Braun 1994, Kiriti-Nganga and Tisdell 2002, Jaleta et al. 2009, Mwangi et al. 2013, Justus et al. 2016)

2.4.3 Determinants of household food security

Following the criticism of the Malthusian population growth theory in its failure to explain the food insecurity when global food production outpaced population growth, Sen's entitlement stating that household food security is based on household entitlements and endowments (Dewall 1990). Therefore, according to Sen (1980) households are able to acquire their household food needs based on three forms of entitlements. Firstly, the trade based entitlement, which is the ability of a household to sell certain commodities to earn income, which they can use to purchase food. Secondly, the producer based entitlement, which refers to the ability of a household to grow enough food for its consumption (Von Braun et al. 1991). Thirdly, the own labour based entitlement which is described as the ability of a household to offer labour (skilled or unskilled) for purchasing or producing food. The volatility of food prices (in most cases due to external forces) results in loss of exchange entitlements thereby reducing household access to food. Fourthly, transfer based entitlements, which relates to access for food through inheritance or food transfers from government non-governmental organisations or other person in the society (Devereux, 2003 et al.).

Criticisms of Sen's approach point that it was limited in that its basis was exclusively on endowments and entitlements undermining the fact that in times of famines some people may

choose to starve than dispose of their capital (Dewall 1990). Several studies on determinants of food security seem to concur with Sen's entitlement theory on entitlements (Akaakohol 2014). For farming communities, their main source of food entitlement is producer-based entitlement and this determines food availability and accessibility (IFAD 2013). The resource base (financial, human, social, physical and natural) of a household allows households food entitlements for example a rich social network allows for transfer based entitlement. Farmers with a higher asset base are likely able to cope with shocks such as drought by disposing some of their assets to purchase food. A multi regression analysis on the determinants of food security in Ghana showed that farmers with more access to credit, access to more agricultural land and owned more livestock were found to be more food secure compared to those who had less of those resources (Aidoo 2013). This can be attributed to the fact that these assets improve the productivity of farming as a livelihood hence increasing food availability. Similar results were found in Tanzania where farmers who had more access to physical assets were more food secure than their counterparts do with less assets (Mbukwa 2014).

Physical assets such as tools and equipment allow for technical efficiency of production of crops. Infrastructure such as roads and storage facilities are important for marketing of the crop. Households with higher dependency ratio were less food secure in Pakistan (Sultana and Kiani 2011). This forms one of the basis of Sen's approach that if a household does not have enough labour to produce own food or to offer in exchange for income it becomes food insecure under the labour based entitlement. Mango et al. (2014) computed the effects of age of household head and level of education as a proxy for human capital on Household Diversity Score and realised that farmers who had more farming experience were more food secure than those with less experience do. A general consensus of most of the studies on food security is that the resource ownership of a household is the major determinant of food entitlements in the household (Dercon 2002, Gebre 2012, Musemwa et al. 2013, Mango et al. 2014, Ncube 2012, Kirimu et al. 2014).

2.4.4 Household expenditure patterns

Since income largely determines food accessibility, it is imperative to study the household expenditure patterns in order to understand effect of income use on the food security situation of cash crop farmers. Household expenditure results from budget limitations at the one hand and choices based on needs, demand and preferences on the other hand. Households maximise their utility by choosing a set of goods according to their preferences, the market price and

wealth (Syrovatka, 2003). Much of the work on household expenditure surveys has used four main components of expenditure: Food, durable goods, Education, Health and Transport. (Smith and Sumbandoro 2007, Swindale and Bilinsky, 2006).

For households in low income areas food expenditure was the highest expenditure category (Browne et al. 2009, Sekhampu 2012, Adekoya 2014, Akaakohol and Aye 2014, Seng 2015) and the elasticity for food is expected to be higher than that for high income (Browne et al. 2007). Umeh and Asogwa 2012 analysed the determinants of household expenditure for rural households in Nigeria using the OLS. Their results identified that the income, age of household head and household size to be the significant factors in affecting household expenditure. An increase in household income resulted in a positive increase in household food expenditure. This is in line with empirical evidence by Sekhampu (2012), in South Africa who identified income and household size as the main factors determining expenditure.

According to Babatunde (2010), both farm income and non-farm income positively affect food expenditure. Akphan et al. (2013) used regression to analyse the determinants of food expenditure realised that food expenditure contributed more than 40% of total expenditure for agro firm workers in Nigeria and food expenditure was positively influenced by non-food expenditure. In a study done by Adekoya (2014) in Nigeria income, age, sex and marital status were the major determinants of household expenditure. A double logarithm regression model carried out by Umeh and Asagowa (2012) to analyse determinants of household expenditure showed that where there are many dependents food consumption would be sacrificed to cater for other household needs such as education. However, household size in other studies was positively influencing food expenditure (Babatunde 2009, Sultana 2011. Results from a baseline study report on household hunger, coping strategies and household dietary diversity in Zimbabwe in (2015) showed that female-headed households experienced higher rate of severe hunger as compared to male-headed households (Zimvac 2016). Ali-Olubandwa (2013) also asserted that male-headed households tend to be more food secure than female-headed households do. Food expenditure in rural households is affected by income, price and other socio-economic demographic characteristics. (Meng et al. 2012).

2.5 Empirical evidence on impact of cash cropping on household food security.

The benefits of cash cropping and limitations will be discussed under the four dimensions of food security: Availability, Food Access, Utilization and Stability.

Food Availability-Much of the studies done on the impact of cropping decisions on food security was mainly done on diversification and food security rather than singling out cash crops effect on food security (Goshu et al. 2012). Achterbosch et al. (2014) gave a broader picture on how cash cropping in Africa increases food security at the national level. The study postulated that export crops such as tobacco and cotton increases the net export value of a country, however per capita distribution of that income is not always equal. Empirical evidence in Africa is not conclusive on whether crop diversification, especially into high value crop, has a direct impact on household food security as the effect is sometimes negative, neutral or positive (Von Braun 1994, Goshu et al. 2012, Achterbosch et al. 2014). According to Von Braun (1994), the outcome depend on whether government policies are directed towards improving the productivity of food crops or cash crops and trade policies between countries as most of the cash crops are export oriented. The general consensus, however, is that since land size is a fixed resource in smallholder agriculture the opportunity cost of introduction or the expansion of cash crops on land is a decrease in food production unless technologies to improve yields are included (Mazunda et al. 2012, Muhoyi et al. 2014). The underlying argument against expansion of cash crop production, therefore, is that food entitlements through production will be reduced as farmers grow more cash crops and abandon their own food production (Achterbosch 2014, Anderman 2014). Whilst these studies show the competitive nature of cash crop expansion, some empirical evidence suggests that the relationship is rather complimentary. Crop diversification into high value crops has a positive effect on production system through crop rotation (Sichoongwe 2014). Residues of fertilizer from previous cash crops can be utilised efficiently in the production of food crops (Joshi et al. 2006, Anderman et al. 2014). This is associated with an increase in food crop yields. Govereh et al. (1999), found the commercialisation of cotton production in Zimbabwe to be impacting positively food availability of households producing cotton. In the same study in Mozambique farmers through contract farming.

Food accessibility. The incorporation of economic and physical access into food security definition shows that income is a major determinant of food security (Devereux and Maxwell

2000). Household food security indicators such as HFIAS and HDDS measure the economic access of food. Although fewer studies have been done on direct effects of cash crop farming on food security especially in Africa (Govereh and Jayne 2003, Justus et al. 2016), much of the previous work done in Zimbabwe on viability of cash crop production has proven that cash cropping results in increases in household income (Jayne 1994, Masvongo et al. 2013). According to a study carried out by Masvongo et al. (2013), using gross margin analysis on the viability of tobacco production in Mashonaland central Zimbabwe it was established that the crop was economically viable and a reliable source of income for smallholder farmers. The extra income from cash crops can be used to buy inputs, which are required for more intensive food production.

According to Joshi et al. (2014), diversification of crops including the production of high yielding and high value crops had the strongest impact on incomes at the household level. Despite the positive contribution of cash, cropping to household income the income pathway is not always linear. Such factors as household nutritional knowledge, characteristics of food markets and gender of household head (Mazunda et al. 2014) affect the implications of increased household income from agricultural production. There is need to consider the implications of increased cash cropping separately at national and household level as the effects may not be the same. For instance, Van Braun (1994) argues that cash cropping at the national level is expected to increase exports and such additional income can be used to purchase food products. However, at the community level, the unavailability of immediate food crops may push the local prices of food commodities and the income gained may not be enough to offset all the food needs (Devereux and Maxwell 2000). According to Jayne (1994), households that produced cash crops still had enough food at constant food prices.

Food utilisation Food utilisation goes beyond food consumption as it looks at nutrition. Empirical evidence shows that Income from cash crops had a positive effect on child nutrition if households have access to health services (Goshu et al. 2012, Mazunda et al. 2014). Typically, the assumption is that income-mediated effect on nutritional improvements operates through two main pathways. First increased income can be used to purchase a wider range of foodstuffs and this positively affects the household dietary diversity. Secondly, the income can be used to buy non-food items such as access to health facilities thus improving the health status of household members and their ability to utilise available food efficiently.

In Malawi, HDDS increased for households involved in diversification into cash crops (Mazunda et al. 2014) however, the impact on other micronutrients was neutral. A similar study (Snapps and Fisher 2014) to determine the effect of improving food production (through maize input subsidies) showed that increased maize production did not have any direct effect on farm households' dietary quality. Carletto et al. (2017), analysed commercialisation and nutrition in Tanzania, Uganda and Malawi. The results indicated high levels of malnutrition. Using the logit model for analysis, the trio concluded that there was no relationship between commercialisation and astrometric outcomes. However, there was little evidence of a positive relationship between commercialisation and food consumption in Uganda according to Wiggins (2013).

Stability of food over a period. In Zimbabwe, dependency on rain fed agriculture has been synonymous with the seasonality of food production and food availability. Jayne (1994) assessed if the changes in food markets left cash crop farmers vulnerable. The study concluded that farmers who grew cash crops efficiently were also identified as the farmers growing sufficient food crops, which could take them through the lean season. Therefore, according to that study it was established that cash cropping did not have any negative impact on food supply in farming households. However, other recent studies carried pointed out that volatility of quantity of food that can be purchased using cash crop income puts farmers at risk, as there will be insufficient income to purchase their food needs to last all year round. This is because food prices are always volatile. Therefore, the dimension of stability in the food security definition will not be met. (Tawodzera 2012, Kirimu et al. 2013). In summary, the effects of introduction or expansion of cash cropping on food security varies within locations and types of crops grown. The effect on food security is through the mediated income effect of which the direct effect is complex due to different expenditure patterns and intra household food distribution (Justus et al. 2016).

2.5 Summary

This literature review presented in this chapter conceptualises smallholder farming in Zimbabwe and gives empirical evidence on impact of cash cropping on food security for smallholder farming households. The broader changes in agrarian structures has been described as affected by history, context and trends. The review shows that smallholder agriculture have evolved over time with changes in land holdings and type of crops grown (Anseeuw 2012, Dekker 2009). Smallholder farmers over the years have also become more market oriented with

more smallholder farmers involved in production of cash crop such as tobacco and cotton (Shumba and Whingwiri 2006, Chamunorwa 2010). Maize being the staple food is grown countrywide (Anseeuw 2010, Mutami 2015), however, there is limited evidence on the proportion of area covered by maize and other crops. The study will elaborate further on which cash and food crops cover the biggest area across the different types of smallholder farmers.

Various studies done in Africa showed that smallholder farmers decision-making is usually utility maximisation under risky conditions (Devereux et al. 2003, Jaleta 2009, Okezie et al. 2012). The decisions to commercialise and extent of commercialisation are affected by a set of variables. According to Von Braun et al. (2001), increased commercialisation may be as a result of growing more cash crops or generating more surplus food crops for sale. Most of the studies have concentrated on commercialisation of specific food crops such as maize, bananas cassava and groundnuts (Ouma et al. 2010, Okezie et al.2012, Ele at al. 2013, Msongaleli et al. 2015, Justus et al. 2016,). These studies have been able to highlight the factors determining commercialisation of specific crops. However, as alluded by some studies on commercialisation, farmers grow a combination of food and cash crops in one particular season (Govereh and Jayne 2003, Kiriti and Tisdell 2002) therefore commercialisation decisions of one specific crop cannot be generalised for all the crops. This research will therefore, add to existing knowledge by using aggregate commercialisation index of all crops.

The concept of food security is complex to measure as it consists of four main dimensions of food availability, accessibility, utilization and stability. The dimensions do not have a universal method of measurement (Carlletto et al. 2017). Whilst several methods have been used in different impact studies (Chege et al. 2015, Tankari et al. 2017), the HFIAS will be employed for this study as it will be able to show the mediated effects of income from cash crops on food security. Empirical evidence presented on impact of cash cropping on food security is inconclusive. Some studies have asserted that increased cash crop production or commercialisation has positive impact on food security (Govereh 1999, Govereh and Jayne 2003, Joshi et al. 2006, Anderman et al. 2014, Justus et al. 2016). However, other studies have shown that increased cash crop production have negative impact on household food security for smallholder farmers in low potential areas (Chege et al. 2015, Tankari et al, 2017). Another study has found cash crop production being positively associated with food access but having neutral effects on utilization (Mazunda et al. 2014). The study will therefore add to existing

knowledge on the impact of cash crop production on household food security.This will add to existing knowledge on formulation of policy instruments to improve food security

Household income and expenditure patterns are important in determining welfare of household and food security. For households in low-income areas food expenditure was the highest expenditure category in previous studies (Browne et al. 2009, Sekhampu 2012, Adekoya 2014, Akaakohol and Aye 2014, Seng 2015). Expenditure patterns are affected by a set of variables. This study will reveal the income levels in the smallholder farming households and unpack the set of variables affecting food expenditure. This is important in providing recommendations for demand led agricultural growth in the smallholder agricultural sector. Generally, this study will bridge the research gaps on how the cultivated area is distributed among cash and food crops, factors affecting such choices and impact thereof on food security.

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CHAPTER 3 CROPPING PATTERNS IN SMALLHOLDER FARMERS. A CASE OF SHAMVA DISTRICT

3.0 Abstract

The agricultural sector of Zimbabwe has undergone transformation with significant changes in land distribution and agricultural supporting policies. As such, there have been considerable changes in the cropping patterns across different land holdings for the smallholder sector. The objective was to assess the cropping patterns between communal, old resettlement and A1 resettled farmers in the area. The research was conducted in Shamva district, Mashonaland Central Province of Zimbabwe and the sample frame consisted of 281 farming households. The results showed that smallholder farming households across the different land holdings in Shamva district have diversified cropping patterns with most farmers growing a combination of two crops. The average area cultivated in the 2015/16 season for the sampled households was 1.87ha. Maize and groundnuts were the main food crops grown in the area. About 95% of the sampled households grew maize in the 2015/2016 season and used about 61% of the total cultivated area. Tobacco covered 17% of the area and was the main cash crop. Statistically significant differences ($p<0.01$) between male-headed and female-headed households were observed in cash crops production with female-headed households planting less tobacco than male-headed households do. The average yield per hectare of maize and tobacco was significantly higher ($p<0.01$) in A1 resettlement than communal farmers. Generally, the farmers consider themselves as having access to most of the agricultural services such as output markets, inputs and extension. However, there is very little financial support for all crops, with only 6.76% of the households receiving financial support. There were no significant differences in accessibility of the agricultural and support services for resettled and communal farmers. Male-headed households had more access to extension ($p<0.05$) and markets ($p<0.1$) than female-headed households. Any agricultural intervention should be geared towards maximising the production of tobacco and maize as the major crops in the area.

Key words: Smallholder farmers, Cash crops, Food crops

3.1 Introduction

The agricultural sector of Zimbabwe has undergone transformation with significant changes in land distribution and agricultural supporting policies (Moyo et al. 2000). Traditionally a dualistic structure existed which emanated from colonisation of the country from 1890 (Shumba and Whingwiri 2006). African farmers were allocated small marginal land in native reserves whilst the white large-scale farmers were given exclusive rights to the rich and fertile soils together with various forms of support and assistance (Chamunorwa, 2010). Land ownership for the black farmers was under communal and mainly staple crops were grown by subsistence means whilst specialised farming and cash cropping was concentrated in the white commercial farms. Crops such as tobacco dominated the exports of Zimbabwe albeit grown by a small population of white commercial farmers (Dekker 2009). After independence in 1980 the drive of the government was to increase the productivity of food crop production in the communal areas and old resettlement areas. Several policies were made to promote smallholder production and marketing of crops for example, the early 1990s saw the establishment of grain marketing boards to improve the marketing of food crops, and the government as the sole buyer of grain offered a guaranteed minimum price (Shumba and Whingwiri, 2006).

The most common cash crop promoted in the smallholder sector was cotton and supporting structures included the establishment of marketing boards in rural areas (Juana and Mabugu 2005). Much of the expansion in the smallholder sector of Zimbabwe from independence until 2000 could be attributed to favourable conditions such as availability of credit facilities, extension and markets (Dekker 2009). As a developmental policy, the government of Zimbabwe in 2000 launched the Fast Track Land Reform Program (FTLRP) and some communal farmers were resettled under the A1 resettlement scheme. The period after land redistribution was characterised by an overall decrease in both food and cash crops. At the national level areas under cultivation for maize declined substantially between 1999/2000 and 2007/8 from 850 000ha and tobacco from 180 000 to 60 000 (Dekker 2009). Although the smallholder farmers have also ventured in other cash crops such as tobacco and soya beans, the small-scale farmers like in other sub-Saharan countries are the backbone of the country's food security and provide about 70% of its staple crop (ZIMVAC 2016). Almost 70% of the rural population is involved in farming as a livelihood (FAO 2012). The primary characteristics of smallholder agriculture in semi-arid developing countries are its diversity in space, its variability through time, and its multidimensionality in terms of the ways it operates and

survives (Umar, 2001). The Zimbabwean smallholder sector is not exempted from this notion as so much has changed from colonial time to post land reform programme (Moyo et al. 2011). There arises the need to define smallholder farmers since definitions vary across spatial and contextual backgrounds.

The definition of smallholder farmer differs depending on the context, the country and even ecological zone. Often the term 'smallholder' is interchangeably used with 'small-scale', 'resource poor' and sometimes 'peasant farmer' (Umar, 2013). The term smallholder farmer is used more generally to describe rural producers who mainly use family labour and derive their income from on-farm activities (Ellis 2000) and in Zimbabwe it has been generally used to define indigenous black farmers with small land holdings (Masvongo et al. 2014). In the context of this research smallholder farmers are characterised by land holdings of 0.5 to 10 hectares. From the Zimbabwean context the smallholder sector now consists of A1 farmers, old resettled (OR) farmers and communal farmers. These sectors are defined by the different schemes of settlement they fall under and will be referred to as such throughout this paper. Smallholder farmers are not homogenous as they differ in context and resource endowments. Cousins (2010), argue that treating smallholders as a homogenous group tend to obscure inequalities and significant class-based differences such as gender and land distribution within the large populations of households involved in smallholder agricultural production. These variations tend to be noticed when one analyses the resulting differences in cropping patterns in terms of output and area allocated to different agricultural activities (Aneseew et al. 2010). Cropping pattern is the proportion of area under various crops at a point in time and space. Cropping pattern can, therefore, be discussed in terms of crops occupying the major share of land, crop productivity and the level of crop diversification (Mandal et al. 2013).

In Zimbabwe, Chamunorwa (2010) found out that the productivity of cash crops varied between A1 farmers and communal farmers in Mashonaland west province of Zimbabwe. A1 farmers grew more cash crops on relatively larger piece of land than their communal counterparts did. Mutami (2015) realised the same results and concluded that newly resettled farmers are more oriented towards cash cropping than other smallholder farmers. However, maize still dominated the crop mix and at least 50% of smallholder land was allocated maize. One other production pattern realised by Juana and Mabugu (2012), is that over the years, smallholder farmers are becoming more market oriented. Whether they grow food crops or cash crops, they have a significant output for sale. Shumba and Whingwiri (2006) concluded that availability of extension services, credit facilities and marketing structures in the

smallholder sector have led to increased participation of smallholder farmers in output markets. In this regard, farmers are allocating a significant proportion of their land to cash crops. However, Dekker (2010), implored that the volatile macroeconomic environment and the harsh economic climate such as hyperinflation and high interest rates of Zimbabwe has often resulted in less financial support to the agricultural sector.

Due to the several changes in distribution of land in the agricultural sector, there has been changes in the cropping patterns of smallholder farmers especially from traditional subsistence food production towards cash crop production. For instance, there has been an increase in smallholder farmers venturing into tobacco production (TIMB 2015). This information is limited for policymaking, as it does not provide adequate analysis of which crops cover the most part of the cultivated area and the productivity of such crops at household level. For example, pre independence 95% of the maize farmers were smallholder farmers though they only contributed 10% of the total maize produced in the country (Rukuni et al. 2006). Though some studies have been done on, different cropping patterns in different areas of Zimbabwe (Chamunorwa 2010 in Mashonaland West, Zamasiya 2014 in Manicaland, Mutami 2015 in Mazowe), cropping patterns are context specific. Assessing cropping pattern for a particular region helps in understanding which crops are being promoted and which interventions should be taken by policy makers to improve smallholder crop production in that particular area. Therefore, the objective of the study is to identify the cropping patterns of smallholder farmers' households in Shamva District.

3.2 Methodology

3.2.1 Description of Study area

The research was conducted in Shamva district, Mashonaland Central Province of Zimbabwe (see Figure 1). The district is located 60km North West of the capital city Harare.

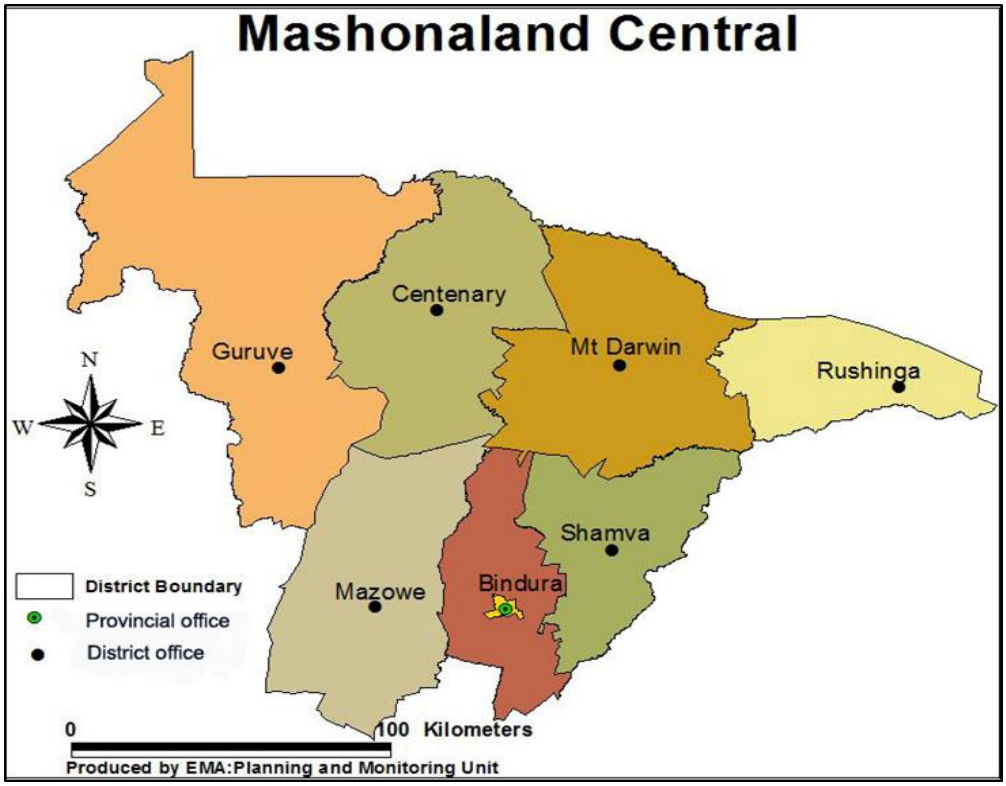

Figure 3.1 Mashonaland Central Province map

The area is classified under natural farming region II of Zimbabwe that is suitable for intensive cropping and livestock production. This area is characterised by mean annual temperature range of 19-23 ºC and rainfall ranges from 750 to 1000 mm/year (Campbell 2003). Rainfall is confined to summer which spans usually from October to February. Shamva District has high mountains, mild hills and valley floors. Soil fertility varies from place to place however light sandy soils to clay soils dominate the area. Generally, farmers in the area practise both crop production and livestock rearing. The main crops grown in this area are cotton, tobacco, soya beans, maize and wheat (Mugandani et al. 2012). A tarred road cuts across from Bindura to Harare, which is in good condition. Communication infrastructure is available and mobile network providers are functional in Shamva District.

3.2.1 Data collection

Data was collected through a household survey in 2016. Using multistage random sampling, 281 farmers were selected. Firstly, the district was randomly selected from the seven districts of the province. The smallholder farmers in the district comprises of A1 farmers, Old resettled

farmers and communal farmers. This is based on the landholdings, as smallholder farmers do not own land in Zimbabwe. Recent studies by Mutami (2015) asserted that newly resettled farmers were more inclined towards cash crop production as compared to their communal counterparts. It is under this notion that there was need to stratify the sample according to different land holdings. Stratified sampling was used to come up with the following strata -A1: 91, old resettlement: 92 and communal: 96 to come up with a representative sample for all groups of smallholder farmers. Data was analysed using the Statistical Package for Social Scientists (SPSS) and Microsoft excel to generate descriptive statistics. A detailed description was used in the results section based on the sustainable livelihoods framework of analysis.

Descriptive statistics were used for analysis of data to give a clear description of resource endowment, age, training, assets, land utilisation, and marketing of crops. Chi squared tests were implored to test for variations on socio-economic factors for discrete variables. The Analysis of Variance (ANOVA) was used to test the significance for mean area under cultivation for particular crops, proportion of area under each crop and yield across different land holdings. The study used independent t test to compare female-headed households and male-headed households. The null hypothesis was given as $H_{0:}$ There is no significant difference between proportions of land allocated to cash crops between the three strata of farmers.

3.3 Findings and Discussion

3.3.1 Household socio-economic characteristics

Table 3.1 summarises the socio-economic characteristics of the households making up the sample frame. The chi squared p value for discrete variables and the p value for the ANOVA are represented by the p value on the table and shows the level of variation across the three farming sectors for different variables. Generally, male-headed households dominate the sampled population. Most of the household heads were middle aged. There was no significant difference across the land holdings for gender of household head, employment status marital status and age of household head. However, there was a significant variation in mean number of cattle ($p< 0.1$), the household size ($p< 0.01$), the total labour ($p< 0.01$) and the total arable land. Farmers under the OR model had the highest mean number of cattle and the A1 farmers tend to have higher total labour. Communal farmers had the least mean household size of about five people.

Table 3.1 Socio-economic characteristics of households

Variable **Discrete variables**		**A1** (n=92)	**OR** (n=93)	**Communal** (n=96)	**Pooled** (n=281)	**Significance value**
Gender of household head (% frequency)	Male	83.7	80.65	80.21	81.8	0.800
	Female	16.3	19.35	19.79	18.9	
Employment status (% frequency)	Formally employed	9.78	11.83	95.83	91.46	0.148
	Not formally employed	90.22	88.17	4.17	8.54	
Marital Status (% frequency)	Married	80.43	79.57	80.21	77.08	0.717
	Otherwise	19.57	20.43	19.79	22.92	
Age of Household head(years)	Mean	48,64	48.82	49.86	4.12	0.812
	Standard Deviation	13.94	13.63	14.67	14.06	
Household size	Mean	6.25	6.81	5.41	6.15	0.007
	Standard Deviation	2.91	3.78	2.33	3.08	
Number of cattle	Mean	4.51	5.22	3.39	4.36	0.062
	Standard deviation	5.28	6.59	3.92	5.4	
Total labour	Mean	7.11	6.32	4.66	6.01	0.000
	Standard deviation	3.2	3.61	2.76	3.36	
Total arable land	Mean	4.39	3.96	2.16	3.48	0.000
	Standard deviation	1.13	1.59	1.19	1.64	

3.3.2 Access to agricultural services

According to the Sustainable Livelihoods Framework of Analysis (IFAD 2012), accessibility of agricultural services constitutes the supporting structures which can influence livelihoods outcomes. Table 3.2 shows the frequency percentage of farmers acknowledging that a particular service was accessible in. There was high accessibility of extension, markets and draft power across all the land holdings. There was no statistically significant difference in accessibility of the three services. On the other and there was little access to finance though there was no statistically significant variation across the three landholdings. A1 farmers tended to be members of formal groups than their counterparts and the variation was statistically significant (significant ($p<0.01$)

Table 3.2 Access to agricultural services by land holding

Variable	**A1 (% frequency yes)** n=92	**Old resettlement** n=93	**Communal** n=96	**Chi-square p value**
Access to extension	93.33	92.47	88.54	0.631
Access to draft power	77.17	83.87	68.75	0.085
Access to markets	72.83	64.52	78.13	0.111
Access to agricultural finance	7.61	7.52	5.2	0.756
Group membership	10.87	6.45	4.17	0.000

Table 3.3 shows variation in accessibility of agricultural services between male and female-headed households. Male-headed households had significantly higher access to extension services ($p<0.05$), markets ($p<0.1$) and members of formal groups ($p<0.01$) than female-headed households.

Table 3.3: Access to agricultural services by gender of household head

Variable	**% frequency Male-headed (yes=1)**	**% frequency Female-headed (yes =1)**	**% frequency Pooled (Yes =1)**	**Chi-square p value**
Access to extension	92.58	82.69	90.74	0.026
Access to draft power	78.17	69.23	76.51	0.170
Access to markets	74.24	61.54	71.89	0.066
Access to agricultural finance	7.86	1.92	6.76	2.369
Group membership	13.54	0	11.03	0.005

3.3.3 Crop production patterns

Table 3 gives a summary of the cropping patterns in terms of the average area allocated for each crop. Nine field crops were identified as making up the crop mix in the area (See table 3.4). Of the nine crops maize, tobacco and groundnuts were the main crops and they occupied at least 5% of the total cultivated area. Maize dominated the crop mix in all the land holdings as the greater area was allocated for maize. At the household level, the food crops sorghum, sunflower and sugar beans were allocated the least land. The crop mix shows variations between different farm holding for cash crops.

Tobacco being the major cash crop was allocated more land by A1 farmers and there was a significant variation in the area allocated for the crop originating from A1-OR ($p<0.05$) and

A1-Communal ($p<0.01$). Though OR farmers allocated more area for tobacco production than communal farmers the difference in average area under tobacco between the two was not significant. Butternut was grown in the old resettlement area only and occupied 8% of the total cultivated land. Soybeans and cotton were grown on a relatively small piece of land as they occupied less than 0.2ha. ANOVA was used to test for differences between total area allocated for cash crops across the three land holdings; the results are presented in Table 3.4. There is no significant difference in the proportion of total land allocated to cash crops between A1 –OR farmers. However, significant differences were realised between A1-Communal ($p<0.01$) and between OR–Communal ($p< 0.01$). Therefore, we reject the null hypothesis that there is no significant difference in proportional area allocated to cash crops across different land holdings.

Table 3.4 Cropping patterns of smallholder farmers by average cultivated area and land holdings

Crop	**A1**	**Old resettlement**	**Communal**	**ANOVA p-sig. level**	**Contrast**
	Area (ha) (Standard deviation)	**Mean area (Standard deviation)**	**Mean area (Standard deviation)**		
Maize	1.41 (0.97)	1.12 (0.10)	0.73 (0.72)	0.001	A1-OR (0.200) A1-com (0.000) OR-com(0.002)
Groundnuts	0.27 (0.44)	0.14 0.30)	0.14 (0.20)	0.011	A1-OR(0.020) A1-com(0.028) OR-com(0.995)
Sunflower	0.04 (0.23)	0.01 (0.09)	0.00 (0.00)	0.150	A1-OR(0.408) A1-com(0.134) OR-com(0.800)
Sorghum	0.01 (0.05)	0.02 (0.16)	0.00 (0.02)	0.663	A1-OR(0.773) A1-com(0.984) OR-com(0.666)
Sugar beans	0.01 (0.05)	0.06 (0.20)	0.012 (0.10)	0.015	A1-OR(0.022) A1-com(0.949) OR-com(0.046)
Tobacco	0.51 (0.64)	0.29 (0.44)	0.21 (0.44)	0.000	A1-OR(0.0150) A1-com(0.000) OR-com(0.519)
Cotton	0.16 (0.43)	0.05 (0.28)	0.06 (0.12)	0.028	A1-OR(0.048) A1-com(0.056) OR-com(0.996)
soya beans	0.12 (0.41)	0.05 (0.30)	0.01 (0.04)	0.022	A1-OR(0.209) A1-com(0.017) OR-com(0.546)
Butternut	0.00 (0.00)	0.16 (0.49)	0.00 (0.00)	0.000	A1-OR(0.000) A1-com(1.000) OR-com(0.000)
Food crops	1.72 (1.15)	1.41 (1.28)	0.88 (1.7)	0.001	A1-OR (0.133) A1-com (0.000) OR-com(0.003)
Cash crops	0.79 (0.75)	0.58 (0.67)	0.28 (0.44)	0.001	A1-OR (0.120) A1-com (0.000) OR-com(0.008)
Cultivated land	2.5 (2.81)	1.97 (1.40)	1.16 (0.87)	0.001	A1-OR (0.038) A1-com (0.000) OR-com(0.006)
Land left fallow	1.63 (2.73)	1.99 (1.30)	1.01 (1.27)	0.002	A1-OR (0.393) A1-com (0.065) OR-com(0.01)

After examining whether cropping difference exists between male and female-headed households the results are presented in Table 3.5 below. Differences were noted between the major cash crops cotton and tobacco. Though the results showed a higher incidence of women growing cotton than men the difference was not statistically significant. On the other hand, males had a higher incidence of growing tobacco compared to women and the results were statistically significant ($p<0.01$).There were no statistically significant differences in cultivation of major food crop (maize and groundnuts) between male and female-headed household.

Table 3.5 Cropping patterns according to the gender of household head.

Crop	**Male heads (% frequency)**	**Female heads (% frequency)**	**Pooled(% frequency)**	**X^2 p value**
Maize (n= 268)	95.20	96.15	95.37	0.767
Groundnuts (n=111)	38.86	42.31	38.41	0.647
Sunflower (n=6)	2.18	1.92	2.14	0.907
Sorghum (n=6)	2.18	1.92	2.14	0.907
sugar beans (n=13)	4.37	5.77	4.63	0.664
Tobacco (n=128)	41.92	9.62	35.94	0.000
Cotton (n=42)	13.54	22.00	14.9	0.164
soya beans (n=18)	6.99	3.85	6.56	0.404
Butternut (n=13)	5.24	1.92	4.6	0.304

3.3.4 Crop Yields

Maize and groundnuts were the major food crops grown by the smallholder farmers respectively. On the other hand, the main cash crops grown by smallholder farmers were tobacco and cotton. The productivity in terms of average yield per hectare of the four main crops is summarised in Table 3.6. The ANOVA was used to test for significance in differences the contrast gives further information on the source of variation. There results show that there were significant variations across the land holding sectors for maize ($p< 0.01$), groundnuts ($p<0.05$) and tobacco ($p<0.01$). For maize ($p< 0.05$), A1 farmers had significantly higher average yield than their communal counterparts did. There was a significant variation for groundnuts in average yield per hectare between A1 and communal farmers. The A1 farmers had the highest average yield for tobacco production and significant variations between A1-OR ($p<0.05$) and A1–communal ($p<0.01$) farmers were observed.

Table 3.6. Average yield for major crops across different land holdings

Crop	A1	OR	Communal	ANOVA p value	Contrast
	Mean yield (kg/ha) (Standard deviation)	Mean yield (kg/ha) (Standard deviation)	Mean yield (kg/ha) (Standard deviation)		
Maize	686.13 (586.18)	410.69 (760.86)	405.87 (398.25)	0.001	A1-OR (0.050) A1-com (0.004) OR-com (0.998
groundnuts	568. (511.65)	273.38 (305.72)	305.72 (333.60)	0.040	A1-OR 0.110 A1-com0.08 OR-com0.932
Cotton	709.44 (397.37)	934.05 (369.08)	760.00 (577.99)	0.604	A1-OR 0.581 A1-com 0.951 OR-com 0.700
Tobacco	1375.05 (692.14)	652.59 (392.36)	943.51 (462.49)	0.000	A1-OR 0.01 A1-com0.06 OR-com0.110

Household survey (2016)

3.3.5 Cropping combinations and crop diversification

The cropping combinations were important to analyse the degree of specialisation by farmers with farmers with single crops being considered as completely specialising. The average number of crops grown was 2. There were no significant differences in mean number of crops grown across all land holdings. Furthermore, crop diversification was analysed by gender. The mean number of crops grown by males and females was found to be 2.10 and 1.85 respectively. The results of the t test showed that male-headed household had statistically significant higher number of crops grown than women ($p< 0.05$).

3.4 Conclusion and Policy Implications

Smallholder farming households in Shamva distict have diversified cropping patterns however most farmers grow a combination of two crops. The sampled households utilised just above half of their arable land and labour is not a constraint in the area.Their crop mix is dorminated by the staple food crop maize with the cash crop tobacco becoming more popular amongst the smallholder farmers.There is a significant diffrence in cropping patterns between the three types of smallholder farmers in terms of proportion of the area allocated to cash crops and food crops. Generally, the farmers consider themesleves as having access to most of the agricultural services such as output markets, inputs and extension, however, there is very litlle financial support for all crops. Female-headed households had signifcantly lower access to the extension and marketing services. Any agricultural intervention should be geared towards maximising the production of tobbacco and maize. In this regard, more actors in the agricultural financial sectors such as agro processing companies and input distribution companies should enter into contracts with farmers to increase access to agricultural financial support. Femal headed households should also be supported in the extension and market services. Having identified the crop production patterns in terms of area covered by major cash and food crops across different land tenure regimes the next chapter analysises the determinants of commercialisation in the smallholder sector.

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CHAPTER 4 DETERMINANTS OF COMMERCIALISATION IN SMALLHOLDER FARMERS ZIMBABWE

4.0 Abstract

Empirical evidence supports the attainment of economic growth through commercialisation of agricultural production. However, there are still high levels of subsistence farming in Sub Saharan Africa. The study aimed at determining the commercialisation levels in smallholder farmers and factors affecting such decisions with a view of identifying strategies for advancing commercialization. The study was carried out in Shamva District of Zimbabwe and a randomly selected sample of 281 farmers was used. Data were analysed using descriptive statistics and the Tobit regression model. The commercialisation level was captured by the Household Commercialisation Index (HCI), which was calculated as the ratio of the value of marketed output to the value of crops produced. The average HCI was found to be 0.45, implying on average farmers sell less than half of the value of their produce. The variables: gender of household head ($p<0.05$), labour ($p<0.1$), access to draft power ($p<0.05$), access to extension ($p<0.01$), access to markets ($p<0.05$), access to finance ($p<0.01$) and level of crop diversification ($p< 0.01$) positively influenced commercialisation. Age of household head ($p<0.01$), off farm income ($p<0.05$) and communal land holding ($p<0.05$) were negatively associated with commercialisation levels. The target group for commercialisation interventions should be smallholder farmers with fewer income sources, as they are likely to be motivated to grow more cash generating crops. Descriptive statistics showed low levels of access to agricultural finance albeit its importance in improving production and commercialisation levels. Since communal land tenure was negatively associated with commercialisation hence future land redistribution should continue to decongest smallholder farmers and provide them with support. Communal farmers with increased support are more likely to commercialise.

Key words: Smallholder farmers, commercialisation, land tenure

4.1 Introduction

Empirical evidence suggests commercialisation as a crucial pathway towards economic growth and development for countries with agro–based economies (Von Braun 1994, Govereh and Jayne 2003, Jaleta et al. 2013). Zimbabwe is such one country depending on the agricultural sector for economic stability and growth with the sector contributing around 18% to the total

GDP such that agricultural development precedes economic development (World Bank 2008, FAO 2010). Studies in Zimbabwe have shown a positive association between agricultural value of production and economic growth (Dekker 2011, Mapfumo 2015). The historical context of the Zimbabwean agrarian sector was dualistic with commercialisation on the large-scale farms and subsistence farming in the smallholder sector (Shumba and Whingwiri 2006). However, the new agrarian sector in Zimbabwe promotes the commercialisation of smallholder sector as the farmers account for about 95% of the farming population (Dekker 2011). Common characteristics among subsistence farmers are their dependency on family labour, limited use of high value inputs and limited participation in the produce markets (Von Braun 1994).

Commercialisation is a progression towards the use of high value inputs and increased degree of participation in the produce market. This is achieved through different pathways including increased production of cash crops such as tobacco and soybeans and realisation of surplus food crops. The degree of market participation can be measured using a Household Commercialisation Index (HCI). Von Braun (1994) postulated three main ways of measuring commercialisation. The first is the output-input specialisation, which is the measure of agricultural output sold to the market and input acquired from the market as a proportion of value of agricultural production (Ele et al. 2013). The second index is the extent of household integration into cash economy, which is measured by the value of goods and services acquired through market transactions to the total household economy (Jaleta et al. 2009). The third index, which has been extensively used in most crop commercialisation studies, is the proportion of volume of crop marketed by a household. It is the ratio of the gross value of all crop sales per household per year to the gross value of all crop production (Kiriti & Tisdell 2002, Govereh and Jayne 2005, Ele et al. 2009, Kamoyo et al. 2015, Osman and Hassain 2015). The last index is adopted for this study.

Govereh and Jayne (2003) highlighted the importance of cash crop farming and found out that under conditions of market failure farmers who commercialised increased their food productivity. In that study, cotton farmers who participated in input schemes generated surplus inputs, which were used in maize production. Furthermore, production of cash crops allowed crop rotation between cash crops and food crops thus naturally improving soil fertility. Despite such empirical evidence of positive economic gains of growing cash crops in Sub Saharan Africa, the proportion of subsistence farmers remains high as very few smallholder farmers participate in the markets (Devereux et al. 2003). There is a lack of appropriate instruments to

inform policy makers on how to increase commercialisation in the smallholder sector. Although several studies have been carried out on commercialisation (Govereh & Jayne 2003, Ele et al. 2009, Jaleta et al. 2010, Umar 2013). Von Braun et al. (1994) warned against generalisations of commercialisation as it is context specific especially due to differences in agro-ecological conditions. Furthermore, most of the studies focused on commercialisation of one particular crop at a time, especially food crops (Ele at al. 2013, Justus et al. 2016, Zamasiya et al. 2016). It is from this background that this paper intent to contribute towards the understanding of household specific factors affecting extend of commercialisation of field crops. The analysis accounts for aggregate commercialisation of all the crops produced taking into consideration that farmers usually grow more than one crop in a particular season (Mutami 2015). The objective of the study is therefore to analyse the extent of commercialisation in smallholder farmers and determinants thereof.

Theoretical framework

Following Jaleta et al. (2009), it is postulated that farmers' decision to participate in the output market is utility maximisation rather than profit maximisation under risky conditions. The risks emanating from imperfect markets or non-existent markets at all a common feature in Sub-Saharan Africa (Devereux et al. 2003). The agricultural household model is used considering that smallholder farming households consume a certain proportion of their produce (Ellis 2000). Consequently, they have to make the production and consumption decision simultaneously. In making the decision to commercialise or not to, and the levels of commercialisation, farming households compare the utility derived from each of the decisions. Therefore, commercialisation decisions are affected by a set of explanatory variables.

Previous studies on determinants of commercialisation identified various explanatory variables. Govereh et al. (1999) found out that in cotton growing smallholder farmers of Gokwe in Zimbabwe commercialisation was synonymous with expanding cotton production and was mainly determined by farm size. Okezie et al. (2012) found labour and fertilizer to be significant factors determining commercialisation. Using the Tobit regression, Ele et al. (2013) identified that off farm income, age, household size, gender, level of education and membership of an association were positively associated with the commercialisation of food crops in Cross River state, Nigeria. Justus et al. (2015) also found farm size together with agricultural services such as extension, markets and credit being positively associated with commercialisation in Rwanda. When assessing the impact of cooperatives on commercialisation, Bernard et al.

(2008) found group membership to be positively associated with commercialisation. Kabiti et al (2016) found out that commercialisation of maize in smallholder farmers of Munyati area, Zimbabwe was positively affected by labour, age and off farm income. However, communal land holding was found to negatively influence commercialisation in the same study.

4.2 Research Methodology

4.2.1 Data collection

The research was conducted in Shamva district of Mashonaland Central Province of Zimbabwe. The area is classified under agro-ecological region II of Zimbabwe, which is suitable for intensive cropping and livestock production. This area is characterised by mean annual temperature range of 19-23 ºC and rainfall ranges from 750 to 1000 mm/year. The main crops grown in this area are cotton, tobacco, soybeans, maize and wheat (Mugandani et al. 2012). The sample consisted of 281 smallholder farmers randomly selected from the 24 wards of Shamva district. Stratified sampling was used to get a proportional representation of the three types of smallholder farmers according to their scheme of settlement. Data was collected using a pretested questionnaire by well-trained enumerators. The data collected related to the characteristic of households, resource endowments, crops output and marketed value, and access to agricultural services. The Statistical Package for Social Scientist (SPSS) and STATA software were used for data analysis. The data was collected, entered, sorted, cleaned and stored for further analysis.

4.2.2 The Empirical model

To further analyse the factors influencing commercialisation decision the Tobit regression model was used. This has been previously used in commercialisation studies (Ele et al. 2013, Kabiti et al. 2016). The model answers both questions of factors influencing the decision to commercialise and extend of commercialisation as it assumes that both decisions are affected by the same set of variables (Burke 2009). Tobit model is appropriate for analysing variables with lower and upper limits (McDonald 1980). In this case, the dependant variable HCI is lower censored at zero and upper censored at one as it can only take values between zero to one. Subsistence farmers who sell none of their output would have a zero HCI on the other hand farmers who sell all their output will have an HCI of one and are regarded as completely commercialised (Ouma et al. 2010). The Tobit model avoids bundling of farmers into either

commercialised or non-commercialised since such discrete distinctions do not exist since farmers have diversified cropping patterns.

The Tobit model is estimated as follows: $Y_i^* = \beta_0 + \beta X_i + e_i$

Where

Y_i^*=is the latent variable of the dependant variable (HCI)

β =Vector of parameters to be estimated

X_i=set of explanatory variables

e_i = the disturbance term

The model errors e_i are assumed to be independent, N (0, σ2) distributed, conditional on the X_i. The observed Y_i^* is defined as 1 if $Y_i^* > 0$ and 0 if $Y_i^* \leq 0$.

The dependant variable

Following the work of Von Braun (1994), The Household Commercialisation Index (HCI) formula was given as:

$$HCI = \frac{\text{Value of all crop sales}}{\text{Total value of crops produced}}$$

This factor in all types of crops either food or cash crops. Many smallholders grow a diverse portfolio of crop mix with cash crops and food crops in one season, therefore, they practise both own food production and market production (Shumba and Whingwiri 2006). For one to analyse the extent of cash cropping the commercialisation index can be used as it gives the overall extend of market orientation by aggregating value of all crop sales as a ratio of total value of crops produced.

Independent Variables in the model

This study builds on empirical evidence of market participation decisions under transactions costs for specific crops as influenced by household characteristics, resource endowment and information (Ouma et al. 2013, Umar 2013, and Zamasiya et al. 2014). Household characteristics include variables such as the age of household head, gender, household size and labour. The household assets or resources include the number of cattle, off farm income, land and extension. The level of access to information is captured by group membership and market access. Table 4.1 gives a summary of the variables, which were likely to have an effect on commercialisation levels. It was expected that the higher the household size the greater the

chances of a household being involved in commercialisation due to increased labour supply which might be needed for cultivation of cash crops (Duve and Guveya 2016). The age of household head was expected to have a positive or negative effect. Age of farmer could be associated with more farming experience. As farmers become more experienced, they may have more access to marketing information thus age can be positively related to commercialisation decisions (Kiriti & Tisdell 2002, Kabiti et al. 2016). Gender of household head captures the variation between male headed and female-headed households in their market orientation. Male participants are expected to be more marketed oriented compared to the female participants (Kiriti & Tisdell 2002, Osman and Hassain 2015).

Table 4.1 List of variables expected to affect household commercialisation

Description of variable	**Measurement**	**Expected relationship**
Gender of household head	1= Male 0 =female	+
Age of household head	Number of years	-/+
Household size	Number of people	+
Number of cattle	Number of cattle	+
Total Off farm Income	Annual off farm income in US$	-
Access to market	1= access to market 0=otherwise	+
Communal tenure	1= communal 0=otherwise	-
OR resettlement tenure	1= A1 resettlement 0=otherwise	+
Total arable land	Hectares	+
Total labour	Number of family +hired labour per season	+
Total land cultivated	Hectares	+
Group membership	1 =group member 0 =otherwise	+
Number of crops grown	Continuous	+
Access to finance	1 access to finance 0 otherwise	+
Access to draft power	1 access to draft power 0 otherwise	+
Access to extension	1 access to extension 0 otherwise	+

Ownership of physical assets such as cattle and total arable land would be expected to positively influence commercialisation. The availability of more land for cultivation allows farmers to grow more crops, generate surpluses, and hence increase chances for

commercialisation. Martey et al. (2012) and Ele et al. (2013) in separate studies found that the commercialisation level increased with increase in total arable land. Due to the heterogeneity of smallholder farmers in Zimbabwe, with some of the variations arising from land holdings, it can be expected that there would be differences in commercialisation between the communal farmers and resettled farmers. Communal farmers are less likely to commercialise than resettled farmers are. Mutami (2015) and Kabiti et al. (2016) have indicated that communal farmers have relatively less total arable land as compared to their resettled counterparts (A1 and OR) therefore, due to land constraints they are less likely to generate surplus for sale. According to Martey et al. (2012), accessibility of credit is expected to link farmers with modern technology, ease liquidity and input supply constraint thereby increasing agricultural productivity and market participation. Therefore, farmers with greater access to finance are likely to commercialise than those failing to access credit.

Accessibility of both food and non-food crops markets is expected to positively influence commercialisation (Kiriti and Tisdell 2002, Goshu et al. 2012). Access to draft power and extension is expected to increase the productivity of cash crops thereby resulting in higher commercialisation (Govereh and Jayne 2003). Group membership may assist in providing marketing and production information, thus it is expected that farmers who belong to formal groups are likely to commercialise than non-members (Msongaleli et al. 2015, Bernard et al. 2016). Smallholder farmers usually grow a variety of crops in one season to minimise production and marketing risks. Number of crops is likely to reduce the marketing risks associated with specialisation in cash crops hence a positive association between the number of crops grown and commercialisation is expected (Mukherjee 2010).

4.3 Results and Discussion

4.3.1 Descriptive statistics

The mean value of crops produced per household was found to be US$1073 and the average HCI for the sample was 0.45 implying that on average farmers sell less than half value of their produce. Descriptive statistics for continuous variables are given in Table 4.2 and descriptive statistics for dummy variables are given in Table 4.3. Continuous variables were categorised and ANOVA was used for significance testing. The findings revealed that the continuous variables, age of household head ($p<0.01$), number of cattle ($p<0.05$), non-farm income ($p<0.01$), total cultivated land ($p<0.01$), labour ($p<0.01$) and number of crops grown ($p<0.01$) were significantly associated with commercialisation.

Table 4.2 Descriptive statistics for continuous variables

Variable	% Frequency	Mean HCI	Standard deviation	significance
Age (years)				
20-29	7	0.3667	0.4761	
30-39	21	0.5494	0.4237	
40-49	27	0.5495	0.43206	0.005
50-59	21	0.364	0.42239	
above 6o	24	0.3424	0.37737	
Household size				
2-3	15	0.3969	0.43711	
4-5	32	0.4939	0.43381	
6-7	27	0.4499	0.4392	0.753
8-9	13	0.4242	0.41347	
10 and above	13	0.4186	0.39603	
Non- farm income ($)				
<1	31	0.646	0.38251	
1-<100	28	0.3447	0.40935	
100-<200	16	0.3673	0.44299	0.003
400-<600	10	0.3424	0.40955	
600-<1000	7	0.3601	0.38657	
1000 and above	8	0.4316	0.45374	
Number of cattle				
0	31	0.3398	0.4287	
1 to 5	42	0.5265	0.42412	0.016
6 to 10	18	0.4821	0.40876	
11 and above	9	0.3965	0.40778	
Total arable land (Ha)				
<2	16	0.3012	0.4312	
2<4	33	0.4538	0.42803	0.114
4-<6h	47	0.4786	0.42254	
6ha and above	4	0.654	0.32751	
Cultivated land				
0.5-<1.5	47	0.3204	0.42043	
1.5<3ha	32	0.6075	0.39669	0.000
3-<4.5	14	0.4684	0.40884	
4.5 and above	7	0.5577	0.38713	
Labour (People)				
1-3	28	0.2578	0.38251	0.000
4-6	34	0.4446	0.44187	
07-9	22	0.5727	0.39063	
10 and above	16	0.6179	0.3948	
Number of crops				
1	26	0.2213	0.40609	
2-3	70	0.5137	0.40792	0.000
4-5	4	0.8211	0.20003	

Age was categorised into five main groups and the results indicated that the young farmers (20-29 years) were the least. Majority of the farmers (48%) were found in the middle age (30-49 years). From the mean HCI based on age, younger farmers were less likely to commercialise. However, maximum mean HCI was realised in the middle-aged farmers and decreased further for old aged farmers. Younger farmers may lack farming experience and resources, therefore, they may not be capable of generating surplus for sale or grow more cash crops. The middle-aged farmers, on the other hand, would have accumulated resources and more experience hence they are more risk preferring and commercialised. Older farmers are likely to be more risk averse hence their low participation in produce markets. A greater percentage (31%) did not have any cattle at all. Mean HCI decreased with increase in the number of cattle implying that those with fewer or no cattle are likely to depend on crop production for their income hence increased commercialisation whilst those with more cattle may depend on cattle sales as other sources of income.

Farmers without non-farm income had the greatest frequency and those with above US$1000 off farm income were the fewest. Highest mean HCI was recognised in the category with zero non-farm income, this shows farmers dependency on producing crop for income generation where alternative sources do not exist. However, commercialisation decreased with an increase in off farm income with farmers having more than US$1000 having least mean HCI. The highest frequency of farmers cultivated between 0.5 and 1,5ha of land, which was the least cultivated area. Mean HCI was negatively associated with area cultivated with farmers growing the highest area (4.5 ha and above) being the least commercialised. Most household had between 4-6 people of labour and this range experienced highest mean HCI. Commercialisation increased with labour availability, however, lower HCI were realised for the household labour of above 10 people. This is because of decreasing labour productivity as the labour force continues to increase. The number of crops grown increased the commercialisation level as crop diversification reduces the marketing risk associated with individual crops. However, the least mean HCI was found in a group of farmers growing the highest number of crops (four and above). Growing too many crops may result in poor management and distribution of labour resources; this, in turn, reduces production and generation of surpluses for sale.

Statistically significant differences were noticed for the dummy variables gender, finance access, extension access, market access, draft power access, membership to a group, OR land holding and communal land holding. There was a statistically significant higher HCI for males than females ($p<0.01$) implying males participated more in the output markets than females.

Very few farmers had access to finance. However, farmers with access to finance had significantly higher mean HCI than those without. Farmers had relatively higher access to other agricultural services such as draft power, extension and markets. Statistically significant higher HCI were also noticed for access to finance ($p<0.01$), draft power ($p<0.01$) and extension ($p<0.01$). Therefore, access to agricultural services increases the farmers' commercialisation levels, as they would be able to generate a surplus for sale. Very few people belonged to a formal group and there were statistically significant lower HCI for members of groups than non-members. A1 farmers had the highest average HCI ($p< 0.1$) and communal farmers the least ($p<0.35$). Significant differences were realised across the three groups of farmers ($p<0.05$).

Table 4.3 Descriptive statistics for dummy variables

Variable	% Frequency (N=281)	Mean HCI	Standard deviation	Significance
Gender				
Male	81	0.5029	0.42933	0.000
Female	19	0.2105	0.32591	
Finance access				
Yes	7	0.9431	0.06827	0.000
No	93	0.4129	0.41983	
Extension access				
Yes	91	0.0869	0.42416	0.000
No	9	0.4857	0.25428	
Market access				
Yes	72	0.4835	0.43002	0.072
No	28	0.36	0.40877	
Draft power access				
Yes	76	0.2357	0.34931	0.000
No	24	0.5142	0.4281	
Group membership				
Yes	11	0.406	0.42371	0.054
No	89	0.7939	0.27152	
Land tenure				
A1	32	0.5252	0.42337	
OR	33	0.4753	0.40806	0.014
Communal	34	0.3498	0.42706	

4.3.2 Determinants of commercialisation

The results of the Tobit regression model for the determinants of commercialisation are summarised in Table 4.4. The variables gender, age of the household head, off farm income, labour, access to finance, access to extension, access to markets, access to draft power and communal land holding were statistically significant determinants of commercialisation. The variables household size, group membership, total arable land, land cultivated and A1 land holding did not significantly influence the level of commercialisation.

Table 4.4 Tobit estimates of the determinants of commercialisation

Variable	**Coefficient**	**standard error**	**Significance level**
Gender	0.242279**	0.1079545	0.015
Age	-0.0102322**	0.0030442	0.001
Household size	-0.0032279	0.0125303	0.797
Number of cattle	-0.0089361	0.0079406	0.261
Non-farm income	-0.0001751**	0.000724	0.016
Total arable land	-0.0092137	0.0329687	0.780
Land cultivated	0.0043918	0.0213156	0.837
Labour	0.0238771*	0.0139379	0.088
Group membership	-0.1638056	0.1209525	0.177
Finance access	0.3749718 **	0.1446536	0.010
Extension access	0.5734942***	0.1792583	0.002
Market access	0.1746278**	0.08774328	0.047
Draft power access	0.3326467***	0.1042683	0.002
Communal	-0.2370279**	0.1130246	0.037
A1	0.0798142	0.0946844	0.400
Crops n	0.233607	0.0516059	0.001
Constant	-0.7755806***	0.2925147	0.008
LR chi^2 126.51; Pwww5rob>chi^2 0.000; Pseudo R^2 0.2261			

Significant at:*10%, **5% and *** 1%

NB *117 left-censored observations at comm1<=0; 146 uncensored observations; 17 right-censored observations at comm1>=1*

Gender was found to positively influence commercialisation ($p<0.05$) This is consistent with a study by Kiriti and Tisdell (2003) who found that male-headed households were likely to grow more of the labour intensive cash crops such as tobacco hence greater commercialisation than their female counterparts. The extent of commercialisation based on the age of a farmer was significant ($p<0.01$). For each one-year increase in age, commercialisation level decreases by 0.01. In other words, younger farmers are more market-oriented than the elderly. This is most plausible because participating in output markets is considered risky and young farmers are

less risk averse than older farmers (Von Braun 1994). Non-farm income was negatively associated with commercialisation ($p<0.05$). Previous studies found that the higher the non-farm income the more likely is the farmer to commercialise. It is argued that more income allows farmers to purchase high value inputs and technology favouring commercialisation (Ranjitha and Thapa 2009, Jaleta et al. 2010, Ele et al. 2013). However, the findings of this study do not concur with such studies. A one-dollar increase in non- farm income results in a 0.0002 decrease in commercialization. This can be explained by the fact that commercialising farmers regard income from crop sales as their main source of income, hence they channel most of their production resources, including labour, toward the production of marketable crops. On the other hand, farmers with larger values of non-farm income may not embark on commercialisation as they have other income sources. An additional person in the labour force resulted in an increase in commercialisation by 0.24. Labour was positively associated with commercialisation ($p<0.1$). This shows the importance of labour in generating surpluses for sale. Furthermore, industrial crops such as tobacco, which increase the commercialisation index, require more labour. Hence, labour is positively associated with commercialisation. These results concur with findings by Mwangi et al. (2015) that increasing labour supply in the diversified farming system resulted in higher profitability of cash crop farming.

Market access was found to positively influence commercialisation ($p<0.05$). Farming households who considered the markets as accessible were more market oriented than their counterparts were. Despite the fact that several studies used market access as a continuous variable measured by distance to the market (Osman and Hassain 2015, Jaleta et al. 2009, Dube and Guveya 2016). This study is still consistent with previous studies even when using a qualitative measure to assess market access. This shows that for farmers to commercialise they largely depend on the access to the markets so that they are able to sell their output. Access to finance was positively and significantly associated with commercialisation ($p<0.05$). Farmers who have access to finance are able to participate in input markets and produce high value crops resulting in higher commercialisation levels. Access to the extension services was also positive and statistically significant ($p<0.01$), as farmers having access to the extension services are more likely to commercialise compared to those without access. These results are consistent with Martey et al. (2012) since accessibility of credit and extension is expected to link farmers with modern technology, ease liquidity and input supply constraint, thereby increasing agricultural productivity and market participation. Access to draft power had a statistically

significant positive effect on commercialisation ($p<0.01$). Draft power is regarded, as a productive resource hence, access to draft power is important for generation of surplus for sale.

Number of crops grown was positively associated with commercialisation ($p<0.01$). For an additional crop added to the crop mix, the HCI increases by 0.23. Growing a variety of crops on a piece of land rather than specialisation is some measure farmers usually take to insulate themselves from risks. This is consistent with findings by Mukherjee (2010) that farmers who use the available land to produce a diversified cropping portfolio would minimise production risk thereby increasing their chances to generate surplus and increase marketable output. Communal land holding was negatively associated with commercialisation ($p<0.05$). This can be attributed to the fact that communal farmers have less resource endowments especially fertile land resulting in low productivity hence they are less likely to generate marketable surpluses (Mutami 2015). Kabiti et al. (2016) obtained the same results in Munyati area Zimbabwe.

4.4 Conclusion and Policy Implications

The study aimed at determining the commercialisation levels in the smallholder farmers and factors affecting such decisions with a view of identifying strategies for advancing commercialization. The commercialisation level was captured by the HCI, which was calculated as the value of marketed output to the value of crops produced. The average household commercialisation level was found to be around 0.45, implying on average farmers sell less than half of the value of their produce**.** Household characteristics influencing commercialisation were the age of household head and gender of household head. As farmers grow older, their commercialisation levels decreases. Female farmers were less likely to commercialise. Furthermore, resource endowments such as labour and off farm income also affected farmers' decision to participate in output markets. Farmers with higher non -farm income were less interested in commercialisation. Labour was positively associated with commercialisation. Access to basic agricultural support services such as markets, finance extension and draft power had a statistically significant positive association with commercialisation. The target group for commercialisation interventions should be smallholder farmers with fewer sources of income as they are likely to be motivated to grow more cash generating crops. Descriptive statistics showed low levels of access to agricultural finance albeit its importance in improving production and commercialisation levels. Since communal land holding was negatively associated with commercialisation future land redistribution should continue to decongest communal areas and provide them with support. Communal farmers with increased support are more likely to commercialise.

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CHAPTER 5. IMPACT OF CASH CROP PODUCTION ON HOUSEHOLD FOOD SECURITY

5.0 Abstract

There has been a considerable shift towards the commercialisation of agriculture in the smallholder sector of Zimbabwe through the production of more cash crops such as tobacco at the expense of food crops. Though cash cropping has been associated with increased income, however, the missing link is whether the income gained from cash crops would be used to cover the food needs of farming households. The research aimed at understanding the level of food security and analysing the impact of cash cropping on food security. A cross sectional household survey consisting of 281 randomly selected smallholder farmers in Shamva District was used for primary data collection. Data was analysed using the Tobit regression model in STATA. The Household Food Insecurity Access Scale (HFIAS) was used to measure food security. The level of cash cropping was computed as the ratio of land under cash crop to total area cultivated. The mean food security score was 1.89. The categorical HFIAS, however, further specified that 63 % were food secure, 18% were mildly food insecure, 13% were moderately insecure and 6% were severely food insecure. Cash cropping was found to be significantly positively affecting the food security of farming households. For each unit increase in the proportion of cash cropping area, the household food security would increase by 4.3 units. Other factors that significantly positively influenced food security include off farm income ($p<0.05$), number of livestock ($p<0.1$), and quantity of maize harvested ($p<0.05$), access to markets ($p<0.1$), finance ($p<0.05$) and access to draft power ($p<0.05$). Household size ($p<0.1$) was negatively associated with food security. Cash crop production should be promoted, however, it should not be regarded as the solution to food insecurity on its own. Therefore, there is need to combine both cash and food crops. There is need for further research to derive optimum combinations of cash and food crops in the crop mixture for smallholder farmers to achieve food security. Furthermore, opportunities for off-farm livelihoods options should be developed since non-farm income was also positively significantly associated with food security.

Key words. Cash crop, household, food security and smallholder farmer.

5.1 Introduction

For the past three decades, the number of food emergencies in Africa has increased and current challenges such as climate change are making the situation worse (World Bank 2008). Though improvements have been made in crop yields globally, chronic food insecurity, hunger and undernourishment persist in many parts of the world (Muhoyi et al. 2013). In Zimbabwe, food security is maize based the staple crop with little promotion of other foods to diversify food sources (Ndlela and Robinson 2007). As such, maize availability is considered the main factor when assessing the food security situation in the country. The smallholder farmers are the producers of the bulk of the maize, contributing about 60% of the national production (Dekker 2010). At the national level, many factors have influenced negatively the food security situation. Challenged with production and marketing constrains such as drought, high production costs and volatility of markets, there has been considerable decline in maize production especially in the smallholder sector over the past two decades. (Ndlela and Robinson 2007, Chamunorwa 2010).

There has been an increase in rural poverty from 63% in 2003 to 76% in 2014 (FAO 2015). This poses a threat to food accessibility in the rural areas as studies have shown a direct link between food insecurity and poverty (Coleman-Jensen et al. 2013, Wight 2014). There is also lack of a properly articulated policy on food security in the country. The policy framework for marketing of grain has been ever changing with the 2009 policy giving the Grain Marketing Board (GMB) the sole mandate of buying maize and maintain the grain reserves. However, the parastatal is no longer effective in carrying its mandate as a strategic grain reserve, which has contributed much to the grain shortages in the country (USAID 2015).

Food security is defined as a situation when all people have physichal, social and economic access to safe and nutritious food all the time (World Food Summit 1996). Consequently, food insecurity is thus defined as a condition when individuals have an uncertain or limited access to food through socially acceptable channels (Tawodzera 2011). Central to food security analysis is an understanding of the household's access to food and livelihood strategies (Coates et al. 2007).Various methods are used to measure food security, however, there is no one universally accepted method measuring all the four dimensions of food security (Chege et al 2015). Despite the fact that previous decades' measurements were based on supply side measurements of food production and availability there has been tremendous development towards assessment of accessibility and utilisation since 2000 (Bilinsky and Swindale 2007).

Though many factors have contributed to the food insecurity situation in Zimbabwe, one of them was a decrease in area under maize at national level (FAO 2015). This could have been attributed to low output prices for maize as compared to cash crops such as tobacco. Furthermore, maize farmers received their payments late from GMB (USAID 2015). This could have contributed to a decrease in total area cultivated under maize as farmers opted for cash crops such as tobacco where they receive payment timely (TIMB 2014). There has been an increase in the number of new smallholder farmers joining the tobacco sector in Zimbabwe. For instance, in comparison with the 2011/12 growing season, the number of tobacco growers registered in the 2012/13 growing season increased by approximately 52% from 42000 to over 62 000 (Masvongo et al. 2013).

Several studies in Africa have shown increased commercialisation to be associated with increase in household income (Govereh and Jayne 2003 in Zimbabwe, Goshu et al. in Ethiopia, Cockburn et al. 2014 in South Africa, Justus et al. 2016 in Nigeria). The increase in income, provide cash so that food becomes economically accessible to those households not directly producing their own food (De Schutter 2011, Coleman-Jensen et al. 2013). However, the income pathway to food security may not be always linear as the income may be used for other non-food expenditure at household level (Devereux and Maxwell 2000). Some studies have found cash cropping being negatively associated with food productivity as cash crops compete with food crops in smallholder production where land is a fixed resource (Mazunda et al. 2012, Muhoyi et al. 2014). Furthermore, in cases of market failure the increase in income may not be enough to offset the volatility of food prices (Govereh and Jayne 2003). According to Tankari (2017), cash crop production actually reduced the welfare of households in Senegal. Very few studies have examined the effect of cash cropping on food accessibility or availability and found a direct effect (Govereh and Jayne 2003, Langert et al. 2011, Nwachukwu et al. 2014).

Empirical evidence on the impact of cash cropping on food security is therefore inconclusive as there is inadequate information on how cropping decisions affect the level of household food security. Most of the researchers concentrated on either horticultural crops, plantations or other perennials such as coffee and sugarcane at the expense of annual crops such as cotton and tobacco (Jayne et al. 2010, Anderman et al. 2014, Cokburn et al. 2014, Justus et al. 2016). Whether farmers pursue cash crop production or food crops, an understanding of the implications of cash cropping on the household food security level is missing. The objective of this study is therefore to analyse the impact of cash crop production on household food security

in smallholder farming households. This will allow recommendations to improve food security at the household level to be derived.

Theoretical framework

This study builds up on Sen's entitlement approach to food security. The theory asserts that food security is based on entitlements and endowment. According to Sen's theory of entitlement to food security household food can be acquired through three key forms of entitlements. These are trade based entitlement, production based and labour based entitlements (Sen 1980). It is under this notion that cash cropping positively increase trade-based entitlement through provision of cash for food purchases or negatively as reducing production based food entitlement through competing with food crops for production resources (De Wall 1990). Although Sen's entitlement theory was heavily criticized because it was based on a single case study, it provided a framework for analysis, which supports that food security, is determined by how political, social and economic environment determine endowments that people have and how they can use such endowments at a time of food shortages. (Devereux 2001). Endowments and entitlements give an indication of households' ownership, access and control of resources (De Wall 1990). Therefore, food security of a household is determined by a set of variables comprising of household characteristics, resource endowments and access to information. Studies on determinants of household food (in) security have shown socio-economic factors such as gender of household head, household size, farm sizes, total income, access to extension and access to draft power among others as affecting food security (Gebre 2012), De Cock et al. 2013, Muhoyi et al. 2013, Justus et al. 2016). Most impact studies have used regression analysis to quantify influence of commercialisation on food security (Hendricks and Msaki 2009, Nwachukwu et al. 2013, Malumfashi and Kwara 2013, Langert et al. 2013, Justus et al. 2016). According to Malumfashi and Kwara (2013) commercialisation positively influenced national food security in Nigeria. Cash crop production, among other factors, was also found to be positively influencing household food security in Kenya (Langert et al. 2013).

5.2 Methodology

5.2.1. Description of study site

The research was conducted in Shamva district of Mashonaland Central Province of Zimbabwe. The area is classified under natural farming region II of Zimbabwe that is suitable for intensive cropping and livestock production. This area is characterised by Mean annual temperature range of 19-23 ºC and rainfall ranges from 750 to 1000 mm/year. The area consists of smallholder famers and small-medium scale commercial farmers. The sample consisted of 281 smallholder farmers randomly selected from the 24 wards of Shamva district. Stratified sampling was used to get a proportional representation of the three types of smallholder farmers according to their tenure of settlement. The data were collected by use of pretested questionnaires administered by well-trained enumerators in 2016. The data related to the characteristic of households, resource endowments, crop production patterns and food consumption patterns. SPSS software was used to generate descriptive statistics and STATA was used for the econometric modelling. The data were collected, entered, sorted, cleaned and stored for further analysis.

5.2.2 The Emperical model

Tobit regresssion model was used to measure impact of cash cropping on food security. Following Frimpong and Asuming-Brempong (2013), a Tobit regression model was structured to identify variables that have greater likelihood of affecting the food security status of the households in the study area.

The Tobit model is estimated as follows: $Y_i^* = \beta_0 + \beta X_i + e_i$

Where

Y_i^*=is the latent variable of the dependant variable (HFIAS)

β =Vector of parameters to be estimated

X_i=set of explanatory variables

e_i = the disturbance term

The model errors e_i are assumed independent, N (0, σ2) distributed, conditional on the X_i. The latent variable is lower censored at zero and upper censored at 27. The data was tested for multicollinearity of explanatory variables before running the model using the Variance Influence Factor (VIF). Multicollinearity exists when two or more independent variables are highly correlated resulting in unreliable estimation results, coefficients with wrong signs or high standard errors (Jorgen and Jesus 2006). The higher the VIF the higher the level of

collinearity and a value of 1 implies no collinearity. VIF values greater than 10 are considered unacceptable, as they are likely to result in wrong estimations (Barry 2017).

5.2.3 The Dependant variable

The Household Food Insecurity Access Scale (HFIAS) was used to assess household food security. The use of HFIAS in this study was informed by previous studies in Africa (Coates et al. 2007, Swindale and Blinksy 2006, Decock et al. 2013). The HFIAS method tries to quantify the reactions caused by experiences of food insecurity. The HFIAS is developed by asking respondents eighteen questions of food inacess experiences. The HFIAS is the summation of all values for frequency of occurrence quaestions and a value of zero is asigned where the condition never occurred, one for rarely, two for sometimes and three for often. Therefore the scale ranges from 0 to 27 and the closer the score to zero implies higher degree of food security in the household.

5.2.4 Description of the explanatory variables

The Independent variables are summarised in Table 5.1. The proportion of area under cash crops is used to measure level of cash cropping. A cash crop is defined as a crop grown for direct sale rather than for household consumption (Anderman et al. 2014). The proprtion of area under cash crop is found by the total area under cash crops divided by total cultivated area in one season.The variable proportion of cash crop is expected to have a positive (Govereh and Jayne 2003, Shumba and Whingwiri 2006, Langert et al. 2011, Justus et al. 2016) or negative impact on household food security (Mazunda et al. 2012, Muhoyi et al. 2014).

Male headed households are expected to have higher food security levels than female-headed households, therefore gender of household (where male is the default) is expected to positively influence food security (Kiriti and Tidell 2002, FAO 2015). Household size is measured by the number of people residing at the same home sharing resources, expenditures and activities at a particular point in time (Casmiri 2014). A negative association between household size and food security is expected since more people in the household increase household food demand (Sultana and Kiani 2011, Gebre 2012, Mohammed 2016).

It is expected that an increase in livestock units has a positive association with food security According to Frimpong and Asuming-Brempong (2014) and Muhoyi et al. (2014), households depend on their food production for food security, therefore, the quantity of maize harvested is expected to have a positive impact on food security. Access to draft power is likely to have a

positive contribution to food security. (Kiriti and Tisdell 2002). Non farm income is the summation of all income from off farm activities including wages, salaries, pensions and remittances. It is expected that total non-farm income should be associated with increase in food secutity (Mango et al 2014).

It it is expected that labour will positively influence food security since labour is on of the prodcutive resources in agriculture (Nmadu and Akinola 2015). Extension agents are responsible for dissemination of production and marketing information; in this regard, access to extension can be used as a proxy for measuring access to information and training. According to Zwane (2012), access to extension ensures farmers have access to new technologies resulting in increased agricultural production. Therefore, access to extension is likely to have a positive impact on household food security. According to Jaleta et al. (2009) and Jayne et al. (2010), access to markets and information is a precondition for promoting agricultural growth in the smallholder sector. It is expected that access to input and output markets results in increased food security. Access to finance is also expected to have a positive effect on food security.

Table 5.1 Summary of explanatory variables on determinants of food security

Description of variable	**Measurement**	**Expected relationship**
Proportion of cash crop	Ratio of area under cash crop to total cultivated land	+/-
Gender of household head	1 if male 0 if female	+
Size of Household	Number of people in a household	+
Total livestock units	Total number of livestock	+
Non-farm income	Annual income in US$	+/-
Total arable land	Land in hectares	+
Total Cultivated land	Total area under crops in hectares	+
Labour	Number of people(family + hired labour)	+
Quantity of maize harvested	Quantity in kilograms	+
Access to finance	1 if yes 0 otherwise.	+
Access to extension	1 if yes 0 otherwise	+
Access to market	1 if yes 0 otherwise	+
Access to draft power	1 if yes 0 otherwsie	+

5.3 Results and Discussion

5.3.1 Level of food security

The mean food security score was 1.89. This shows higher level of food security on a scale of 0 to 27. The HFIAS was categorised according to the four levels of food security and the results are presented in Figure 5.1. According to the categorisation of HFIAS based on the severity of anxiety, food quality and food quantity and severity, 63% were found to be food secure with 37% having ranging from moderately insecure and insecure.

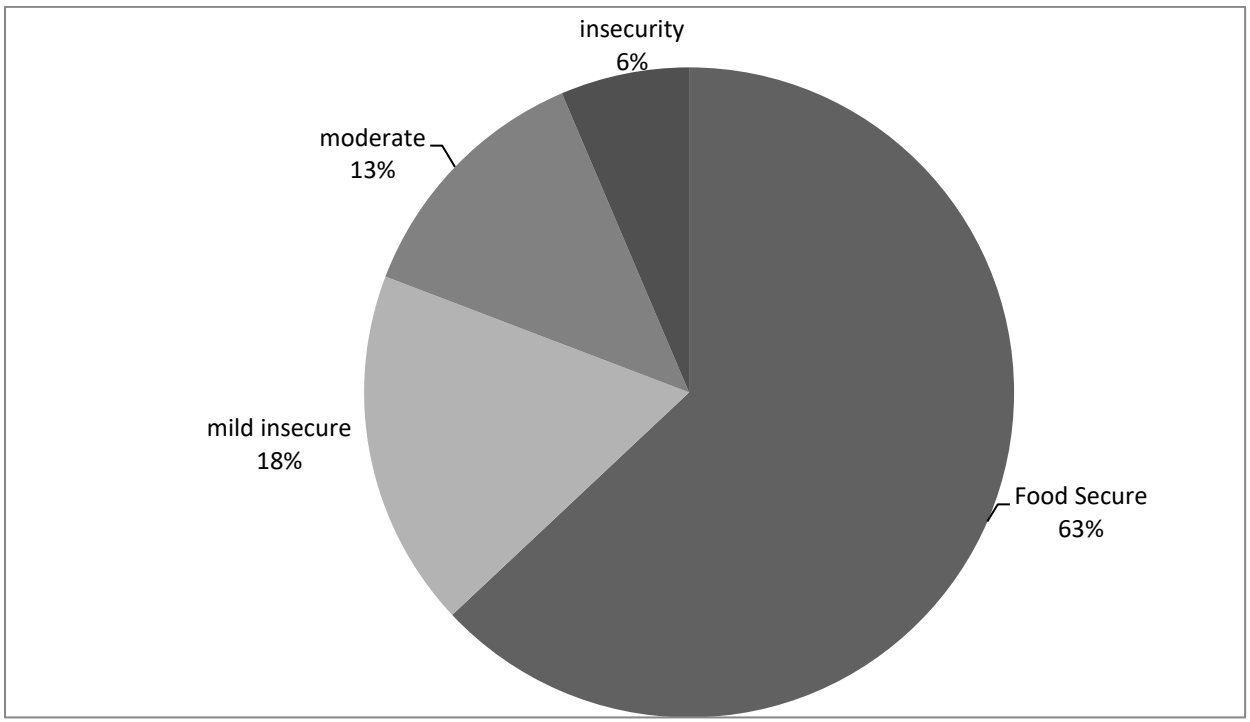

Figure 5.1 Household food security by categorical HFIAS.

5.3.2 Descriptive statistics for socio-economic status of farming households

The descriptive statistics for continuous and dummy variables representing socio-economic characteristics of households are presented on Table 5.2 and 5.3 respectively. There were statistically significant differences in mean HFIAS between total arable land ($p<0.01$), proportion of cash crops ($p<0.01$), total cultivated land ($p<0.05$) and non-farm income ($p<0.01$).

Table 5.2 Descriptive statistics for continuous variables

Variable	Values	Frequency	Mean HFIAS	Standard deviation	Sig level
Size of household (Persons)	2-3	15	2.4	3.297	0.737
	4-5	32	1.7	3.082	
	6-7	27	1.9	3.5	
	8-9	13	1.4	2.384	
	10 and above	13	2.2	3.866	
Non-farm income ($)	<1	31	1	2.306	0.001
	1-<100	28	3.6	3.986	
	100-<200	16	2	3.561	
	400-<600	10	1.8	3.259	
	600-<1000	6	0.4	1.042	
	1000 and above	9	0.5	1.103	
Total livestock units	<1	20	3.2	3.624	0.010
	1 to 3	32	2.2	3.746	
	4 to 6	26	1.1	2.185	
	6 to 10	14	1.1	3.15	
	11 and above	8	0.7	1.636	
Total arable land (Ha)	<2	16	3.3	4.285	0.007
	2<4	33	1.6	2.903	
	4-<6	47	1.7	3.09	
	6ha and above	4	0.2	0.632	
Total Cultivated land (ha)	0-1.5	47	2.6	3.638	0.010
	1.5-3ha	32	1.2	2.706	
	3-4.5	14	1.5	3.178	
	4.5 and above	7	1.2	1.954	
Labour	1-3 people	28	3.9	4.119	0.001
	4-6people	34	1.6	2.725	
	7-9people	23	0.4	1.044	
	10 and above	16	1.1	2.943	
Proportion of cash crops	0	47	3	3.819	0.001
	0<area<0.3	33	1.5	2.688	
	0.3<area<0.6	13	1	2.714	
	0.6 and above	7	0.6	1.246	

Highest food insecurity was realised in households with less than 2ha of land and a statistically significant increase in food security was recognised as total arable land increased. Households cultivating more land were relatively food secure than those cultivating less. However, farmers cultivating between 1.5-3ha were more food secure than those growing 3-4.5ha. Mean HFIAS decreased with an increase in off farm income. It was observed that 31% of the households had zero non-farm income and had a mean HFIAS far less than those with income levels ranging

from $1- $600. Overall, as non-farm income increased the HFIAS decreased implying that higher non-farm income was associated with increase in food security. Total livestock units were positively associated with an increase in food security. Farmers with arable land of less than 2ha had the highest mean HFIAS implying that food security increases with increase in total arable land. Similarly, food security increased with total area cultivated with least HFIAS observed in farmers cultivating at least 6ha. As labour increased, the HFIAS decreased implying higher food security. However, after 10 people, the food security begins to fall, as too much labour may not result in increased production. The proportionate area under cash crop was positively associated with food security. Approximately 47% of the households did not grow any cash crop and were the least food secure (HFIAS=3.8).

The descriptive statistics for the dummy variables for access to agricultural services are summarised in Table 5.3. Most of the farmers had access to draft power, extension and markets. There was a statistically significant positive association between access to extension ($p<0.05$), draft power ($p<0.01$), markets ($p<0.05$), implying that access to the agricultural services had a positive impact on food security at household level. Though finance had a statistically significant association with food security ($p<0.01$) only 7 % of the sampled households had access to finance.

Table 5.3 Descriptive statistics for dummy variables

Variable	% Frequency	Mean HFIAS	Standard deviation	F Significance level
Gender of Household head				
Male	19	1.68	3.042	0.053
Female	81	2.83	3.959	
Access to extension				
Yes	91	1.7	3.135	0.020
No	9	4.1	3.615	
Access to market				
Yes	72	1.60	3.035	0.030
No	28	2.62	3.635	
Access to draft power				
Yes	76	1.28	2.647	0.001
No	24	3.888	4.160	
Access to finance				
Yes	7	0.2	0.501	0.001
No	93	2	3.333	

Multicolinearity Diagnostic results

The results from the descriptive statistics prompted the need to square size of the household as an additional variable. Regression using the dependent variable size of the household would suggest a linear however; the relationship is not linear. The use of the interactive term squared size of the household can be used to suggest the actual functional relationship (Rawling et al. 1998). The VIFs for most of the variables were less than five implying low levels of multicollinearity. High VIFs were recorded for the interactive term of squared size of household and its main effect size of household. The interactive term of squared household size and its main effect size of household had high VIF values (VIF= 10.08) since the interactive term include the main effect term therefore high correlations would be expected. Such collinearity problems do not emanate from poor estimation of variables hence may not be 'harmful' (Barry 2017). The mean VIF was less than five (VIF=2.65) therefore the model would not suffer from multicollinearity consequences (Jorgen and Jesus 2006)

5.3.3 Impact of cash cropping on household food security

Cash cropping was fit together with other determinants of food security in a Tobit regression model and the results are presented in Table 5.4. Cash cropping significantly positively influenced household food security. A unit increase in the proportion of cash crop results in an increase in food security by 4.3 units. Therefore, cash cropping has a positive impact on food security. Similarly, Nwachukwu et al. (2014) and Justus et al. (2016) found that farmers who had higher commercialisation levels had higher food security. This can be attributed to the income pathway of cash cropping to food security (Jaleta et al. 2009). Farmers who grow more cash crops are likely to increase their household income. Income positively influenced household food security in previous studies (Frimpong and Asuming-Brempong 2013, Decock et al. 2013, Anderman et al. 2014). According to Govereh and Jayne (2003) cash crop production was positively correlated with food crop production hence the duo argued that cash crop production does not compete with food crop production

5.3.4 Other determinants of household food security

Other variables which positively affected household food security are non- farm income, total livestock units, the quantity of maize harvested, labour, access to markets, access to draft power and access to finance. On-farm Income was significantly positively influencing food security ($p<0.05$). It was noted that for every USD increase in non-farm income HFIAS decreases by 0.002. This is consistent with previous studies that an increase in household income regardless

of source inevitably results in increased household food security (Langert et al. 2011, Sultana and Kiani 2011, Tawodzera 2011). Whilst farming households depend mainly on agriculture for their own food security, most rural people have different sources of income. Such sources of income caution the farmers in times of shocks such as drought ensuring that their livelihoods become more resilient and food secure. The variable maize harvested was significantly positively impacting food security ($p<0.05$). It was noted that for every 1kg increase in quantity of maize harvested in the 2015/16 season the household food security level would increase by 0.001. The fact that maize is the staple crop in Zimbabwe explains these results. Therefore, entitlement to food security is achieved through its production (Mango et al. 2014). For every one member added to the labour force of the household HFIAS decreased by 0.49. Labour availability therefore positively significantly influenced food security. The results are consistent with Nmadu and Akinola (2015) who found labour supply positively influencing food production in Nigeria.

The variable squared household size negatively affected household food security. At 5%, significance level an increase in a person would result in food security decreasing by 0.33. This could be because as household size increase the demand for food increases at the household level and available food may not be enough to satisfy such demand. These results are consistent with Muhoyi et al. (2014) and De Cock et al. (2014). Access to finance was positively statistically significantly ($p< 0.05$) impacting food security. According to Juana and Mabugu (2005) access to agricultural credit enables farmers to purchase high value inputs and improve food crop production resulting in food security. Similarly access to markets was positively influencing food security ($p<0.1$). This is in line with Jaleta et al. (2009) and Jayne et al. (2010). Access to draft power had a positive impact ($p<0.05$) on food security. This was expected since draft power is a productive asset of which access to it boosts both food and cash crop production thus promoting food security. Similar results were observed by Kiriti and Tisdell (2002). Generally, access to agricultural services enhances production thereby increasing food security.

Table 5. 4 Tobit results for determinants of food security

Variable	Coefficient	Standard error	p>|t|
Proportion of cash crop	-4.296875***	1.360886	0.002
Gender of household head	-0.8822138	0.8719205	0.313
Size of household	-0.1702001	0.3439525	0.621
Squared household size	0 .035686*	-0.0020238	0.091
Total livestock units	-0.1905086*	0.1048912	0.070
Non-farm income	-0.0020782**	0.0008522	0.015
Total arable land	0.0425417	0.2734482	0.876
Total cultivated land	0.3889777	0.3693097	0.293
Labour	0.4896705***	0.1601783	0.002
Quantity of maize harvested	-0.0013199**	0.0005314	0.014
Access to finance	-5.137621**	1.124553	0.032
Access to extension	-1.57302	1.105978	0.163
Access to market	-1.383755*	0.7583192	0.069
Access to draft power	-1.741762**	0.8854152	0.050
Constant	8.351354***	1.710084	0.000

Significant at * 10%, ** 5% and *** 1%
NB Number of observations = 281 Uncensored =120 Left-censored = 161 Right-censored = upper = 27 0 Limits: lower = 0

5.4 Conclusion and Policy Implications

The study was designed to analyse the impact of cash cropping on household food security. Generally farming households were food secure. The HFIAS however further specified that 63 % were food secure, 18% were mild food insecure, 13% were moderately insecure and 6% were severely food insecure. Cash cropping was found to be impacting positively on food security. Cash crop production ensures that farmers have much income that can be used for purchase of food items at the household level. Other variables such quantity of maize harvested, off farm income, total livestock units and access to agricultural services (finance, markets and draft power) were also positively significantly associated with food security. The variable household size negatively influenced household food security.

Stakeholders including government and marketing firms should promote production of cash crops through production contracts since increased cash cropping ultimately results in food

security at the household level. Albeit its contribution to food security access to finance remains relatively low. There is need to develop mechanisms to improving access to finance for cash crops. The production of cash crops should not be regarded as a panacea to food security on its own as food crop production in particular maize had a positive impact on food security. Policies that promote food crop production only as a means for ensuring food security might be unsustainable in the long run since food crops have low output prices therefore, there is need for proper land use planning on combination of both cash and food crops. There is need for innovations through research on optimum combinations on production of cash and food crops.

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CHAPTER 6. HOUSEHOLD INCOME AND EXPENDITURE PATTERNS AMONG SMALLHOLDER FARMING HOUSEHOLDS

6.0 Abstract

The study was designed to analyse the income and expenditure patterns of smallholder farming households and determinants there off. This will help to inform policy makers on appropriate instruments to improve income, food security and wellbeing of the rural people. Income and expenditure data were collected from 281 randomly sampled farming households in Shamva district. Descriptive statistics were used to analyse the income and expenditure patterns. The OLS regression was used to model the determinants of household food expenditure. The results indicated cash crop sales, food crop sales and livestock sales as the major sources of income. Remittances, wages, salaries and pensions were the major sources of non-farm income. The statistics showed that 64% of the cash income was obtained from farm activities and the non-farm income contributed 36% of the total income. Statistically significant different differences in cash crop sales were realised between male-headed and female-headed households ($p<0.01$) Food expenditure constituted the main expenditure category and accounted for over 60% of total expenditure. The variables household size ($p<0.05$), dependant ratio ($p<0.05$) and income (cash crop sales, food crop sales, livestock sales and non-farm income) positively affected household food consumption. Age of household head ($p<0.01$) negatively affected household expenditure. Policy instruments to promote agricultural production to generate farm income should be developed to promote demand led economic growth.

Key words

Income, Expenditure, Smallholder farmer

6 .1 Introduction

Around 45% of the population in Sub-Sahara lives below the minimum poverty line of USD1 per day with a greater disparity in income between urban and rural households and smallholders constituting two thirds of the poor population in rural areas (World Bank 2008). Smallholder farmers depend on agriculture for their livelihoods and are subject to shocks and stresses such as climate change and volatility of food prices, making them vulnerable (O'Brien et al. 2008). The rural areas in sub-Sahara are characterised by poverty, food insecurity, unemployment, inequality and a lack of important socio-economic services (Njimanted 2006). The extent to

which rural households are able to feed themselves depends on their production of own food as well as ability to purchase food using off-farm and farm income (Bhaipheti and Jacobs 2009). The current debates on human development are centred on reducing poverty and income inequality in the rural areas (World Bank 2008, Adekoya 2014, Mignouna 2015). Proponents of agricultural-led economic growth argue that increase in farm incomes results in increase of expenditure on consumer goods and services therefore, can lead to indirect growth in non-farm incomes and employment (Browne et al. 2007, Bhaipeti and Jacobs 2009). Therefore, for low income countries with large shares of the labour force living in the rural areas, rising farm productivity have the potential to drive overall economic growth, reduce poverty (including food poverty) and improve social development and transformation (Von Braun et al.1991, Bhaipethi and Jacobs 2009. However, Jayne et al. (1999) and Dorward et al. (2005) argue that services such as road infrastructure and markets are preconditions for agricultural development and unless such services are granted, agriculture would be outcompeted for labour with manufacturing industry.

Literature shows that expenditure patterns can give an indication of the potential for demand led growth in rural economies (Umar et al. 1999, Browne et al. 2007, O'Brien et al. 2009. Furthermore, studies on expenditure patterns are regarded as key to monitor and explain inequalities and changes in material living standards, general welfare and food security. However, there are few recent studies on income and expenditure patterns of smallholder farmers constituting the bulk of the poor population, (Umer and Asagowa 2012, Biswajit and Sangeeta 2015). A knowledge gap exists on how farming households use their income and what influences such decisions. The objective of the study is therefore, to analyse the income and expenditure patterns of smallholder farming households and determinants there off. This will help to inform policy makers on appropriate instruments to improve income, food security and wellbeing of the rural people.

Theoretical framework

Production theories recognise that smallholder farming households are both producers and consumers of goods and services. Consumption theory is based on the idea of diminishing marginal utility. Therefore, households choose the best alternative combination of commodities to maximise utility subject to time, resources and technology constraints (Babalola and Isitor 2014). The overall assumption of the household consumption and production theories is that farming households act rationally to simultaneously decide on a bundle of commodities to

produce and purchase which give them maximum satisfaction subject to constraints. Biswajit and Sangeeta (2015) realised that in Odisha, India farming only accounted for 60% of income even thereafter it. In rural households of low income countries, where savings and investments are low, consumption expenditure can be used as a proxy for well-being (Seng 2015, Adekoya 2014). Much of works on household expenditure surveys have used five main components of expenditure: food, education, health, agricultural inputs and durable goods (Swindale and Bilinsky 2006, Smith and Sumbandoro 2007, Mignoun 2015). For households in low income areas food expenditure is the highest expenditure category (Browne et al. 2009, Sekhampu 2012, Adekoya 2014, Akaakohol and Aye 2014, Seng, 2015) and the elasticity for food is expected to be higher than that for high income (Browne et al. 2007). Food expenditure in rural households is affected by income, price and other socio-economic demographic characteristics. (Meng et al. 2012).

According to Babatunde (2010), both farm income and non-farm income positively affect food expenditure. Akphan et al. (2013) used regression to analyse the determinants of food expenditure realised that food expenditure contributed more than 40% of total expenditure for agro firm workers in Nigeria and food expenditure was positively influenced by non-food expenditure. In a study done by Adekoya (2014) in Nigeria it was found that income, age, sex and marital status were the major determinants of household expenditure. Seng (2015) analysed the determinants of household food consumption and realised income, age of household head, household head's education, household members <15years to directly affect household food consumption. Similarly, Sekhampu (2012) and Sekhampu and Niyimbanira (2013) realised that income, age of household head, marital status, household size and education status of household head to be affecting both food expenditure and household monthly expenditure in a South African Township. However, married household heads had significantly lower food consumption than non-married in the same study. In a comparative study in Ghana and Nigeria Mignouna et al. (2015) realised that apart from other factors already mentioned farm size positively influenced household expenditure for yam growing farmers. Cuong 2015 used Ordinary Least Squares (OLS) to analyse impact of cash crop income on expenditure and realised a positive effect on expenditure. Jodlowski (2016) analysed the impact of livestock on food consumption and using Tobit regression and realised livestock income and household size positively affecting food consumption.

6.2 Research Methodology

6.2.1 Data Sources

The data for this study were collected in Shamva district in October 2016. A questionnaire was administered to 281 randomly selected farming households through face-to-face interviews. The questionnaire was pretested and administered by trained enumerators. The data collected include household characteristics, resources and levels of income and expenditure. Data were analysed using Statistical Package for Social Scientists. Specifically, descriptive statistics and the Ordinary Least Squares (OLS) regresion were employed. The OLS is used to predict a dependent variable, based on continuous and/or categorical independent variables, where the dependent variable takes a continuous form (Gujarati 2003). This model is suitable for assessing the factors determining food expenditure in the household. The selection of variables likely to influence use of income was inspired by theory and previous studies such as Umar et al. (1999), Steward et al. (2004), Sekhampu (2012) and Akhpan (2013).

6.2.2The empirical model

The regression model is specified as follows:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \cdots + \beta_n X_n + u$$

Where Y is the dependent variable and this is given as monthly expenditure on food items.

$X^1 ... X^n$ are the independent or explanatory variables.

B0 is the intercept, β1... βk are the estimated coefficients of independent variables and u is the error term capturing the net effect of omitted factors. Since cross sectional data was used, the price was assumed to be constant across different households therefore unobserved charecteristics were relegated to the error term. The Variance Inflation Factor(VIF) was used to test for the presence of multicollinearity. This was done so as to ensure more linear combinations of explanatory variables are screened thereby ensuring the consistency of the expenditure function estimates. Cross sectional data usually have some degree of collinearity (Jorgen and Jesus 2006). A VIF value of 1 shows the absence of collinearity and higher values of VIF implies higher colinearity however it is for values greater than 10 when one has to remove such values in the model to ensure the model remains consistent (Liao and Richard 2012).**The Dependant variable**

The dependent variable is the household monthly food ependiture as estimated from a 30 day recall period. It summarises all the cash expenditure on food items consumed in the household.

Explanatory variables

Table 6.1 summarizes the demographical and socio-economic-economic explanatory variables. Income has been found to be one of the major factors affecting expenditure patterns. Sekhampu

(2012) and Browne et al. (2009), found total household expenditure and food expenditure being positively influenced by monthly income in township households. Babatunde (2010), state that both farm and non farm income positively affect food expenditure. In Vietnam, Cuong (2009), further disaggregated farm income into income from perennial crop sales, annual crop sales and livestock sales.The results of that study showed all the components of farm income were positively significantly affecting household food expenditure. Similarly, Jodlowski (2016), found livestock income positively impacting food consumption and dietary diversity in Zambia. This shows that households, as cosumption units face an income constraint when making choices for utility maximisation. Therefore, it is expected that income from cash crops, food crops, livestock and non-farm activities will positively influence household expenditure.

In most developing countries females have low access to producton resources such as land, therefore they have lower income resulting in lower consumption than males (Akpan et al. 2013, Biswat and Sangeeta 2015). It is expected that female-headed households would have less food expenditure than male-headed households. Bigger household sizes are expected to spend more especially on food as they have a higher food demand need. Households with a larger number of dependants (elderly and children) are likely to have greater food expenditure as they partake a protein rich diet, which is more expensive. For low income level households, as the number of depndants increase, per capita income decreases resulting in lower food expenditure (Yimer, 2011). A negative relationship is therefore expected between dependent ratio and food expenditure. Married household heads are likely to spend more on food as they collaborate in the decision making process to maximise utility through a diversified diet. Income (non farm income or farm income) as in other previous studies, (Umar et al. 1999, Akaakohol and Aye 2014, Adekoya 2014) is expected to positively influence food expenditure.

Table 6.1 Demographical and socio-economic explanatory variables for household food expenditure

Description of Variable	Measurement	Expected sign
Sex of household head	1=Male, 0 = Female	+
Age of household head	Number of years	-
Marital status of household head	1 = Married, 0 = otherwise	+
Household size	Number of people	+
Dependant ratio	Ratio	-
Non-farm income	Income in USD	+
Food Crop Sales	Income in USD	+
Cash crop sales	Income in USD	+
Livestock sales	Income in USD	+

6.3 Results and discussion

6.3.1 Household income sources

The household main sources of farm income were cash crop sales, food crop sales, livestock sale and vegetable sale. The main sources of non-farm income were remittances, salaries, wages, pension and trading (including petty trade and small-medium businesses). The mean annual income per household from the main sources is summarised in Table 6.2. Statistically significant differences in mean income were noted between female-headed households and male-headed households in cash crop sales, remittances, farm income and total income. It was noted that female-headed household had a statistically significantly higher income from remittances ($p<0.05$) than male-headed households. About 10% of the farmers were receiving remittances. Male-headed households had statistically significantly higher income from cash crop sales than female- headed households ($p<0.01$). Over 25% of the sample had income from cash crop sales. Generally, male-headed households had higher average annual incomes than female-headed households did. The annual income per capita showed that, on average, a household spent around 0.5USD per day per head, which is far below the World Bank poverty line. Male-headed households had significantly higher per capita income) than female- headed household ($p<0.05$). The statistics showed that 64% of the cash income was obtained from farm

activities comprising mainly of crop and livestock sales. The non-farm income contributed 36% of the total income. This implies that though smallholder farmers rely more on agriculture for cash generation, other non-farm activities also play a significant role (Bowne et al. 2007, Babatunde 2010, Akaakohol and Aye 2014, Adekoya 2014).

Table 6.2 Mean annual household income aggregated by gender of household head

Income source	**Income in USD Males** **Mean (Standard deviation)**	**Income in USD Females** **Mean (standard deviation)**	**Pooled Mean (standard deviation)**	**Significance**
Cash crop sales	802 (1468)	229 (904)	696 (1398)	0.001
Food crop sales	122 (488)	93 (366)	135 (468)	0.623
Livestock sales	81 (208)	97 (239)	84 (214)	0.627
Trading	69 (252)	44 (131)	64 (234)	0.488
Wages +salaries	131 (473)	59 (331)	118 (450)	0.293
Remittances	37 (163)	105 (182)	50 (168)	0.015
Total farm income	665 (776)	310 (599)	600 (759)	0.000
Total non-farm	345 (601)	308 (397)	339 (569)	0.675
Total income	1011 (963)	619 (733)	939 (936)	0.000
Income per capita	205 (284)	115 (125)	189 (265)	0.027

6.3.2 Household expenditure patterns

Table 6.3 shows the mean monthly expenditure in USD across different categories. Household expenditure for farming households could be split into five main categories. Food presented the highest expenditure accounting for 62% of monthly income. Male-headed households spent significantly higher income on food than female-headed household ($p<0.05$). However, the proportions of income spend on food for a female- headed household was 71% as compared to 61% for male-headed households. The next biggest category is education, which accounted for 17% of total expenditure. Male-headed households also had significantly higher levels of expenditure on education than female-headed households ($p<0.05$). There was no statistically significant difference in monthly expenditure on inputs between male-headed and female-headed households ($p> 0.10$). Agricultural inputs accounted for about 13% of the monthly expenditure. Health and other expenses such as durable goods had similar spending of 4%. Generally, male-headed households had significantly higher total expenditure than female-

headed households. The results are consistent with previous studies, which found food as the main expenditure category for low income farming households (Umar 1999, Umeh and Asogwa 2012, Mignouna 2012, Seng 2015).

Table 6.3 Average monthly household expenditure in USD

Expenditure category	**Male**	**Female**	**Pooled**	**t test significance**
	Mean USD	Mean USD	Mean USD	
	(Standard deviation)	(Standard deviation)	(Standard deviation)	
Food	51.65 (30.89)	38.78 (33.63)	49.72 (31.75)	0.008
Agricultural inputs	7.28 (23.60)	2.73 (9.08)	6.44 (21.71)	0.482
Education	13.75 (27.83)	10.84 (21.92)	13.21 (26.82)	0.024
Health	3.1914 (6.81)	1.01 (1.48)	2.79 (6.25)	0.000
Durable goods	4.99 (31.92)	0.71 (3.14)	4.19 (28.88)	0.346
Total	83.81 (81.90)	53.40 (52.71)	78.18 (78.16)	0.001

6.4 Household food expenditure

6.4.1Descriptive statistics

Additional descriptive statistics of household characteristics for sampled households are summarised in Table 6.4. Male-headed households dominated the sample and had a significantly higher mean food expenditure than female-headed households ($p<0.008$). Married households head also had a significantly higher expenditure on food than unmarried, with unmarried households only constituting 20% of the population. The unmarried household heads included widows, singles and separated. Over 50% of the households had household sizes of between 4-7 people and food expenditure increased significantly with household sizes. Households with at least four hectares of land had significantly higher food expenditures (average monthly household food expenditure). The descriptive statistics for explanatory variables for income have already been discussed from Table 6.2. The aggregated non-farm income was used. However, farm income was disaggregated and each component was fitted into the model.

Table 6.4 Descriptive statistics for household characteristics

Variable	Frequency (%) n=281	Mean Food expenditure	Standard Deviation	Significance
Gender				
Male	81	51.59	33.62	0.008
Female	19	38.77	30.97	
Marital Status				
Married	80	52.02	30.97	0.003
Otherwise	20	38.22	32.94	
Age				
Less than 30 years	7	36.22	21.13	0.382
30-39years	21	50.90	31.90	
40-49years	27	59.79	35.17	
50-59years	21	47.53	29.63	
above 6o years	24	40.61	28.59	
Household size				
2-3 people	15	32.13	26.74	
4-5people	32	47.67	27.20	0.065
6-7people	27	55.19	35.04	
8-9people	13	52.44	35.29	
10 and above	13	57.06	30.91	
Dependant ratio 0-<0.3	11	52.77	24.20	
3-<0.6	41	48.98	32.54	0.815
0.6 and above	49	48.75	31.75	

6.4.2 Determinants of household food expenditure

The results of the regression model on determinants of household food expenditure are summarised in Table 5. The tests for multicollinearity showed low VIF values with most of the variables closer to one. Sex of household head (3.247), marital status (3.236) and total labour (2.166) had VIF values greater than two however they were fitted into the model since the degree of multicollinearity was considered less detrimental (Jorgen and Jesus 2006). The model was able to predict 40% of the variation (R^2= 0.402). The results show that age of household head ($p<0.01$), household size ($p<0.05$), dependent ratio ($p<0.05$), non-farm income ($p<0.01$), cash crop income ($p<0.01$), food crop income ($p<0.01$) and livestock income ($p<0.001$) significantly influenced food expenditure. As age of household head increased food expenditure decreased. The results are consistent with Sekhampu (2012) and Hopper (2011) as older households head are likely to spend less as they become more risk averse. Household size

was positively affecting food expenditure. Similar findings were realised in Nigerian farm workers (Akphan 2013). The bigger the household the greater the food demand, therefore, such household spend much on food consumption. The dependant ratio significantly positively affected food expenditure. The children and elderly people who constitute the dependants in the household usually require more expensive protein rich diets thus increasing the food expenditure (Hassan and Babu 1991). As expected income from all sources significantly affected food expenditure positively. For every 1USD, increase in non-farm income food expenditure increased by 0.27 USD. Non-farm income significantly positively affected household food expenditure. In line with Babatunde (2010) farming, households rely on different sources of income for their food consumption. Cash crop income was also positively significantly influencing food expenditure. A dollar increase in cash crop income resulted in 0.44 USD in food expenditure. Coung (2015) realised similar results in Vietnam with annual cash crops. Food crop income was also significantly affecting food expenditure positively with each dollar increase in food crop income resulting in 0.17 USD increase in food expenditure. In line with Jodlowski et al. (2016), livestock income was significantly positively impacting household food expenditure.

Table 6.5 Determinants of household food expenditure

Variable	**Beta**	**Standard Error**	**Significance**
Constant		7.455	0.00
Sex of household head	-0.52	6.847	0.538
Age of household head	0.145***	0.116	0.005
Marital status of household head	0.114	6.600	0.173
Household size	0.134**	0.531	0.010
Dependant ratio	0.083**	6.037	0.013
Non-farm income	0.269***	0.003	0.000
Food crop income	0.177***	0.003	0.000
Cash crop income	0.441***	0.001	0.000
Livestock income	0.166***	0.007	0.001
Adjusted R^2	0.402	F statistic p value 0.00	
Number of observations	281		
Significant at:*10%,		**5% and *** 1%	

6.5 Conclusion and Policy Implications

The study was designed to analyse the income and expenditure patterns of farming households and the determinants of food expenditure. It was realised that the household main sources of farm income included cash crop sales, food crop sales and livestock sales. Main sources of non-farm income for households were wages and salaries, small businesses and remittances. Female-headed households had significantly higher levels of remittances than male-headed. Mechanisms to allow efficient flow of cash remittances should be allowed as they are an important source of income for rural households. Male-headed households had significantly higher average income from cash crop sales than the female-headed households did. Food expenditure dominated the household expenditure accounting for as much as 62% of total expenditure. Non-farm income, cash crop income, food crop income, livestock income, household size and dependant's ratio and total labour significantly influenced household food expenditure positively. However, age of household head negatively influenced household food expenditure. The farming households can be classified as low income as such food expenditure should be encouraged to promote demand led agricultural growth.

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CHAPTER 7 CONCLUSION AND RECOMMENDATIONS

7.1 Recap of the purpose of study

Considering that agriculture is the backbone of the Zimbabwean economy, most developmental policies have been agricultural oriented. The smallholder farmers constitute the bulk of the farming population and they are the most food insecure. Various programmes have been set to promote smallholder agricultural production including the FTLRP, which promoted equitable distribution of land. Over the past decades, smallholder farmers changed their cropping patterns, with a relative increase in number of farmers growing cash crops such as tobbacco. Though current debates advocate for commercialisation as a tool for agricultural-led growth, the empirical evidence on implications of such shifts on household food security is limited. This study analysed factors determining cash cropping decisions in smallholder farmers and the impact of such choices on food security. Specifically, the study pursued the following objectives: To determine the household crop production patterns among smallholder farmers. To determine the household socio-economic factors influencing cash crop production decisions. To analyse the income and expenditure patterns and the factors determining food expenditure in the household. To determine the impact of cash crop farming on household food security. In this chapter, the important question of how smallholder use the income to purchase food or non-food items was answered.

A household survey was conducted in Shamva district and a questionnaire was administered to 281 randomly selected respondents. Various descriptive statics and econometric models were employed to address the objectives. ANOVA and independent t-test were used to analyse the smallholder farmers cropping patterns in Chapter 3. Tobit regression model was used in Chapter 4 and 5 to analyse the determinants of commercialisation and impact of cash crop production on household food security, respectively. Descriptive statistics were used to analyse income - expenditure patterns and an Ordinary Least Squares regression was used to determine factors influencing household food expenditure in Chapter 6. This chapter provides the conclusion drawn from the study, suggests policy recommendations and areas for further study. The basic question answered by the study is how farmers decision making processes concerning types of crops grown affect their livelihood outcomes in terms of food security and income

7.2 Conclusion and policy implications

Chapter 3 showed that smallholder-farming households across different land holdings in Shamva District have diversified cropping patterns with most farmers growing two crops. Maize, the staple crop, dominated the crop mix, accounting for above 60% of the total cultivated area. The smallholder sector grew tobacco as a major cash crop. Statistically significant differences in average area under cash crops were realised across the different land tenure regimes. Resettled farmers allocated more land to cash crop production than did communal area farmers. Smallholder farmers in Shamva District consider themselves as having access to most of the agricultural services such as output markets, inputs and extension. However, there is very little financial support for production of all crops in the smallholder sector. There were no significant differences in access to agricultural and support services between resettled and communal farmers. In this regard, policy implications intervention should target production of maize and tobacco as the major crops in the area. The dominance of the staple crop maize in terms of area covered shows that though farmers grow cash crops they exercise some caution This indicates that smallholder farmers mainly depend on own food production to ensure household food security .

The empirical results from Chapter 5 implored that on average smallholder farmers sold less than half of their gross crop value, suggesting limited commercialisations across the sample. Household characteristics, resource endowments and access to agricultural services determined commercialisation. Male-headed households were more commercialised than female-headed households, possibly because females have less access to productive resources and may shun cash crops, which are labour intensive. Older farmers were less likely to commercialise than younger farmers as the former are considered more risk averse and are likely to grow less cash crops. Access to agricultural services (extension, finance, markets and draft power) had a positive impact on commercialisation. Access to agricultural services promotes use of technology, inputs and information thereby resulting in increased productivity and marketable surplus. Labour is an important factor of production in agriculture. Cash crops such as tobacco are labour demanding therefore, size of household labour positively influences commercialisation. Commercialisation is attained through production of cash crops or generation of surplus food crop. The policy implication is that favourable health conditions in the agricultural industry should be promoted in order to maximize labour availability for

agricultural production. Commercialisation decreased with an increase in farm income, implying that farmers with other sources of income are likely to grow fewer cash crops and less surplus food crops. The major question answered by this study is on how different factors such a resource endowments and household characteristics and supporting structure influence farming decisions, particularly the decision to commercialise or not.

Empirical evidence from Chapter 5 shows that cash crop production positively impacted household food security. This was due to the income effect of cash crop sales on food security. Farmers had more economic access to food using the cash crop sales. The results also showed quantity of maize harvested, livestock units, squared household size, and labour, access to finance, access to markets and access to draft power as positively affecting household food security. Considering that maize is the staple crop in Zimbabwe, the quantity of maize harvested ensures attainment of household food security. Whilst the evidence supports attainment of food security through increased cash crop production, a diversified cropping pattern is more suitable as highlighted from the cropping patterns of smallholder farmers. The importance of both food crops (quantity of maize harvested) and cash crops in determining household food implies that cash crop production should not replace food crop production completely.

Empirical evidence from Chapter 6 identified the household main sources of farm income as crop sale, livestock sale and vegetable sale. The main sources of non-farm income were remittances, salaries, wages, pension and trading (including petty trade, small-medium businesses). Household descriptive statistics showed significant differences in mean household income between male and female-headed households. Male-headed households had significantly higher income from cash crop sales than the female-headed. The main component of expenditure was food, accounting for as much as 62% of total household expenditure. The household characteristics, i.e. household size and dependants' ratio, positively affected food expenditure. However, age of household head negatively influenced food expenditure. Older household heads are more risk averse and spent less on food. Larger households have higher food demand thus an increase in household size results in increased food consumption. Income from cash crop sales, food crop sales, livestock sales and non-farm activities had a positive impact on food expenditure. Therefore, cash crop production is important in promoting food demand-led agricultural growth.

The empirical evidence in this study shows that cash crop production is important in improving household income, which is used important in purchasing household food. Therefore, the study contribute to agricultural and rural development by offering policy instruments on improving agricultural production, food security and demand led economic growth.

7.3 Recommendations

Diversified cropping patterns should be encouraged in the smallholder factor as food crops and cash crops complement each other in the attainment of household food security. Private agri-businesses and the government should offer support in terms of extension, markets and access to draft power to boost cash crop production in the smallholder sector. Albeit its contribution to commercialisation and food security, access to finance in the smallholder sector remains low. Therefore, stakeholders in the agricultural sector, such as government and marketing firms, should increase farmers' access to finance. Access to finance should target maize and tobacco, the major crops smallholder farmers grow. Studies have shown tobacco contract farming to be viable for the smallholder sector, therefore, the government should provide a conducive policy environment for private firms to engage in contract farming. This will increase use of high value inputs and improve production and food security. Land resettlement should continue to be used for decongesting communal areas and providing the farmers with access to fertile land thereby increasing agricultural production, commercialisation and food security. Cash crop production should not be regarded as the panacea for achieving food security. Therefore, institutes of higher learning and the agricultural research department should invest in research on ways to improve tobacco and the staple crop maize production. Disseminating this information ensures increased production and food security in the smallholder sector. The next section provides the limitations of the study.

7.4 Limitations of the study

The major limitation in analysing the impact of cash cropping on household food security emanates from the use of cross sectional data instead of panel data. Cross sectional data is limited in food security studies as it fails to give a robust picture of the outcomes of production decisions over time. The existence of endogenous variables may result in biased estimates of the regression coefficients. Therefore, the dimension of stability of food security is neglected. As in many studies on food security, the lack of universal food security measure limits the generalisation of results for all dimensions of food security. The scope of the study quantifies

the effect of cash crop production through regression coefficients. However, it does not give exact combinations of crops to be cultivated on a piece of land. The study was conducted in one district of Mashonaland central. Therefore, cannot be generalised to the whole country. However, for similar settings based on agricultural on agro-ecological classification zones the results may still be generalised.

7.5 Areas for further research

In future studies, panel data should be used to provide an understanding of changes in food security status over time. Future studies should derive optimum combinations of the food and cash crops in smallholder farmers in order to improve both food and cash crops. More studies on commercialisation and nutrition should be carried out.

ANNEX 1 HOUSEHOLD QUESTIONNAIRE

Household questionnaire: The impact of cash cropping on household food security.

District Name. …… **Ward Name…….**

Ward number |__|__| **Village Name……**

A: HOUSEHOLD DEMOGRAPHIC PROFILE							
A1	What is the sex of the household head (HH)?	**1** = Male **2** = Female					
A2	What is the age of the household head?	|__||__|					
A3	What is the marital status of the household head?	**1**=Married **2**=Divorced **3**= Widowed **4**= Single **5**=Separated					
A4	What is the type of family composition?	1= Nuclear 2= Polygamous 3 = Child Headed					
A5	Employment Status of HH?	1=Not Employed 2=Formally Employed 3=Self Employed					
A6	Highest level of education of HH	1=Primary 2= Secondary 3= Tertiary					
A7	What is the total number of people who have been living in your household for the 30 days (1month)?	**Total**	**< 5 years**	**5-17 years**	**18-59years**	**> 60 years**	
	Male						
	Female						
A8	How many household members in these age groups provide labour in your HH?	< 18 years |__||__| 18-59 years |__||__| > 60years |__||__|					
A9	Number of household members residing on the farm engaged in any activity that brings in income in cash or kind?	|__||__|					

B: HOUSEHOLD ASSETS How many of each of the following household assets does your household own?								
	1.Livestock ownership	**#**		**2.Working Productive (Agric) assets**	**#**		**3.Working Non Productive assets**	**#**
B1(a)	All cattle owned		B2(a)	Hoe		B3(a)	Bicycle	
B1(b)	Draught cattle		B2(b)	Plough		B3(b)	Radio	
B1(c)	Donkeys		B2(c)	Wheelbarrow		B3(c)	Sofas ,Chairs or benches	
B1(d)	Goats		B2(d)	Scotch cart		B3(d)	Beds	
B1(e)	Sheep		B2(e)	Cultivator		B3(e)	Table	
B1(f)	Pigs		B2(f)	Tractor		B3(f)	Solar panel (indicate size in cm)	
B1(g)	Poultry (chickens)		B2(g)	Irrigation equipment		B3(g)	Cellphone	
B1(h)	Poultry (e.g. ducks, turkeys)approx.		B2(h)	Other (specify)		B3(h)	Other (specify)	
	Other (specify)							

C: LIVELIHOODS, INCOME & EXPENDITURE				
`C1	During the past 12 months what were your household's main sources of income? Rank them in order of their relative importance starting with the source with highest amount.	**1**= remittances **2**= cash crop sales 3 = food crop sales **4**= casual labor **5**= livestock sales (cattle) **6**= livestock sales (chicken, goats) **7**= skilled trade/ artisan **8**= medium/large business	**9**= petty trade **10**= beer brewing **11**= formal salary/wages **12**= pension **13**= sale of fish **14**= gold panning **15** = vegetable sales **16**=cross-border trade **17**= None **18**=other (specify)_____	
C2	During the 12 months past 30 days, what were your household's total earnings from each of the sources? (Please indicate currency ,USD)	**Income source**	**Amount(USD)**	
		1		
		2		
		3		
		4		
		5		
C4	In your household, who usually makes decisions about expenditure? Select one	1= HH 2= spouse of HH 3= male hsh members 4= female hsh members 5=male and female hsh members jointly		
C3	What was total amount spent on each of the following during the past 30 days (Please indicate currency USD)	Food …….. Education…….. Health…… Social gatherings…….. Agricultural inputs…… Household goods…… Other (specify)……. Total……..		

D. HOUSEHOLD CONSUMPTION PATTERN AND DIETARY DIVERSITY

D1	How many meals did the **members in your household aged 5yrs and above** eat **yesterday**?	|__| **NUMBER OF MEALS**
D2	How many meals do the members of this household aged 5 years and above normally eat daily?	|__| **NUMBER OF MEALS**

D3 Over the last **seven days**, how **many days** did your household consume the following food items and ***What*** was the **main source** of each consumed food item? ***(Add 99 for Main Sources if food item was not consumed)***

Food Items (use standard items)		Eaten yesterday	Number of days in the past 7 days ***(0 to 7)***	Main source (***see codes)***
D3(a) Maize , maize porridge, rice, sorghum, millet pasta, bread and other cereals		**1= No 2=Yes**		
D3(b) Cassava, potatoes and sweet potatoes, other tubers, plantains		**1= No 2=Yes**		
D3(c) Beans. Peas, groundnuts and cashew nuts		**1= No 2=Yes**		
D3(d) Vegetables, leaves		**1= No 2=Yes**		
D3(e) Fruits including wild fruits		**1= No 2=Yes**		
D3(f) Meat	beef, goat, pork	**1= No 2=Yes**		
	Poultry, eggs	**1=No 2=Yes**		
	Fish, matemba	**1= No 2=Yes**		
D3(g) Milk yogurt and other dairy products		**1= No 2=Yes**		
D3(h) Sugar and sugar products, honey		**1= No 2=Yes**		
D3(i) Oils, fats and butter		**1= No 2=Yes**		
D3(j) Spices, tea, coffee, salt, tomato sauce (condiments)		**1= No 2=Yes**		

Main Food Source Codes 1 = Own production 2 = Purchases (cash and barter) 3 = Remittance from **Outside** Zimbabwe 4 = Remittances from **Within** Zimbabwe 5 = Government Food Assistance (In-kind, cash or vouchers) 6= Grain loan scheme	7= Non State Agencies Food Assistance (In-kind, cash or vouchers) 8= Gifts (from non-relative well-wishers) 9 = Labour exchange 10= Borrowed 11 = Hunting and gathering from wild 12 = Other

E HOUSEHOLD FOOD INSECURITY ACCESS SCALE	
	Response Option (circle appropriate response)
E1 In the past 4 weeks/30 days, did you worry that your household would not have enough food?	1 = No (skip to Q2) 2 = Yes
E1a How Often did this happen in the past 4 weeks/30days?	1 = Rarely (1-2 times) 2 = Sometimes (3-10 times) 3 = Often (more than 10 times)
E2 In the past four weeks, were you or any household member not able to eat the kinds of foods you preferred because of a lack of resources?	1 = No (skip to Q3) 2 = Yes
E2a How Often did this happen in the past 4 weeks/30days?	1 = Rarely (1-2 times) 2 = Sometimes (3-10 times) 3 = Often (more than 10 times)
E3 In the past 4 weeks, did you or any household member have to eat a limited variety of foods due to a lack of resources?	1 = No (skip to Q4) 2 = Yes
E3a How Often did this happen in the past 4 weeks/30days?	1 = Rarely (1-2 times) 2 = Sometimes (3-10 times) 3 = Often (more than 10 times)
E4 In the past 4 weeks, did you or any household member have to eat some foods that you really did not want to eat because of a lack of resources to obtain other types of food?	1 = No (skip to Q5) 2 = Yes

E4a How Often did this happen in the past 4 weeks/30days?	1 = Rarely (1-2 times) 2 = Sometimes (3-10 times) 3 = Often (more than 10 times)
E5 In the past 4 weeks, did you or any household member have to eat a smaller meal than you felt you needed because there was not enough food?	1 = No (skip to Q6) 2 = Yes
E5a How Often did this happen in the past 4 weeks/30days?	1 = Rarely (1-2 times) 2 = Sometimes (3-10 times) 3 = Often (more than 10 times)
E6 In the past 4 weeks did you or any other household member have to eat fewer meals in a day because there was not enough food?	1 = No (skip to Q7) 2 = Yes
E6a How Often did this happen in the past 4 weeks/30days?	1 = Rarely (1-2 times) 2 = Sometimes (3-10 times) 3 = Often (more than 10 times
E7 In the past4 weeks, was there ever no food to eat of any kind in your household because of lack of resources to get food?	1 = No (skip to Q8) 2 = Yes
E7a How Often did this happen in the past 4 weeks/30 days?	1 = Rarely (1-2 times) 2 = Sometimes (3-10 times) 3 = Often (more than 10 times
E8 In the past 4 weeks did you or any household member go to sleep at night hungry because there was not enough food?	1 = No (skip to Q9) 2 = Yes
E8a How Often did this happen in the past 4 weeks/30 days?	1 = Rarely (1-2 times) 2 = Sometimes (3-10 times) 3 = Often (more than 10 times)
E9 In the past 4 weeks did you or any household member go a whole day and night without eating anything because there was not enough food?	1 = No (skip next section) 2 = Yes
E9a How Often did this happen in the past 4 weeks/30days	1 = Rarely (1-2 times) 2 = Sometimes (3-10 times) 3 = Often (more than 10 times)

F1	What is the total amount (surface) of arable land that your household has access to? (own or lease)	……. ha **(1 acre= 0.4 ha)**
F2a	What was the total land cultivated in 2015/16 season? (Including land rented)	……..ha

F2b	What was the amount of leased or borrowed land for 2015/16 season	…….ha
F3	How many people provide active agricultural labor on this land (household members, hired, others)?	……..
F4	In the hh who determines which crops to grow for a particular season	1= HH 2=spouse of hh 3= male hsh members 4=female hsh members 5= female and male hsh members jointly

F5	**2015-2016 (current season)**						
a Crop Type (*Write the name of the crop eg maize ,tobacco*)	**b Total area planted for this crop in ha**	**c Estimated quantity of crop harvested**	**d Quantity retained for consumption**	**e Total quantity sold**	**f Total earnings from sales**	**g Units for quantity**	**h What factors did you consider for you to choose growing this crop** (*Write all that apply*)
i							
ii							
iii							
iv							

F6 2014-2015 (previous season)					
A Crop Type	**B total quantity harvested**	**C quantity Sold**	**D Units for quantity**	**E total earnings**	**F for how long have you been growing this crop**
I	i				
Ii	ii				
Iii	iii				
Iv	iv				
	v				

F7	**Crop**	**Inputs used**	**C. Total Quantity of input used(***see units below***)**	**Did you manage to get sufficient quantities of this input which you required for the crop?**	**What was the main source of this input?**	**Did you hire any labour for this crop?**
i)						
ii)						
iii)						

iv)						
	Maize, sorghum, groundnuts , tobacco , cotton , soya beans etc.	1 Seed, 2 Basal fertilizer 3 Top dressing 4 Herbicides 5 Pesticides 6 Manure	Kgs. 2= 2.5lt tin 3= small cup 300mls 4=5lt tin 5=large cup>300mls 6= 9lt tin 7=bucket 20lts 8=vine/seedlings 9=50kg bag 10= other specify 11=90kg bag	1= Yes 2= No	1=own stock purchased from formal sector 2 own stock harvested last season 3=gift 4=GMB 5=purchase using bank or microfinance loan. 6= purchase from Farmers' group savings 7= NGO including seed fair vouchers 8= Other (specify)	1= yes 2 = no

G Access to agricultural services				
G1	Did any member of this household receive any extension training this agricultural season (2015/2016)	**1=**No **2=**Yes		
G2	If yes, state the source?	**1 =** AGRITEX /LPD /VET **2=** NGO **3=**GMB/ARDA **4=**Academic Institutions **5=** Private Companies **6=**Lead Farmers **7=**Other Farmers		
G3	How often do you access extension programs in a month(including field days, home visits and formal training sessions)	1=Once 2=Twice 3 = Thrice 4 = Other		
G4	How useful were the extension education programme you have attended	**1=** Very useful 2= Useful **3=** I don't know **4 =** Somehow useful **5=** Not Useful		
G5	For each of the crop you grew in the previous season how easy was it to access the market	Crop(*list the crops in separate rows*)	**Access to market**	
		I	1= extremely easy to access 2= easy to access 3= I don't know 4 =somehow accessible 5 =very difficult to access	
		Ii		
		Iii		
		Iv		
G6	Did you have adequate financial support in terms of access to credit (indicate for each of the crops you grew)	Crop (*list the crops*)	Adequacy of financial support*(probe for ranking)*	
		I	1= very adequate financial support 2= adequate 3= indifferent 4= not adequate 5 no support at all	
		Ii		
		Iii		
		Iv		
G7	Which one of the following financial services have you used in the past twelve months	1=savings 2= agricultural credit/loans 3= agricultural insurance 4= none		
G8		Crop	Fairness of price	

	Using a scale of 1-5 to represent fairness of price how would you perceive the producer price of your crop.	I	1=Too low 2= low 3= Fair 4 = high 5 = too high
		Ii	
		Iii	
		Iv	
G9	On a scale of 1-5 where 1 represents a severe lack of knowledge and 5 represents excellent knowledge about production and marketing of a crop how would you rank your knowledge on specific food and cash crops grown in the area.	Crop	Level of Knowledge*(either 1.2.3.4.5)*
		Maize	
		Sorghum	
		Sunflower	
		Tobacco	
		Cotton	
		Soya beans	
G10a	What did you use as draft power	1= cattle 2= cattle + donkeys 3 = Donkeys 4= Tractor 5 = Other (specify)	
G10b	What was the source of your draft power	1= own 2= loaned from friends and relatives 3 = government support 4= other (specify)	
G10c	On a scale of 1- 5 where 1 represents a severe case of in access to draft power and 5 represents abundantly available draft power. Did your household have access to draft power?	Access to draft power 1 2 3 4 5 →	
G11 a	Does any member of this household belong to a formal group in the community?	1= Yes 2= No	
G11b	If so which type of group .(*indicate all applicable)*	1= Tobacco growers 2= Cotton producers 3= cereal producers 4= master farmer training group 5 = income generating group 6= women empowerment group 7= Other	

Household water and Sanitation Behaviour		
H1	What is the main source of drinking water for members of this household	***Select one*** 1= tap 2=borehole 3=protected well 4=unprotected well 5= bottled water 6=surface water (river/dam/stream)
H2	What do you normally do to make water from your main source of drinking safer to drink	***Select all that apply*** 1=Boil 2= add bleach or chlorine 3=strain it 4=solar disinfection 5=let stand and settle 6= add water treatment tablet 7= Don't treat 8=other
H3	What is the main source of water used by this household for cooking	***Select one*** 1= tap 2=borehole 3=protected well 4=unprotected well 5= bottled water 6=surface water (river/dam/stream)
H4	What kind of toilet facility do members if this household usually use	***Select one*** 1= Flush toilet 2=Blair latrine 3=pit latrine with slab 4=pit latrine with no slab 5=bush 6= other……specify
H5	Does this household currently share this toilet facility with any other households	***1=Yes 2= No***
H6 If yes to 5	How many households use this facility (including your own)	|__|
H7	Do you normally wash your hands with soap after visiting the toilet	***1= yes 2= No***
H8	Under which circumstances do you normally wash your hands with soap	***Select all that apply*** 1=after visiting the toilet 2=after changing baby nappy 3= before eating 4= before eating 5 =before cooking or preparing food 6=other

Comments……
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……..

Thank You