

An analysis of factors that influence production and participation decisions in cowpea production in Rushinga district, Mashonaland Central.

**A dissertation submitted in partial fulfilment of the requirements for the Master of Science Degree in Food Security and Sustainable Agriculture
(Crop Production)**

Bindura University of Science Education



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DECLARATION

I hereby declare that the research project entitled “ **An analysis of factors that influence production and participation decisions in cowpea production in Rushinga district, Mashonaland Central**” submitted to Bindura University of Science Education, Department of Agricultural Economics, Education and Extension is a record of an original work done by me under the guidance and supervision of Dr R.V Chivheya and this work is submitted in partial fulfilment of the requirements for the award of a Master of Science Degree in Food Security and Sustainable Agriculture. The results embodied in this thesis have not been submitted to any University or Institute for the award of any degree or diploma.

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DEDICATION

This work is dedicated to my late parents who never doubted my efforts even when I stumbled. All the love that I have received from all that call me their daughter, I will treasure all the support. May the Almighty bless you abundantly. My wonderful children for their patience and love during my study period and to my Beloved Husband, I reflect on the past and look into the future and all I see is you right beside me. Thank you.

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ABSTRACT

Despite its importance as a legume, cowpea production has not received much attention as other crops in Zimbabwe. This study investigated the livelihoods, knowledge, attitudes and practices and the technical, socio-economic, institutional factors influencing cowpea production in Rushinga district, Zimbabwe. Data were collected with the use of questionnaire administered to 252 farmers selected randomly from four different wards. Key informants were also interviewed. Descriptive statistics, likert scale and logit regression was used to analyze the data. Findings indicated that 37.7% of the farmers were females and the rest were male. Age of the respondents ranged from 26 to 40 years of age and more than 50% have attained education up to secondary level. Majority had less than 0.5ha grown to cowpeas. Most of the farmers still use the manual methods for their on-farm operations. The research findings elaborated that the common livelihood strategy is cultivation of food and cash crops. Farmers are knowledgeable and well aware of the benefits of cowpeas this is in agreement with the positive attitude that has been portrayed by the respondents. Result of the logit regression presented that use of certified seed, time of planting, education; extension visits, market and access to credit are positive and significantly influence cowpea production. It is recommended that policies should be formulated to take advantage of the factors that positively influence cowpea production and build on them so that farmers' livelihoods can improve through increase in production of cowpeas.

Keywords: Cowpea, livelihoods, likert scale, socio-economic and institutional factors

LIST OF ACRONYMS AND ABBREVIATIONS

AEWs	Agricultural Extension Workers
AGRITEX	Agricultural Technical and Extension Services
CIMMYT	International Maize and Wheat Improvement Centre
FAO	Food and Agriculture Organization of the United Nations
FTLRP	Fast Track Land Reform Programme
GDP	Gross Domestic Product
HH	Household
IYP	International Year of Pulses
KAP	Knowledge, Attitude and Practices
MAMID	Ministry of Agriculture, Mechanization and Irrigation Department
MFA	Ministry of Food and Agriculture
MLAWCRR	Ministry of Land, Agriculture, Water, Climate and Rural Resettlement.
MT	Metric tonnes
NGO	Non Government Organization
OCHA	United Nations Office for the Co-ordination of Humanitarian Affairs
RTGS	Real Time Gross Systems
SSA	Sub-Saharan Africa
WFP	World Food Programme of the United Nations
ZIMSTAT	Zimbabwe Statistics
ZimVAC	Zimbabwe Vulnerability Assessment Committee

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Chapter 1

Introduction

1.1 Background of the study

Akibode, Maredia, & Economics, (2011) indicate that cowpea is one of the pulses that serve as an important food crop due to its high protein and essential amino acid content. Globally, pulses have been proven to have larger protein content than cereals. The seeds of pulse crops are typically made up of 20-25% protein compared to 6-10% protein content in major cereal crops. Pulses are also rich in dietary fiber and usually have only small amounts of oil. The protein of pulse seeds is high in the amino acids lysine and methionine, making pulses nutritionally complementary to cereals, which are deficient in these two essential amino acids. Pulses are the main source of protein in the diet of vegetarians, and feature prominently in the traditional cuisine of virtually every region of the globe. Moreover, in recent years there has been a change in the consumption of pulses in several developed countries where they are increasingly considered as health foods. (USDA-ERS, 2011).

According to FAO (2018), the International Year of Pulses (IYP) was recognised in view to recognize the contribution that pulses make to human well-being and the environment. One challenge faced worldwide is that the diversity of pulses is not captured well in statistics. There is not a clear picture of what is grown and where, and this leads to an under-estimation of their importance for sub-Saharan Africa and consequently reduce research investment in pulses (FAO,2004). Existing agricultural production systems are dominated by cereals, and represent opportunities for enhanced crop diversification, through promoting local and novel pulse varieties.

In Africa, access of reliable data on cowpea production is difficult to attain since it is grown in mixture with other crops (Ngalamu *et al.*2015). It could be estimated that, the total area under production amounts to about 12.5 million hectares with an annual production of over 3 million tonnes worldwide. Cowpea is broadly distributed east and Southern Africa. The top cowpea producing countries include Nigeria, Mali, South Sudan, Somalia, Kenya, and Zimbabwe is increasing due to availability of improved cowpea varieties (Ngalamu *et al.*, 2015).

According to FAO (2004), cowpeas are of vital importance to the livelihood of several millions of people in West and Central Africa. Rural families that make up the larger part of

the population of these regions derive from its production, food, animal feed, alongside cash income. Food habits in West and Central Africa are mainly based on tuber crops (cassava, yam) and cereal (maize, rice, millet). Although they have a high nutritional value, grain legumes are a minor component of food diet. That is the reason why tentative efforts have been made to introduce soybean in African food habits and farmer activities, but with little success because of its undesirable taste and cooking difficulty. Unlike soybean, cowpea is appreciated and different traditional African meals and seasonings are prepared from cowpea, among them homemade weaning foods. (Lambot, 2002)

Agriculture is one of the key sectors in Zimbabwe's economy. It employs about 70% of the total population and contributes about 20% of GDP¹. Since the land reforms of the 2000s, the majority of those engaged in the sector, over 90%, are smallholder farmers. According to FAO², the country is divided into five agro-ecological regions, based on the rainfall patterns, soil conditions and vegetation, among other factors. The quality of soils decline as you move from region I through to Region V. The majority of smallholder farmers are found in communal farms which are mainly in Natural Region IV and V, where the soil conditions and rainfall patterns are low. According to data provided by FAO 2005-7, Zimbabwe did not appear amongst the list for developing countries with pulses which contribute more than 10% per capita protein intake. Nhamo *et al.* (1991) have observed that cowpea is grown in low and high rainfall smallholder farming areas in Zimbabwe. Research on cowpea improvement and utilization was minimal as the crop was regarded as a rural crop with no industrial use. Its productivity has been very low because of lack of high yielding pest and disease resistant varieties of suitable maturity coupled with unavailability of a guaranteed market to dispose excess grains; this has slowly relegated this nutritious pulse which was once ranked first down to obscurity.

Production of the main staple maize continues to dominate in these semi-arid areas of Zimbabwe where other crops such as cowpeas would be more appropriate. This makes it pertinent that adoption of cowpea production be actively promoted in such marginal areas, especially given the adversities presented by climate change. However, growing cowpeas is not without its challenges as many farmers use traditional knowledge for its production, not

¹Government of Zimbabwe. 2011. *Zimbabwe Medium-Term Plan, 2011–2015*. Harare

² FAO (<http://www.fao.org/docrep/009/a0395e/a0395e06.htm>)

proper agronomic practices are used for cowpeas as most farmers grow cowpeas as a secondary crop or mere fill up of unused land during that season.

With this background, it is clear that bulk of cowpea is produced by communal farmers who reside in drier parts of the country. It seems majority of the research has been very technical, such as testing high performing lines for yield and adaptation, characterization of local germplasm and many more (Matova and Gasura,2018). Little research has been done on the farmers' perceptions about the crop. Further research has to done on factors that contribute to adoption and decision making of cowpea production.

1.2 Problem statement

Although agriculture is the mainstay of the economy and smallholder farmers are the majority of the country adoption of cowpea production in semi arid regions still remains low as cowpeas is regarded as a secondary crop. Many smallholder farmers depict that the crop is easily attacked by pests and does not last to cater for a household until the next season (Ngalamu *et.al.*,2015). Furthermore, FAO/ World Food Program (WFP) (2008) noted that food security of individual households in any given location would be influenced by an array of factors.

The smallholder agriculture sector in Zimbabwe especially in semi-arid regions has of recent been characterised with decreased agricultural productivity and worsening food insecurity. The food insecurity situation has long been a problem, Zimbabwe's food and nutrition security situation is classified as "serious" by the 2015 Global Hunger Index.

As a secondary crop category, pulses such as cowpeas do not receive investment resources and policy attention from governments as do the cereal crops, which are often, considered food security crops. Compared to cereal crops (i.e. wheat, maize, rice, barley, sorghum and millet), food legumes not only receive less quantity of land resources, but also other inputs. Also, compared to cereal crops, pulse crops are grown in marginal areas where water is a scarce resource.

The low participation indicates that there are external and internal factors that hinder adoption and participation in cowpea production. The overall participation is incomparable to participation in other crops such as maize production.

This study is designed to analyse the factors that influence participation and adoption of cowpea production at household level in Rushinga by considering one particular production year 2018/19 season.

1.3 Objectives

1.3.1 Main objective

The main objective is to analyse factors affecting the influence of participation in production of cowpea in Rushinga district, Mashonaland Central.

1.3.2 Specific objectives

1. To identify the livelihoods of small scale communal farmers in Rushinga.
2. To determine the knowledge, attitude and practices of the small scale communal farmers on cowpea production.
3. To analyse factors affecting the influence of participation in production of cowpeas in Rushinga district?

1.3.3. Research questions

1. What are the livelihoods of small scale communal farmers in Rushinga?
2. What are the knowledge, attitude and practices of small scale communal farmers on cowpea production?
3. What are the factors affecting the influence of participation in production of cowpea in Rushinga district?

1.6 Justification

The contribution of cowpea to food security and poverty reduction can be substantial (Coulibaly and Lowenberg-DeBoer, 2014). Adoption of the innovations still remains low to ensure food security. Smallholder farming is necessarily powerful in different countries and for different economic activities.

One powerful initiative that can help communities overcome hunger, improve food and nutrition security and build resilience to the changing climate is shifting from the traditional practice of cultivating climate-sensitive crops like maize to increasing the production and productivity of drought-tolerant crops, such as cowpeas which require minimum amounts of

rainfall. Cowpeas have been proven to do well in other tropical regions of developing countries that have the same climate as Zimbabwe. Encouraging farmers to cowpea production and creation of a conducive market can improve their livelihoods and reduce the heavy dependence on food aid in these areas. Cowpea's has a high protein content, which can counter the challenges of malnutrition and undernourishment in most developing countries. Its adaptability to different types of soil and intercropping systems, its resistance to drought, and its ability to improve soil fertility and prevent erosion makes it an important economic crop in many developing regions. All the parts of cowpea used for food (fresh leaves, immature pods and the grains) are nutritious, providing protein, carbohydrate, vitamins and minerals. The grain contains 22-23 % protein (as opposed to 2 % in cassava and 10 % in maize) and good quantity of thiamine (vitamin B₁), riboflavin (vitamin B₂) and niacin (vitamin B₃), and richer

than cereals in iron and calcium content. Cowpea leaves are a significant source of β -carotene and ascorbic acid (vitamin C). Cowpeas seed grain used as food, supplement very well the protein deficiency of the predominantly carbohydrate, cereal, root and plantain diet of African communities. A well-known problem of cowpea grain is its content of tannins, trypsin inhibitors and flatulent sugar, raffinose, which cause bloating of stomach when a meal containing cowpea is consumed. As a result, a meal of cowpea is repulsive to some people. This problem can easily be avoided by grain soaking before dehulling, heat treatment and breeding for cowpea varieties without or with low content of these factors (Ngalamu *et al.*, 2014). This study can enrich the limited literatures regarding adoption and participation in cowpea production. This can serve as input for other researchers working in this area.

1.7 Scope/delimitations and limitations of study

1.7.1 Limitations

The following limitations were borne in mind:

1. The study is subject to constraints of most descriptive social science studies which also include the impracticability of experimental control of relevant variables which results in inability to establish causal relationships between independent and dependent variables.
2. Questionnaires as the instrument for data collection are subject to ignorance or failure of respondents to answer questions. A small sample of the district will be used which is not an equal representation of the whole population. Time is also a limiting factor in this regard. These limitations will be minimised through non-participant observation, qualitative focus group interviews and the use of a quantitative interview schedule.

The population of interest will only be accessed. There may be absence of reliability and validity data for some of the survey measures.

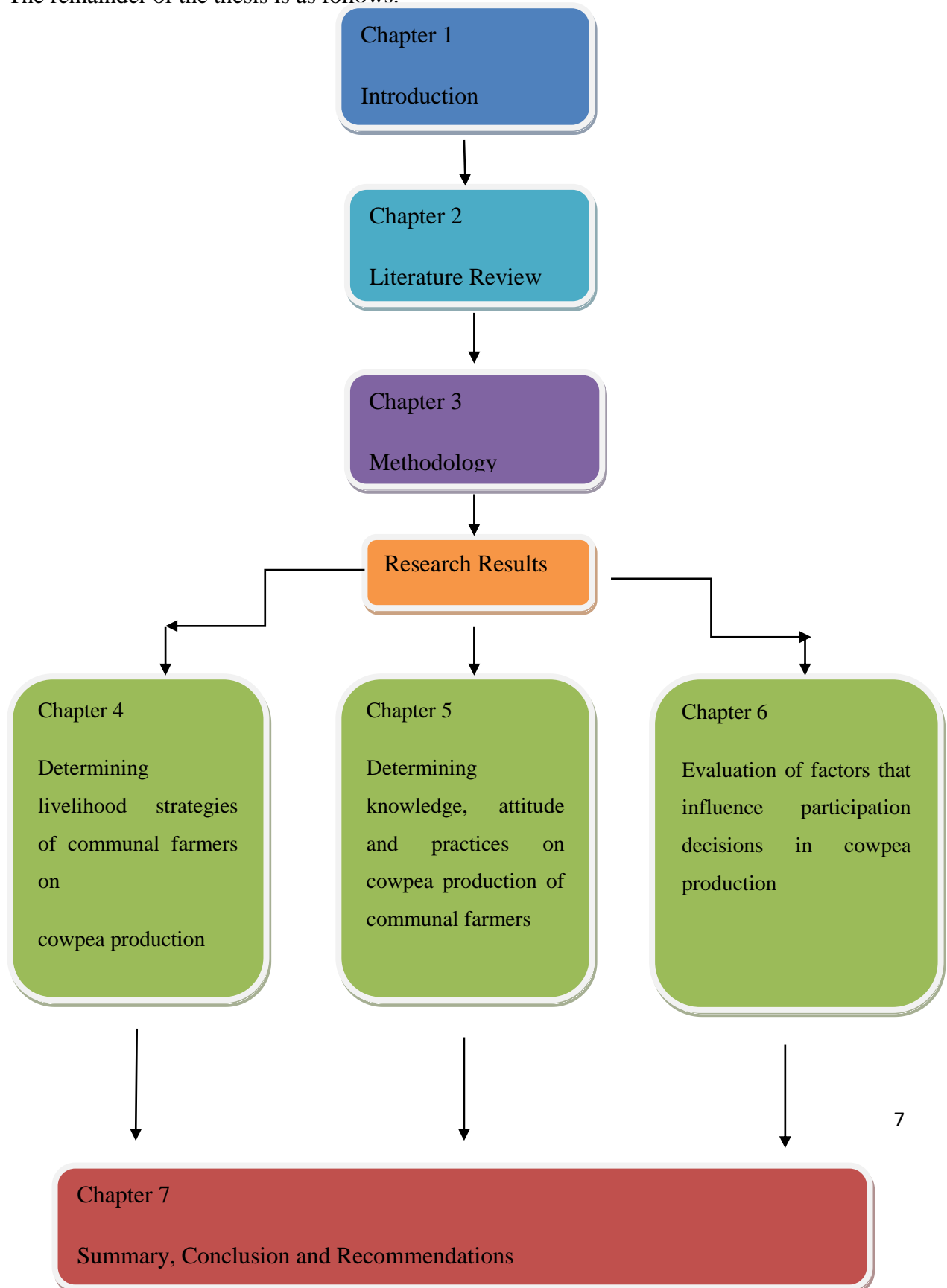
1.7.2 Delimitations

Data collection will be limited to farm households of 5 wards within Rushinga district. This is necessitated by accessibility to the wards and limited funds. Preference is also a factor that

can restrict the questions that can be answered by the respondents. Cowpea may not be a favoured crop although it performs well and it is very nutritious.

1.7 Outline of Thesis

The remainder of the thesis is as follows:



1.8 References

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CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter is going to give an overview of the livelihoods of communal farmers, their perceptions towards cowpea production are going to be discussed. More importantly, the different factors that influence cowpea production will be put on view.

2.2 Overview on cowpea production in Africa

Cowpea has been called "the poor man's meat," due to its high protein content. It produces easily picked crops at maturity. The bushy varieties provide forage for livestock. The vining varieties of cowpeas provide soil cover, thus smouldering noxious weeds, and protecting the soil from erosion. All varieties of cowpea capture and fix atmospheric nitrogen, hence improving soil health. The potential yield of cowpea is known to be up to 1.5 t/ha, but the actual yield in most African countries still hovers below 300kg/ha. This is largely as a result of the fact that recent innovations which should make it possible to realize the full potentials of this crop remain unknown and largely unused by producers (CORAF/WECARD, 2012).

According to Jackai *et al.*,(2018) they presented the multi-advantages of cowpeas which include ability to convert atmospheric nitrogen to useful nitrogen compounds, a good crop to grow as a cover crop or during crop rotation, as it enhances soil fertility and organic matter, while preventing erosion and suppressing weed growth. Cowpea can tolerate a range of conditions, including high temperatures and drought. This property is increasingly attractive in the face of climate change, which is extremely likely to bring greater unpredictability in weather patterns. With its hardiness and versatility, cowpea is an excellent crop for integrated farming systems that incorporate both crops and livestock. All these advantages makes cowpeas a suitable crop for low income farmers in a challenging environment. According to [IITA, 2009] about 7.56 million tonnes of cowpea are produced worldwide annually on 12.76 million hectares with sub-Saharan Africa accounting for about 75% of the total production. West Africa is the key cowpea producing zone, mainly in the dry savannah and semi-arid agro-ecological zones. The principal cowpea producing areas are Nigeria, Niger, Senegal, Ghana, Mali and Burkina Faso. According to FAOSTAT (2009). Nigeria was the world

largest cowpea producer with the production of about 3.15 million tonnes in 2007, accounting for 41.67% of world total production.

Snapp, Mafongoya and Paddington (1998) agree with this, suggesting that the quality and quantity of manure depends on livestock feed, and quality of feeds depends on legumes. Cowpea is one of the most economically and nutritionally important indigenous African grain legumes and an inexpensive source of protein for both rural poor and urban consumers (Lowenberg-DeBoer and Germaine, 2000). Cowpea grain contains about 25% protein and 64% carbohydrate; they are also rich in potassium with a good amount of calcium with a good amount of calcium, magnesium and phosphorus and small amounts of other minerals. Cowpeas are rich in vitamins A and C, have a good amount B vitamins. Pulse crops provide needed dietary diversity, and thus are key contributors to human nutrition as a crucially important source of protein, of amino acid diversity and of B-group, iron, zinc, magnesium and calcium (Ngalamu *et al.*, 2014). The nutritional benefits of legumes include not only high protein content, but also a unique amino acid complement that includes tryptophan and lysine (Asif *et al.*, 2013).

Cowpeas are eaten both as a leafy vegetable and as a legume. Dried cowpeas can be cooked with vegetables to make a thick soup, or ground into a meal or paste, before preparing in a variety of ways. Fresh, immature pods can be boiled as a vegetable. Ngalamu *et al.* (2014) also highlight that, fresh leaves and growth points can be picked and eaten like spinach. Dried leaves are preserved and eaten as a meat substitute. In large parts of Africa, about a third of cowpea produced is used for consumption by the household itself. In West and Central Africa, cowpeas are cultivated by both men and women, but women dominate post-harvest processing and marketing. Cowpea provides a source of cash for women farmers who make and sell snack foods from cowpeas. In many African countries, women harvest and sell direct to consumers on roadsides because pod prices are higher than dry grain prices. In general, women are retailers who acquire the grains from wholesalers and commission agents to sell smaller quantities in local markets.

It was further elaborated by Barrios, Buresh and Sprent (1996); Koutika *et al.* (2005) that a strong case can be made that sustainable agriculture requires that a substantial proportion of crop land be dedicated to growing legumes such as cowpeas. This often involves poly-cultures or mixed cropping systems that include legumes.

High quality feed produced from cowpeas is ideal for sustainable intensification of livestock systems. (FAO, 2018) .Animal feed also involves the high-protein plant products of legumes. This includes stems, leaves, as well as mature and immature pods and seeds.

2.3 Cowpea production in Zimbabwe

Ninety-two percent of Zimbabwean rural households practice agriculture as their primary livelihood (ZimVAC 2017). Cowpeas are amongst the most commonly cultivated food crops in Zimbabwe. According to MAMID (2017) the yield of cowpeas in Zimbabwe was 35 895 tonnes which meant 0.45 tonnes/ hectare. Zimbabwe is still far from actively competing with other African countries such as Nigeria.

In one of the studies, Maroyi (2009) found out that cowpea is used also as a home-garden crop or vegetable in Zimbabwe. Barter trade with neighbours or selling in local markets is the order of the day. The barter trade of crop and vegetables in communities strengthens relationships and brings unity in communities. Cow pea is used for household consumption, sales are confined to local catchment areas because transport to tarred roads and local cities is difficult. Majority of households sell their home-garden producer directly from their gardens. Returns from vegetables and home-gardens constitute about a third of the returns from the main field.

Current studies in Zimbabwe have given evidence that home-gardening with crops such as cowpeas are a strategy to ensure stabilised household food security and income against risks of mono-cropping and climate change. Livelihoods improve as well as the quality of life for rural communal farmers of Zimbabwe.

2.4 Livelihoods of small scale communal farmers

Sustainable livelihoods comprise the capabilities, assets (including both material and social resources), and activities required to achieve a means of livelihood (Maroyi, 2009). A livelihood is sustainable when it can cope with, and recover from, stresses and shocks and maintain or enhance its capabilities and assets both now and in the future, while not undermining the natural resource base (Ellis 2000; Dalal-Clayton *et al.* 2003). The most critical resource for communal farmers is a regular income, especially from paid or self employment in land based activities. Others rely on remittances whilst very few can count on a pension (Sachikonye 2003).

Gamundani (2016) stated that the communal farmers are black indigenous Zimbabweans who benefitted from the FTLRP who formerly resided or still reside in communal areas and practice agriculture largely for subsistence purposes (The Zimbabwe Institute,2007). At times, they may produce excess crops and livestock products which they sale. Communal farmers generally do not possess title deeds to the land under their possession.

In the rural set up, there are various income sources which determine farmers' livelihoods. Mushonga and Scoones (2012) viewed that some new income sources were evident in 2006-07, including gold panning and cross border trading, while others have disappeared, such as savings clubs (due to a lack of cash) and hunting (due to the resettlement of the former farms). Twenty years ago, income associated with successful crop production – such as piece work labour and beer brewing – were more important, while today people focus on off-farm“ production activities such as poultry rearing and gardening, including the cultivation of even marijuana.

2.4.1 Crop production

Manlosa *et al.* (2019) cited that different combinations of food crops and cash crops influence the food security of smallholder farming households. Maxwell and Fernando (1989) defined cash crops as all marketed surplus, non-staple agriculture, non-food agriculture, and export agriculture. Trajectory from subsistence to commercial orientation is perceived as promising potential benefits for food security. Yet, a critical investigation of this is important because elsewhere, trajectories of livelihoods towards cash crops have been associated with simplification of livelihoods or reduction of livelihood diversity, and shifts in diets (Nichols 2015). In a study carried out by Manlosa *et al.* (2019), it was concluded that households that had larger areas of farmland are able to engage in the strategy that had high diversity in food and cash crops, which subsequently generated better food security outcomes.

The observed importance of diverse food crops in local livelihood strategies is consistent with the findings of Fafchamps (1992), who observed the critical importance of staple consumption for survival.

2.4.2 Livestock production.

Livestock are a global resource of significant benefits to society in the form of food, income, nutrients, employment, insurance, traction, clothing and others. In the process of providing these benefits, livestock can use a significant amount of land, nutrients, feed, water and other resources. Singh *et al.* (1997) discussed that contribution of cowpea to overall productivity is small; this creates a paradox in view of its widespread popularity. The answer to this paradox may lie in cowpea's labour complementarity to major grain crops, human diets, livestock fodder. In savanna areas cowpea is equally important as it is used as a fodder crop due to long dry seasons where there is not much to graze upon.

According to FAO (2019) livestock can contribute to risk management in many ways, for instance as complements for labour and capital, and thereby can offset variations in labour/capital availability. With respect to labour, livestock can also act as a substitute. This is extremely important when managing risks arising from labour markets, where seasonal demands may draw workers to higher value temporary activities, and with migration, when family members may leave their household for extended periods. Given livestock reproduce, they also constitute an asset which can appreciate even when prices are stable. Also, timing to realize asset value can be more flexible than for many other agricultural products. Livestock can also be used for risk coping where various advantages are because they more adaptable to environmental shocks than crops.

Shackleton, Shackleton, & Cousins (2001) conclude that the contribution of land-based activities to rural livelihoods is important in both financial and social terms.

2.4.4 Employment (Salaries)

In the ongoing research by Scoones *et al.* (2004) successful agriculture generates employment opportunities, in dry land agricultural settings few can rely on just agriculture for their livelihoods. They must seek piece work jobs in the dry season; sell their skills as builders, carpenters, tailors or hairdressers. And they can make use of local resources for making craft items or agricultural equipment and tools. There are multiple livelihood opportunities in the communal and resettlement areas, as well as flows of labour, remittances and trade. The employment opportunities, although often temporary and low paid, are important for many, and attract hundreds of people to live and work in these areas. This is an

important part of the wider economy, and many of these people come from the nearby communal areas, with labour being recruited through family, church and other networks.

Jodha et al (1977) argued that small farm households were more likely to have more than one source of income because they are particularly vulnerable to drought. Diversification was noted to be a response to risk. It becomes apparent that all households, not just small farm holdings, face risk in agriculture and diversify in order to reduce their vulnerability to shocks and trends within the agricultural sector. Following Singh and Asokan (1981), income was defined as net returns to family-owned resources, encompassing family labour and owned bullocks, capital and land.

2.4.5 Pensions

The Oxford dictionary defines pension as a regular payment made by the state to people of or above the official retirement age and to some widows and disabled people. In an article on National Geographic (2019) fertile Nespresso together with the Colombian Ministry of Labor, the Aguadas Coffee Growers' Cooperative, coffee supplier Cafexport, and Fairtrade International launched an innovative pilot retirement fund for farmers who take part in the Nespresso Sustainable Quality Program. Pensions thereby motivate and create sustainability in quality crop production.

2.4.6 Remittances

Remittances come due to migration and in literature there is a general view that such remittances positively impact economic growth through poverty alleviation in migrant sending countries, (Adams and Page 2005; Bracking and Sachikonye 2010). Remittances flow directly to individual households and as well unlike loans they incur no debt. Their impact therefore can be instantaneous and usage very cheap making it easier for those facing financial constraints at household level to purchase farm inputs for agricultural production timeously and quickly resuscitates household financial wellbeing at minimum costs (Mishi and Mudziwapasi, 2010).

2.4.7 Gardening

According to FAO (2011), gardens are ancient forms of agriculture; gardens can provide many people with improved livelihoods. Home gardens have a long history of adapting

diverse plants and small livestock to meet a range of household needs and conditions, mixing traditional and new technologies. Market gardens are larger, and have more specialized production systems to supply specific commercial markets. While commercial orientation makes market gardens a mainstream form of agriculture, both home gardens and market gardens make significant contributions to livelihoods. In addition to the direct livelihood contributions for consumption and income, a garden area can support other livelihood activities as work area and a place to store products and equipment.

2.4.8 Household income

Pienaar and Traub (2015) explain household income as naturally an important determinant of livelihood diversification. Total income is also included as some auxiliary incomes; together with the main income sources indicate the family's financial position, all the values in the study are in Real Time Gross Systems (RTGS)

2.5 Knowledge, Attitudes and Practices

According to IDAF (1994) KAP is described as Knowledge, Attitude and Practice. This is used to investigate human behavior concerning a topic. This involves what the respondents know about it (K), how the respondents feel about it (A) and what the respondents do about it (P)

2.5.1 Knowledge

Rahman *et al.*; (2005) explains that knowledge is much more than a collection of facts. (Natural Resources Institute, The University of Greenwich), it relates to the whole system of concepts, beliefs, and perceptions that people hold about the world around them. This includes the way people observe and measure what is around them, how they set about solving problems, and how they validate new information. It also includes the process whereby knowledge is generated, stored, applied, and transmitted to others. Whilst Ton de Jona *et al.* (1996) explains that knowledge plays a pivotal role on learning and instruction which is further attributed by a wide variety of properties and qualities.

Building upon farmers' knowledge is now seen as the key to sustainable agriculture, especially in rain-fed, fragile and difficult environments, where over a billion people seek their living today. Increased attention to farmers' knowledge has its pitfalls too. It was discussed by Isubikalu *et al.* (1999) that farmer production goal influences cowpea acreage,

variety choice, seasonal planting, perceptions of problematic pests, and stage and frequency of pesticide application. In a study carried out by Samuel and Cole (2002) it was discovered that mothers have knowledge that cowpeas cause children to grow well with a highest mean score of 99%. Hence this may portray that knowledge of farmers has an influence on cowpea production.

2.5.2 Attitudes

Allport (1935) explores attitude formation as a result of learning, modeling others and our direct experiences with people and situations. McRoberts and Rickards (2010) attested to this on a study on adoption of conservation agriculture. Oladele and Adekoya (2006) established that farmers can discontinue an adoption process due to the poor education extension process. Sheik *et al.* (2003) and D'Emden *et al.* (2008) further agreed showing that farmers' perceptions do influence their adoption decisions. Sometimes farmers are saner when it comes to their behavior as a result of their perceptions influenced by the information that they can access and utilize (Lugandu, 2017).

Samuel and Cole (2002) advised that attitudes of mothers towards cowpeas were favourable where most mothers believed that any child (rich or poor, rural or urban) could be fed either soybeans (90%) or cowpeas (99.5%). However, a majority believed that it was not prestigious to feed their child either soybeans (71.1%) or cowpeas (69.5%).

Perhaps the most straightforward way of finding out about someone's attitudes would be to ask them. However, attitudes are related to self-image and social acceptance (i.e. attitude functions). In order to preserve a positive self-image, people's responses may be affected by social desirability. They may not well tell about their true attitudes, but answer in a way that they feel socially acceptable. Given this problem, various methods of measuring attitudes have been developed. However, all of them have limitations. In particular the different measures focus on different components of attitudes cognitive, affective and behavioral and as we know, these components do not necessarily coincide³

³ <http://www.simplypsychology.org/attitudemeasurement.html> accessed on 18/12/2014

2.5.3 Practices

Tijjani *et al.* (2015) elaborated on low production of cowpeas due to traditional methods which continue to be used by farmers on cowpea production. Cowpea is normally intercropped with cereals for household consumption. Most cowpeas are intersown with other food crops such as sorghum, maize, millet and cassava. Pure stands are sometimes established near homesteads for their leaves to be eaten as vegetable (Ngalamu *et al.*, 2014). Farmers are aware of the benefits of using improved seed however; use of retained seed still remains high. Vast literature suggests that farmers are in one stage or the other when it comes to control measures of pests using pesticides (Tijjani *et al.* 2015).

Cowpea grows well without fertilizer in fertile soils. Weeds are serious problem in cowpea production. If not periodically removed they may act as hosts for pests. Thus, they will reduce both yield and quality of the grain. In addition, fodder yield may also be reduced since cowpea is not a strong competitor for resources particularly at the establishment stage. In other words, cowpea should be kept free of weeds after establishment. Manual weed control is the most common method used by farmers.

The tender leaves are usually picked, crushed and fried and then boiled with meat or sesame or groundnut paste and eaten with '*ugali/asida or kisra*' in South Sudan. In Zimbabwe the cowpea seed can be boiled and eaten as is or mixed with maize grain as '*mutakura*'. Cooking before drying of cowpea leaves is a widespread method of preservation in many parts of Africa (Ngalamu *et al.*, 2014)

2.6 Factors that influence production and participation in cowpea production.

Different factors have influence on cowpea production. Having knowledge on their effect on adoption and participation decisions in cowpea production would be noble to improve yields of cowpeas. Agwu (2001), states that, despite the comparative advantages offered by the use of these improved cowpea technologies, acceptance and use of the technologies by farmers to boost cowpea production vary and have been far from encouraging.

The major reasons for low productivity include heavy biotic pressures, particularly from insects and other pests which often affect the plant throughout its life cycle and the seeds in storage, sub-optimal planting dates, low plant population, poor weed control, mixed cropping

and low soil fertility status. (Ngwagu, 2004). Furthermore, Mzyece (2010), highlighted that if industries could indicate other uses of cowpeas then demand for cowpeas would increase as an incentive will be made available for the farmers as prices would increase. This narrows down to the fact that where a market is available farmers will stampede to produce the crop.

2.6.1 Cowpea production

Of recent, cowpea has been recognised as an important legume that has been underutilised. Cowpea (*Vigna unguiculata L. Walp*) has shown several agronomic, environmental and economic advantages, contributing to further improve the diets and incomes of peasant farming across Africa, Asia and South America (Hall; 2012) cowpea is being described as a multipurpose crop, being consumed for its leaves, green pods, green beans, mature beans, or processed into paste or flour and used as a food ingredient (Frota *et al.*, 2008). These positive traits have allowed global production to increase from 1.3 to 7.0 million tons between 1981 and 2013, Singh (2014) explores that, under the current changing climate, cowpea is expected to contribute to fulfilling the growing requirements of dietary proteins for humans.

2.6.2 Factors that influence cowpea production.

Socio-economic, technical and institutional factors (age, gender, education, employment status, market, access to inputs and so on) are important factors affecting cowpea production. A dearth of literature suggests that socio-economic factors influence cowpea production in various ways. Ibrahim *et al.* (2016) found out that males participate more in cowpea production especially married males.

A farmers' decision to adopt a new technology is determined by the returns of that technology. Availability of other inputs such as hybrid seed and risks associated, this is supported by the study of Kosarek *et al.* (2001).

Purcell and Anderson (1997) observed that farmers would adopt new technologies and modify their resource use when they believe that the proposed change is relevant to their circumstances and can help them achieve their objectives. They further stated that the rate of adoption of a technology (using technology adoption as a proxy for any desirable change in resource use) by a farming population would depend on the characteristics of individual's production circumstances, characteristics of the technology itself, socio-cultural

characteristics of individual farmers and the speed with which the population is made aware of the technology and its application to local production systems.

2.6.2.1 Age

Most of the literature including Ngwagu, (2004) have observed that age is a major contributing factor towards adoption of a new technology. Usually most respondents are around the age of 45 years, usually this age group is usually the first to feel the effects of an economy crunch. The implication of Ngwagu (2004) findings is that majority of the respondents belong to the young and middle-aged group. This is an advantage since they are supposed to be physically able and more mentally alert in learning new technologies than the older farmers.

2.6.2.2 Education

Peterson (1997) is of the view that education has been shown to be a factor in the adoption of yields increasing modern farm practices. Knowledge helps to change the mind set of people and focus on development through the new technologies conveyed to them. It can also be implied that farming experience contributes to acceptance of new ideas as a means of overcoming production constraints and hence could serve as an advantage for increased cowpea production. Acquiring knowledge somehow offers an effective channel for extension contact through farmer co-operatives and presents an opportunity for participatory interaction. Strauss *et al.* (1991) is in agreement stating that farmer's education level contributed positively to the probability of soybean farmers performing soil sample analysis to determine the quantity of fertilizer that they should apply on their rice fields. Similarly, a study by (Rahm and Huffman 1984) designed to evaluate the role of human capital and factors that affected the adoption of reduced tillage in corn production found that farmers' education and experience play a crucial role in enhancing the efficiency of the adoption..

2.6.2.3 Gender

Some literature (Doss and Morris, 2001) has iterated that there are insignificant effects of gender on adoption of new technologies in crop production. Bashir *et al.* (2018) found out in his study that many respondents were males.

Bashir *et al.* (2018) found out that farm size and level of formal education have a positive influence on adoption of cowpea production technologies. Whilst the studies of Ajala (1992)

and Ikani *et al.* (1998) show that farmers' age, farming experience and organizational participation significantly influenced adoption. The difference might be the type of technologies studied among other factors.

2.6.2.4 Use of certified seed

Majority of the respondents are yet to adopt the use of improved cowpea varieties (Tijjani *et al.* (2015). Use of improved cowpea varieties showed to have a high adoption score according to Agwu (2004). Nevertheless, it is being hindered by high costs of purchase (Bashir *et al.*; 2018) farmers are unable to regularly buy certified seed due to the prohibitive costs.

2.6.2.5 Time of planting

In my view, planting dates are rarely observed by communal farmers. Early planting yields good cowpea productivity. Ngalamu *et al.* (2014) cleared that cowpea requires between 400mm to 600mm of rainfall for the crop to reach maturity producing a good quality grain. Timing is critical and cowpeas need rain particularly at flowering and podding. Rainfall extremes, too much or way too little, can be problematic for this crop. In times of serious drought and very low soil moisture, the cowpea plants changes their leaf orientation and close the stomata to reduce heat stress. Flowers and pods separate from the main stem if there is a need to reduce growth and conserve resources. The best times to plant are December and January. Sowing early will lead to reduced yields.⁴ Evidence has been shown that climate change has resulted in temperature, rainfall, and the length of day affect phenophases, or the timing of plant life cycle phases. Seasonal variations impact these phases, but climate change is altering temperature and rainfall patterns, extending growing seasons and shifting them⁵.

2.6.2.6 Employment status

Higher income means that the farmer can buy inputs for farming (Ntshangase *et al.*; 2018), therefore employment status may have a positive influence towards cowpea production. Communal farmers lack in infrastructure like fencing material, an extra income in the household may enable protection of the fields to theft and stray livestock.

⁴ <https://www.africanfarming.com/cowpea-crop-tough-times/>

⁵ <https://blog.arcadiapower.com/effects-climate-change-plants/>

2.6.2.7 Market

According to Nyaupane *et al.* (2010), farmers choose a market outlet considering its convenience and economic profitability. Farmers will therefore choose the channel that is most convenient and that offers the highest returns. In a study carried out by Mzyece (2010) most of the cowpea farmers are small scale farmers who grew less than 1 hectare of cowpea and had no surpluses left to sell, of the few that manage to sell 85% sold less than 50kg. This could indicate that farmers are producing less to attract a lucrative market for cowpeas. This then influences production of cowpeas negatively where farmers will claim that there is no market hence the reason for low production. Ddungu (2013) claims that there is no dominant market for cowpeas, this affects negatively the production of cowpeas.

2.6.2.8 Training

Adesoji and Farinde (2006) elaborated that if the number of demonstrations and training attended by arable crop farmers could increase by one unit, yield of arable crops could increase by 7.1 tonnes per annum. This shows the importance of training and demonstrations by extension agents.

2.6.2.9 Extension visits

Bzugu and Gwary, (2004) cited in Tijjani *et al.* (2015) that adoption of cowpea production technologies is highly facilitated by the efforts of extension workers in introducing and demonstrating to the farmer how to use the technologies. This lack of farmers contact with extension agents counteracts the theoretical role extension agencies supposed to play in technology diffusion and adoption Tijjani *et al.* (2015) which may be due to inadequacy or insufficient logistics for the extension worker to reach the farmer or incompetency of the personnel to be conversant with technical aspect of the technology.

2.6.2.10 Access to credit

Ministry of Food and Agriculture (2010) highlights that access to funds including credit is expected to increase the probability of adoption. For instance, it has been reported that most small scale farmers are unable to afford basic production technologies such as fertilizers and other agrochemicals resulting in low crop yields due to poverty and limited access to credit Literature (Agwu, 2004; Chiekeze, 2009) has shown that the success of agricultural

technology adoption depends partially on the ability of farmers to obtain credit facilities that would enable them procure the needed agricultural inputs such as improved seeds, fertilizer and insecticides/pesticides as well as storage facilities. Sani *et al* (2014) agrees indicating that a positive relationship is hypothesized between extension visits and the probability of adoption of a new technology.

2.7 Conceptual framework

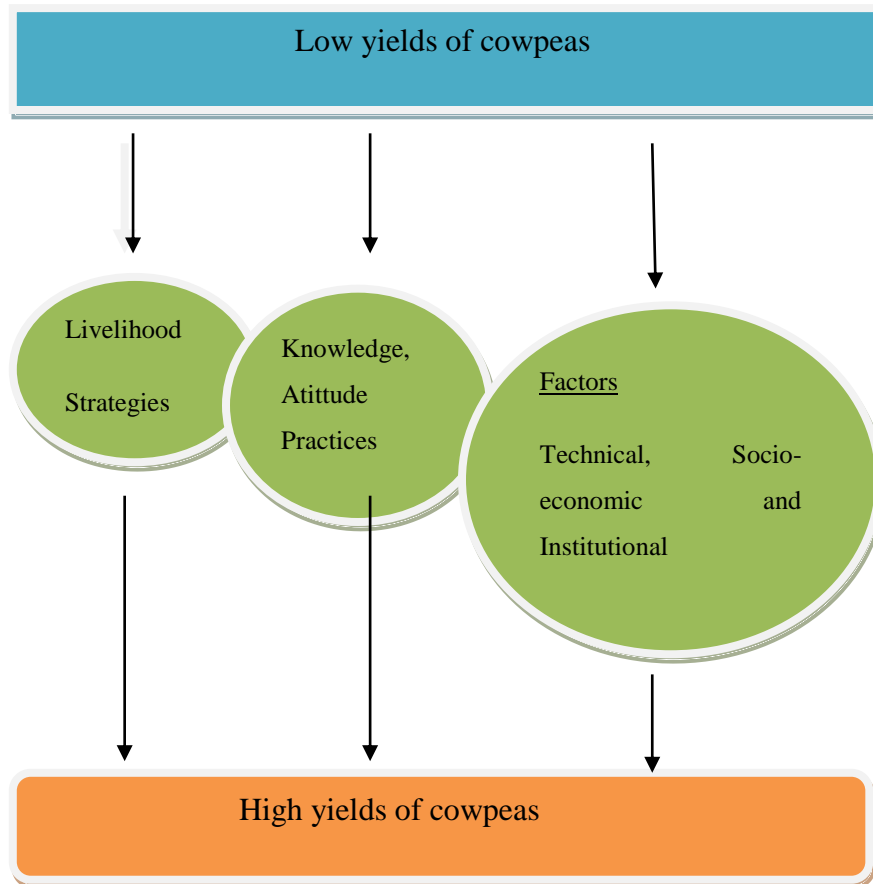


Figure 2.3 Conceptual framework on analysis of low cowpea production in Rushinga district

The conceptual framework in Figure 2.3 demonstrates that a scenario of communal farmers in Rushinga having low yields of cowpeas despite the numerous benefits brought about by the crop. The livelihood strategies of the communal farmers has to be indentified to determine how they go about with their day to day activities. The knowledge, attitude and practices of the farmers on cowpeas has to be established in order to find out the missing link towards an increase in cowpea production. Lastly, various factors have an influence towards cowpea production. In this research, technical, socio-economic and institutional factors are evaluated to determine the different factors that influence production and participation decisions in cowpea production.

2.8 Summary of literature Review

This chapter provided a background to the literature review of key terms of the research study. Of great importance to the study was studying the livelihoods of the communal farmers, finding out their knowledge, attitudes and practices towards cowpea production and establishing factors that influence production and participation decisions in cowpea production. Valuable insights were discussed about cowpea production and the various factors that have been researched on by other authors. There is vast literature on cowpeas as an abandoned crop with vast benefits, but there is limited data that exists on factors influencing production and participation decisions in cowpea production. The next chapter focuses on the methodology used to gather data on the livelihoods of communal farmers, their perceptions towards cowpeas and the various technical, socio-economic and institutional factors that have influence on cowpea production.

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CHAPTER 3

METHODOLOGY

3.1 Introduction

This chapter presents a description of the procedures and methods adopted in collecting and analyzing the data used for the study.

3.2 Description of study site/s

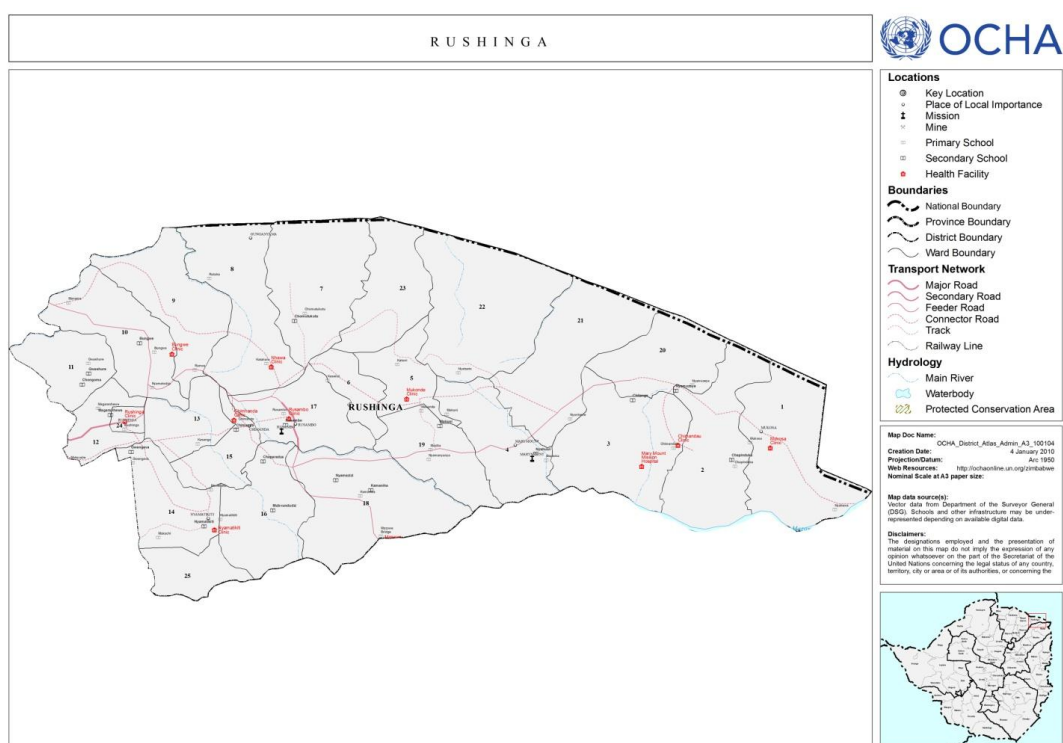


Figure 3.1 Map of Rushinga district

The research was carried out in the rural areas of Rushinga in Kasenzi (Ward 6), Manetsera (Ward 9), Rutuka (Ward 13) and Kasanga (Ward 15). Rushinga district is amongst the 7 districts of Mashonaland Central in Zimbabwe. Found in region IV, where the average rainfall ranges from 450-600 mm. Figure 3.1 shows the map of Rushinga district. According to ZIMSTATS (2012), Population census results, Rushinga has a population of 74 040 and average household size of 4.

Rushinga District is characterized by low rainfall, high day and night temperatures, a short growing period in a low lying area with low humidity levels. The main crops grown are maize, sorghum and millet (mapfunde and mhunga) in Eastern rushinga with maize, cotton and groundnuts forming t h e main crop in Western Rushinga. Goats are more resistant to various diseases and they are an important protein source in Rushinga. Free range chickens are usually kept for consumption. Gold panning is a common income activity practiced in Rushinga. The rainfall pattern for the District is erratic and provides on average a hundred day growing period. This is a very short growing period in which most people grow crops from the end of November to February. This creates a situation whereby certain crops do well whilst others do not. By far the main feature of the District is relatively low agricultural outputs, including food production. Scale of production and crop yields are obviously determined by a variety of factors. Amongst the most important are land husbandry practices (Jassat and Chakaodza, 1986).

3.3 Research design

A questionnaire survey was used to assess farmers’ livelihoods, knowledge, attitudes, practices and the factors that influence cowpea production. The approach that was used in the study was quantitative, involving the collection of data using a structured questionnaire. A quantitative survey allowed for the use of econometric models to determine the influence of different factors on cowpea production.

3.4 Sampling procedure

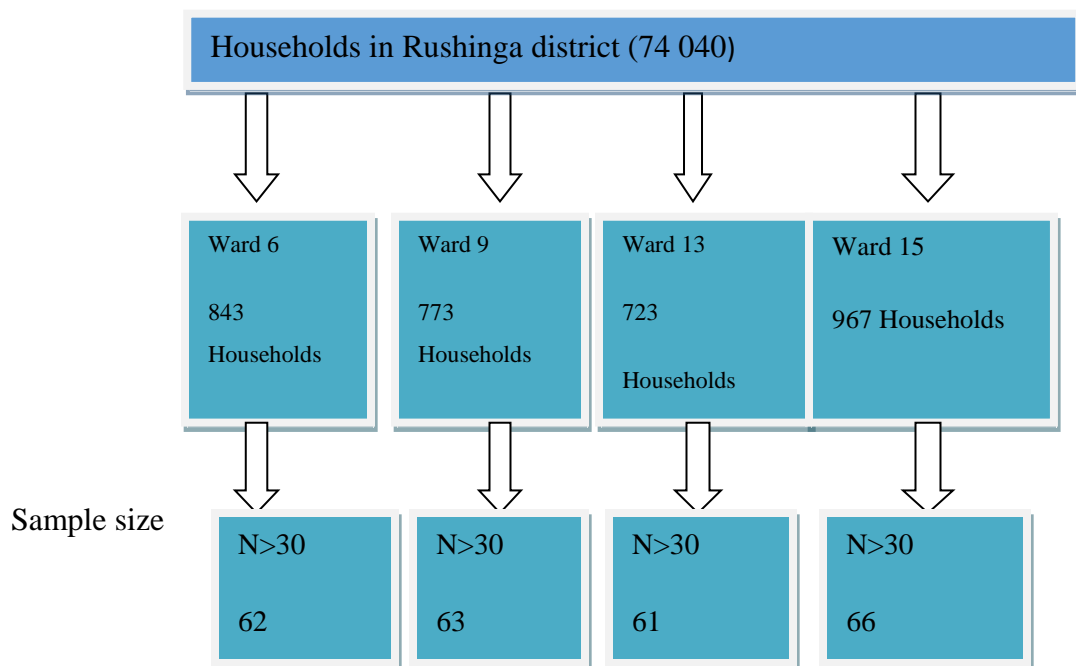


Figure 3.3 Sampled households of Rushinga.

In order to make sufficient information of the knowledge, attitude and practices regarding cowpea production among farmers in Kasenzi, Matsenura, Rutuka and Kasanga, a purposive sampling method was employed to select wards with cowpea growers. Purposive sampling enabled to select research participants who supplied rich and detailed information about the real factors that influence adoption and participation decisions in cowpea production. The selection of sample was done as shown in Figure 3.3 above. The list of beneficiaries was collected from the MLAWCRR. Two hundred and fifty two households were selected randomly from the list of beneficiaries constituted by 62 from Kasenzi, 63 from Manetsera, 61 from Rutuka and 66 from Kasanga. For the purpose of the study, a Cochran (1977) formula was used to select the sample size.

$$n = \frac{Z^2 pq}{d^2}$$

Where:

n= Sample size

Z= normal curve distribution (1.96 which corresponds to 95% confidence interval)

p = proportion of cowpea growers (given as 0.5 when the exact proportion of the farmers is not known)

q = proportion of non cowpea growers (1-p)

d= margin error set at 95% (given as 0.05).

$$\frac{1.96^2 \text{ multiplied by } 0.5 \times 0.5}{0.05^2}$$

$$0.05^2$$

$$n = 384$$

For the purpose of this study 252 households were selected as sample size due to resource constraints for covering 384 households. The sample size for each ward was selected as indicated in figure 3.3.

Purposive sampling was used to select wards because rich information could be acquired from farmers who have a history of growing cowpeas. These beneficiaries were farmers who had received inputs of cowpeas from WFP or FAO since 2015/16 agricultural season. Random sampling was used to select number of farmers in each ward with the assistance of the District Extension staff from the department of AGRITEX. Farmers were interviewed on their homesteads. The household heads interviewed had to be 21 years or older and if the household had was not available any older responsible person was interviewed whether they were male or female. If the household had no one present at the time of the interview a neighbor was consulted.

3.5 Data collection procedure

The collection of data was done with the assistance of Rushinga AEWs and these were trained. The selection of AEWs was based on willingness to participate and fluency in speaking the local languages, it was not mandatory for the responsible extension worker of the ward to collect data. The farmers were asked questions in their local language and the questionnaire was filled up in English. The questionnaire was pre-tested in January 2019 before the actual data collection which was done end of February 2019 to early March 2019. Pretesting was done on five households .This allowed room for corrections to the questionnaire with the guidance of the district extension staff and farmers.

The study adopted a survey design for collecting primary data in respect to farmers' technical, socio-economic and institutional characteristics, and farmer's knowledge on cowpea attributes, farmers' attitude/perceptions and farmer's practices on cowpea production (KAP).

The questionnaire used in the study consisted of four sections that included: (a) Household demographic information (b) Characteristics of a farming household; (c) perceptions of cowpea

farmers; (d) Cowpea production (i) technical factors (ii) institutional support services and (iii) socio-economic factors. Likert scale was taken on to record the responses used to assess knowledge and attitude while closed and open-ended questions were used to review their farming practices. Supplementary information was acquired using non-directive interviews with key informants such as the district administrator, agronomists, NGOs extension staff, agriculture extension officers and traders of cowpeas in open markets and observations on the ground.

3.5.1 Key informants interviews

For this study key informants provided fundamental information that helps search for data. Key informants in this research consisted of District administrator, councillors and district agricultural extension staff of Rushinga district. In depth interviews were conducted, this enabled the research to acquire adequate information on livelihood strategies of Rushinga communal farmers and their perceptions towards cowpeas.

3.5.2 Interviews

Face to face interviews were used to gather data as probing was exercised to get the required information. Attitudes of communal farmers on cowpeas was regarded of importance as this would explain why cowpea production is low when it is considered to be an ancient crop with many benefits.

A 3-scale likert statement (1= don't know; 2= false; 3= true was used to measure knowledge. For each question, a positive response (true) was awarded with one point while a negative response (false) or "don't know" a zero point. The knowledge score was derived from a adding up all positive responses for the sampled farmers out of the 7 questions. Farmers' attitude towards cowpeas was measured on 5-scale statements (1 = strongly disagree; 2 = disagree; 3 = neutral; 4 = Agree; 5 = strongly agree) (Likert, 1932).

3.6 Data analysis procedure

All the responses were coded for easy entry and analysis. The coded answers were entered into Microsoft Excel 2007, cleaned and then imported to the statistical package SPSS analysis. The outcome were presented as descriptive statistics and an econometric model was estimated to identify the factors influencing adoption and participation decisions of cowpea farmers'.

Descriptive analysis was carried out using the Statistical Packages for Social Scientists (SPSS), means, percentages and standard deviation were obtained. To attain the livelihood strategies used by communal farmers data was collected from farmers and frequencies obtained for the most preferred livelihood strategy that provided income for the farmers. T-tests were also used to extract any significant relationships between the variables of interest.

The determinants used for livelihood strategies were income from food and cash crops, livestock, salaries, pensions, remittances, gardening and others. An average for income acquired per ward was generated and each income source was allocated a percentage of the number of respondents who attested to it.

According to Krishnan (2010), Principal Component Analysis (PCA) was used to generate the composite indices for Knowledge score. 7 knowledge questions were used for the computation of indices and 7 attitude questions were allocated a percentage of the number of respondents to an attribute.

Practice was measured using binary questions (yes/no questions). A positive point (1) was granted for each correct practice mentioned, and zero otherwise. A practice score for each household was computed by summing the number of correct responses.

A regression model was used to fit the association of technical, socio-economic and institutional factors to yield which determines the production of cowpeas. Hyeon-Ae, (2013) highlighted that The model serves two purposes: (1) it can predict the value of the dependent variable for new values of the independent variables, and (2) it can help describe the relative contribution of each independent variable to the dependent variable, controlling for the influences of the other independent variables. The co-efficients were computed and explained the significance of the predictor variables.

3.6.1 Logit regression model

Binary logistic regression is typically used when the dependent variable is dichotomous and the independent variables are either continuous or categorical. With logistic regression we model the natural log odds as a linear function of the explanatory variable: $\text{logit}(y) = \ln(\text{odds}) = \ln(a + \beta x)$

(1) $p (1 - p)$ where p is the probability of interested outcome and x is the explanatory variable. The parameters of the logistic regression are α and β . This is the simple logistic model. (Hyeon-Ae, 2013). Literature suggests that if a binary logistic regression model should be applied to analyze the factors influencing adoption. Nyanga (2012) and Agresti (2007) agree that the binary model is motivated by the fact that, when faced with a decision regarding an innovation, a farmer either adopts or rejects the technology. The logistic regression model will be applied because there is widespread literature showing that farmer adoption decisions can be analyzed using logistic regression. (Ntshangase *et al*; 2018)

3.6.2 Independent variables and their expected outcome

Table 3.6 Description of variables and expected signs.

Variable	Description	Variable type	Expected outcome
Gender	1 if male,0 if female	continuous	+-
Age	Age of farmers(hh)	continuous	+
Education	1=literate, 0=illiterate	continuous	+
Marital status	1=married,0=otherwise	categorical	-
Employment status	1=formally employed,0=otherwise	categorical	+
Household size	1=5,0=otherwise	categorical	+
Landownership	1=yes,0=no	categorical	+
Certified seed	1=yes,0=no	categorical	+
Time of planting	1=December,0=otherwise	categorical	+
HH consumption as relish	1=yes,0=no	categorical	+
Extension	1 =yes,0=no	categorical	+
Training	1=yes,0=no	categorical	+
Access to credit	1=yes, 0=no	categorical	+

By authors; (+/□) indicates a positive or negative relationship with the dependent variable

Gender was expected to have an influence on adoption and participation decisions on cowpea production. More females were predicted to have an influence on cowpea production since cowpeas is normally treated as a woman's crop. Age was predicted to have a positive influence as the middle-aged/economically active age group is thought to be more agile in adopting new innovations. Education was treated as a continuous variable where education creates a favorable mindset which creates a greater imagination or wider view towards life hence a positive attitude can be created overtime through education to influencing better farm practices towards cowpea production. Marital status is predicted to have no influence towards the outcome. It was assumed that household heads with formal employment would have a positive influence on cowpea production as access to inputs and affordability would contribute to most technical factors which would enhance yield thus production. Household size was assumed to have no influence on cowpea production as the number of people in a household may be many, however the age group may have no contribution to source of labour which could contribute to the area grown and timeliness of farm operations. Literature suggests that small scale farmers adopt conservation agriculture more than large scale farmers.

Cowpea production is usually done on a small scale by communal farmers and usually the principles of conservation agriculture are adopted for cowpeas. If a farmer owns land, one has a freedom of choice to grow any kind of crop one chooses. Therefore landownership is assumed to be a positive influence to cowpea production. The use of certified seed is predicted to have a positive influence on cowpea production as Bogdanovic *et al.* (2015) viewed that the utilization of the genetic potential of varieties for quality and yield is achieved using certified seed. Time of planting was measured as a categorical variable and majority of farmers in Rushinga plant their first crop in December because that is when they expect their first effective rains. The assumption was that time of planting in December will have a significant effect on yield of cowpeas. It was assumed that farmers who received more extension visits would increase their yields because their knowledge would always be enhanced with the support of an extension worker. Adherence of cowpea production technologies is highly facilitated by the efforts of extension workers in introducing and demonstrating to farmers how to use the technologies

(Bzuga and Guary, 2004 cited in Oladosu and Okunade, 2006. The variable received training in cowpea production was measured by asking farmers whether they had previously been trained in cowpea production or not. The assumption was that training has a significant effect on cowpea production. This was indicated by a yes or no. Access to credit was measured as a categorical variable with a yes or no answer. Availability of a market was measured with a yes or no, it was predicted that market has a significant effect on yield of cowpeas. Production was expected to be high among farmers with access to credit compared to those without.

3.7 Ethical considerations

The researcher found it worthy to consider these principles in order for the research to progress well. Informed consent was obtained and the enumerators took note of the cultural values of the different wards. Confidentiality was taken to be of paramount importance and it was observed.

3.8 Summary

The chapter explored the data collection methods and the data analysis. The next chapters will give an analysis of the research findings of the study.

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CHAPTER 4

RESULTS

4.0 Livelihood strategies of communal farmers on cowpea production.

Abstract

In Sub-Saharan Africa (SSA) food and nutrition insecurity has been a constraint in rural development. Diversification of food production to alleviate food and nutrition insecurity must be intensified. Cowpea production offers various benefits in the face of climate change. Despite the potential, the importance of cowpeas in providing food, nutrition and economic security are not fully exploited in Zimbabwe. The objective of this study was to determine the livelihood strategies of the communal farmers who grow cowpeas in Rushinga. The study was carried out on 252 farmer's households. The formula by Cochran (1977) was used to estimate the sample size. A random sampling procedure was used to select wards with cowpea farmers, wards were selected purposively based on farmers who grow cowpeas. Descriptive statistics were used to determine the livelihood strategies. The study revealed that the most common livelihood strategy is cultivation of food and cash crops where surplus is sold for income and the least livelihood strategy involved gold panning amongst others. There is a need to ensuring access to improved technologies and providing information and training in local languages in order to change current cowpea production methods.

Keywords: cowpeas, livelihoods, livestock, cropping, remittances

4.1 Introduction

Literature suggests that households build their livelihoods on the basis of the assets that they possess (Om Prakash *et al.*, 2003). Access to cowpea production for Rushinga farmers can enhance their household livelihood strategies further improving their food and nutrition security. Most of the household income comes from cultivation of crops (food and cash), livestock, salary, pensions and mostly remittances.

4.2 Material and Methods

A structured questionnaire was administered and a full description is found in Chapter 3.

4.2.1 Description of study area

The data was collected from 4 wards of Rushinga district that commonly grow cowpeas. For more information of the area under study refer to Chapter 3.

4.2.2 Research Design

In order for livelihood strategies to be obtained a structured questionnaire was used for the survey. Chapter 3 fully portrays the picture of the design.

4.2.3 Sampling procedure

The wards were purposively selected according to cowpea growers common in the wards. The wards that were selected had been supported with cowpea inputs before. Random selection was employed for the households selected. Not more than 66 households were selected per ward. A detailed explanation is in Chapter 3.

4.2.4 Data collection procedure

The AEWs collected the data as they are familiar with the areas. The questionnaire was coded for data entry which was done with the assistance of students at DR&SS. Chapter 3 explains the data collection procedure highlighting the interviewees.

4.2.5 Data analysis procedure

The data from the in-depth interviews were analysed and descriptive statistics were used using SPSS version 20 and Chapter 3 gives the detailed information.

4.2.6 Challenges encountered during data collection.

For this study some participants were resistant to participate, as they anticipated that they will receive an incentive towards participating. Others felt that they have been indulged in many interviews but have never received feedback of the results of the surveys that they participated in. As a result this was time consuming as more time was allocated to explaining. The enumerators complained of being hungry and thirsty as they engaged the survey on foot since mobility was a challenge as the extension workers do not have motorcycles.

4.3 Results and discussion.

4.3.1 Household characteristic of respondents.

Table 4.1 displays the profile of the households that constituted the sample with regards to gender, marital status, age, education, employment status and size of household

Table 4.1 Descriptive statistics of household characteristics

	n=62(25%)	n=63(25%)	n=61(25%)	n=66(25%)	n=252(100%)
Characteristic	Ward 6	Ward 9	Ward 13	Ward 15	Total
Gender					
Male	35(14%)	42(17%)	41(17%)	39(15%)	157(62.3%)
Female	27(11%)	21(8%)	20(8%)	27(10%)	95(37.7%)
Marital status					
Married	54(22%)	40(16%)	41(17%)	49(19%)	184(73%)
Single	2(0.8%)	0	1(0.4%)	5(1.8%)	8(3%)
Divorced	1(0.4%)	11(4%)	3(1.2%)	4(2%)	19(7.6%)
Widowed	4(1.6%)	12(5%)	15(6%)	11(4%)	42(16.6%)
Age of Household head					
16-25	10(4%)	1(0.4%)	2(0.8%)	8(3%)	21(8.2%)
26-40	26(10.4%)	19(7.5%)	22(9%)	26(10%)	93(36.9%)
41-59	15(6%)	32(12.6%)	16(6.6%)	22(8%)	85(33.4)
60+	10(4%)	11(4.4%)	21(9%)	10(4%)	52(21.4%)
Highest level of Education					
No education	6(2.4%)	5(2%)	4(1.6%)	5(1.8%)	20(7.7%)
Primary	26(10.4%)	21(8.3%)	18(7.4%)	15(6%)	80(32.1%)
Secondary	29(12%)	34(13.5%)	37(15.2%)	43(16.3%)	143(56.5%)
Tertiary	0	1(0.4%)	2(0.8%)	2(0.8)	5(2%)
Employment status					
Unemployed	43(17.3%)	52(20.6%)	51(21%)	53(20%)	199(82%)
Informal	16(6%)	5(2%)	4(2%)	7(3%)	32(13%)
Formal	3(1%)	3(1%)	6(3%)	0	12(5%)
Size of household					
1 to 3	15(0.06%)	6(2.4%)	11(5%)	13(5%)	45(18%)
4 to 6	25(11%)	39(15%)	31(13%)	48(18%)	143(57%)
>6	22(9%)	18(7%)	18(7%)	5(2%)	63(25%)

Source:Fieldsurvey

4.3.1.1 Gender

The table above gives a description of the households that were sampled. A total of 252 households were interviewed and 37.7% were females the rest were males. According to Abunga *et al.* (2012) this could be that the outcome of the study represents more views and opinions of men than women with regards to factors that influence adoption and participation decisions of cowpea production. Gamundani (2016) highlights that most households are headed by men according to the African tradition despite the fact that majority of the country are females (52%) (ZIMSTATS, 2012).

4.3.1.2 Marital status

The survey also indicated that slightly less than three quarters (73%) of the respondents were married. Mzyece (2010) points out that marital status of the farmers influences how decisions concerning production and marketing of cowpea are made, in her findings she elaborated that marital status has influence on marketing decisions of cowpeas.

4.3.1.3 Age

As for age, the respondents' ranged from 16 to above 60 years of age with the majority being between 26 to 40 years of age (36.9%). This could entail that most are capable of carrying out tasks of various agricultural activities. Agwu (2004) sees this as an advantage since they are supposed to be physically able and more mentally alert in learning new technologies than the older farmers. Hence the respondents could be more agile in enhancing cowpea production technologies.

4.3.1.4 Education.

In terms of education, 7.7 % received no education at all, 32.1 % have attained primary level, 56.5% have attained secondary level and only 2% have attained tertiary education. This entails that majority are able to comprehend new technologies or innovations hence their attitude and decisions can be easily changed because of the level of education acquired by the respondents. Sani *et al.* (2014) discusses that there is a belief that education gives farmers the ability to perceive interpret and respond to new information much faster than their counterparts without education.

4.3.1.5 Employment status

The survey indicated that 82% of the respondents are unemployed, this signifies that most could be dependent on farming activities for their livelihoods. Ntshangase *et al.* (2018) justifies the importance of employment as he states that employment brings in income which may result in affordability of purchasing inputs. The study also showed that 13% are informally employed and 5% are formally employed.

4.3.1.6 Household size

The highest number of household size is between 4 to 6 (57 %). Agwu (2004) and Sani *et al.* (2012) agree that an increase in household size provides labour hence increasing crop productivity within a household, nevertheless, Tijjani *et al.* (2015) argues that early marriages are common in rural communities that despises the suggestion that a high household size depicts an increase in labour and productivity since more of the people in a household could be children.

4.3.2 Livelihood strategies.

Table 4.2 Livelihood strategies of sampled households.

Livelihood strategy	Ward 6 N=62 %	Ward 9 N=63 %	Ward 13 N=61 %	Ward 15 N=66 %	Average N=252 %
Crops (Food and cash)	73	100	66	84	81
Livestock	33	66	41	47	47
Remittances	3	0	58	3	16
Gardening	0	6	2	0	2
Pensions	0	0	8	5	3

Salaries	0	0	11	2	4
Others	0	5	16	5	7

Field survey, 2019

Food and cash crops, the Table 4.2 indicates that more than three quarters (80%) of the respondents are heavily dependent on cultivation of food and cash crops for their livelihoods. Cowpea production can be adopted as it contributes to food and nutrition security because of the various benefits it poses for both humans and livestock. Tijjani *et al.* (2015) indicates cowpea as an important crop in the tropics because every part of the crop is of paramount importance. It was noted that some wards (Ward 9) produce tobacco as the main cash crop, this hinders the progress of cowpea adoption. Key informants also mentioned sesame as one of the cash crops that is grown and the prospective market is Mozambique because of the lucrative prices that the buyers offer. Again cowpeas is less likely to be grown as a market for the crop is not readily available.

Livestock are usually a subsistence farmers' asset. A significant percentage (47%) indicated that they keep livestock as a livelihood strategy. Sani *et al.* (2014) indicates that if more livestock are kept there could be an increase in cowpea production could increase since cowpeas provide grain and fodder for the livestock. Ownership of animals is important as it has a relationship with vulnerability and the livelihood strategy to be employed. Selling livestock when crops fail is usually carried out (Gamundani, 2016).

Remittances are used as a livelihood strategy by a small group of the respondents (16%). Rushinga is remote, urban migration to Bindura or Harare in search of employment may contribute to the remittances that are sent back home for improving livelihoods at household level. This is supported by Mishi and Mudziwapasi (2010) who highlight that the impact of remittances is very instant and cheap as it makes it easier for those facing financial constraints. This could mean that since the percentage of remittances is low, cowpea production can be influenced as a surplus to enhance food and nutrition security.

Gardening (2%), **pensions** (3%) and **salaries** (4%) had little significance towards livelihood strategies of Rushinga. This could indicate that the strategies are used as additional benefit and not as a strategy that households could depend on. FAO (2011) attests to this as it is indicated that home gardens and market gardens meet household needs. Rushinga is a dry region, gardens are not always available as water is a challenge.

There are other strategies that were mentioned by key informants such as gold panning. Out of the 4 wards, respondents indicated that less than 10% highlighted that there are other livelihood strategies. Gold panning in particular could be of negative influence towards cowpea production as farmers prefer resorting to quicker ways of accessing cash to improve their livelihoods.

Table 4.3 Income gained by respondents

Income Source	Ward 6	Column1	Ward 9	Column2	Ward 13	Column3	Ward 15	Column4
	Mean income/year/hh	%	Mean income/year/hh	%	Mean income/year/hh	%	Mean income/year/hh	%
Food and cash crops	219	20	1006	41	250	11	377	18
Livestock	165	15	133	7	59	3	365	18
Salaries	0	0	818	51	956	41	366	18
Pensions	0	0	0	0	340	15	240	12
Remittances	500	46	33	2	228	10	170	8
Gardening	200	18	0	0	200	9	0	0
Others	0	0	0	0	277	12	533	26

Source:FieldSurvey,2019

As presented by the table 4.3 above, the amounts indicated in the table are in Real Time Gross Systems (RTGS), the study displayed that the total mean income differed from ward to ward. The mean income from food and cash crops was a sum of \$219, \$1006, \$250 and \$377 for wards 6,9,13 and 15 respectively. Ward 9 has more of tobacco for their cash crop, explaining the highest mean income of \$1006. This could have an implication towards cowpea production, tobacco farmers prioritize all inputs to tobacco before any other crop. Hence, cowpeas may continue to be treated as a secondary crop.

In ward 13, cattle sales are a common activity and buying and selling of goods keeps the residents occupied hence the high mean income (\$956) from salaries. According to key informants, the cattle sales may always hinder the progress of cowpea adoption. Farmers view cattle sales as quicker income activities than opting to cowpea production. Ward 15 had the highest mean income from livestock (\$365) where ward 9 had the least (\$133). Wards 13 and 15 are nearer to Rushinga town hence the varied income sources, this displays a negative implication towards influencing cowpea production. Ward 6 had the highest income from remittances (\$500), this may enhance farmers to adopt on cowpea production as it is not easy to always depend on remittances for improving a livelihood.

4.3 Recommendation

Improving availability of inputs (seeds and fertilizers). Farmers expressed concern about prohibitive costs of inputs. The Government should subsidize the inputs required for cowpea production and reposition them as important food crop which contributes to both food and nutrition security.

Market, in the context of market oriented agriculture, provision of a lucrative market also increases the demand of cowpeas. Buying points could be established within the communal areas so that farmers do not have to lose their profits to transport costs in search of a better market. The Government should support cowpea production by providing a market just as a market is provided for cereal crops and soyabean.

4.4 Conclusion

This study showed that food and cash crops are the common livelihood strategy for Rushinga farmers. In order for the livelihoods to progress, improved technologies on cowpea production should be enhanced so that productivity increases.

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CHAPTER 5 RESULTS

5.0 Knowledge, attitudes and practices (KAP) on cowpea production of communal farmers.

Abstract

Food and nutrition insecurity continues to be a challenge in Sub-Saharan Africa (SSA). In Zimbabwe, agriculture is the mainstay of the economy where cowpea production can be used to diversify production systems and improve food and nutrition security. The objective of the study is to determine knowledge, attitudes and practices of communal farmers towards cowpea production. The study investigated the KAP of communal farmers of Rushinga. The data were collected with the use of a questionnaire which was administered to 252 farmers who were selected randomly. Farmers were interviewed on their farms. Knowledge and attitude were evaluated on a 3 and 5 point Likert scale, respectively while closed and open-ended questions were used to evaluate the practice. Descriptive statistics was used to assess the data. Findings of the study revealed that the respondents are aware of the value and benefits of cowpeas. Furthermore, farmers displayed a positive attitude towards cowpea production. Despite the valuable knowledge and attitude manual practices are still common means of production. There is a need to ensuring competence of extension staff in order to improve access to technologies and demonstrations. Information must be provided through trainings which are enhanced with implementation of the trainings done. This could change the current practices of cowpea production methods.

Keywords: Food and nutrition security, KAP, cowpea production.

5.1 Introduction

Fanzo (2012) stated that in Sub-Saharan Africa food and nutrition security has been a challenge. Cowpea is grown all over Africa, Asia and America (Inaiuzumi *et al.* 1999). It is of major importance to the livelihoods of millions of people in less developed countries of the tropics, particularly in Asia and Africa. From its production, rural families derive food, animal feed and income (IITA, 2009). It is the main grown legume in Africa, however yields remain low (Agwu, 2004). Ngalamu, (2014) indicated that growing cowpeas is a task not devoid of problems, as a result farmers have different views concerning cowpeas. This is based on the knowledge they have, the attitudes they develop and the various practices that they do on their farms. The current chapter's objective is to find out the knowledge, attitudes and practices towards cowpeas by communal farmers in Rushinga.

5.2 Materials and methods

The study area and methodology including sampling procedure and the data collection procedure are best described in Chapter 3.

5.2.1 Description of study area

The study was conducted in Rushinga district. Chapter 3 gives a full description of the study area.

5.2.2 Research design

A survey design was used for this study, more information is provided in Chapter 3.

5.2.3 Sampling procedure

The cowpea farmers were randomly selected from four wards, they were interviewed by enumerators. Details regarding the sampling procedure are given in Section 3.4

5.2.4 Data collection procedure

A pre-tested questionnaire was used for collecting data by the enumerators who were AGRITEX field staff. The questionnaire was written in English and translated to Shona during the interview. Chapter 3 fully explains the procedure.

5.2.5 Data analysis procedure

Descriptive statistics was applied to this objective and percentages were used to best explain the data on knowledge and practices. A likert scale was used to analyse attitudes. Details regarding the sampling procedure are found in section 3.6.

5.2.6 Challenges encountered during data collection

Majority of the respondents were sceptical towards questions that displayed their attitude. Sometimes a yes and no answer would be given. This made it difficult to conclude on an opinion chosen.

5.3 Results

Table 5.1 Farmers' knowledge of cowpea production.

Characteristic	Response %
Cowpeas are high in protein content	89
Overcooking cowpea is kills nutrients	55
Cowpeas are a good livestock feed	76
Cowpeas are an important commodity in providing Household food security.	95
Cowpeas generate income	98
Cowpeas adapt well	77
Cowpeas provide a good soil cover and nutrients nutrients to the soil.	93

Field survey, 2019

The table 5.1 presents the farmers' knowledge on cowpea production. When asked about the attributes of cowpea production, 98% indicated that they are aware that cowpeas generate

income. 95% highlighted that cowpeas are an important commodity in providing household food security. The respondents are aware that cowpeas provide a good soil cover and nutrients to the soil (93%) whilst 89% indicated that they are aware that cowpeas are high in protein content.

All the seven statements were managed to be responded to correctly by more than half of the respondents. Therefore, it can be concluded that the respondents are conscious to the principles and benefits of cowpea production. This may have a positive implication towards increasing production of cowpeas.

Table 5.2 Comparing knowledge of the sites using pair-wise comparison.

Variable	Sites	Mean Difference	P(T<=t) two-tail
Knowledge	Ward 6 vs Ward 9	88.57143	0.765464
	Ward 6 vs Ward 13	86.14286	0.813139
	Ward 9 vs Ward 13	86.14286	0.921863
	Ward 9 vs Ward 15	86.14286	0.813139
	Ward 13 vs Ward 15	85.14286	0.7809

Field survey, 2019

When the four sites of the research were compared to each other, the mean knowledge indicated that there is no significant difference between the sites.

5.3.1 Farmers' attitudes towards cowpeas.

The attitudes of the respondents towards cowpeas was measured using Likert's rating scale statements (1 = Strongly disagree; 2 = Disagree; 3 = Neutral; 4 = Agree; 5 = Strongly agree).

Table 5.3 Farmers' attitudes towards cowpeas.

Attribute	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Total 252(100%)
Cowpea farming is a woman's activity	37 (14.8%)	91(36.4%)	12(4.8%)	72(30.8%)	33(13.2%)	245(97%)
Cowpea is a poor people's food	100(40.3%)	121(48.8%)	9(3.6%)	13(5.2%)	5(2%)	248(98%)
Cowpeas is food for the elderly	91(36.4%)	146(58.4%)	7(2.8%)	4(1.6%)	2(0.8%)	250(99%)
Cowpeas are difficult to store	76(30.5%)	133(53.4%)	16(6.4%)	6(2.4%)	18(7.2%)	249(98%)
Cowpeas are unfashionable	66(26.6%)	157(63.3%)	25(0.1%)	0	0	248(98%)
Cowpeas taste is not good	70(28.1%)	159(63.9%)	18(7.2%)	2(0.8%)	0	249(98%)
Cowpeas are time consuming to process.	57(23%)	161(64.9%)	23(9.3%)	6(2.4%)	1(0.4%)	248(98%)

Whilst 36.4% disagreed that cowpea farming is a woman's activity 30.8% still agreed that it is a woman's activity. This shows that the mindset of most still needs a shift towards cowpea production being a woman's activity. Almost 50% indicated that cowpea is a poor peoples' food and 58.4% disagreed to the statement that cowpeas is food for the elderly. More than half of the respondents disagreed that cowpeas are difficult to store. Many (63.3%) disagreed that cowpeas are unfashionable whilst an almost equal number (63.9%) of respondents also denied the statement that cowpeas taste is not good. 64.9% disagreed that cowpeas are time consuming to process.

More than 75% disagreed to the seven statements above. This brings to light that most of the respondents have a positive attitude and perception towards cowpea production. Therefore, enhancing the farmers to practice cowpea production should not be a challenge as the attitudes are optimistic.

5.3.2 Practices in cowpea production.

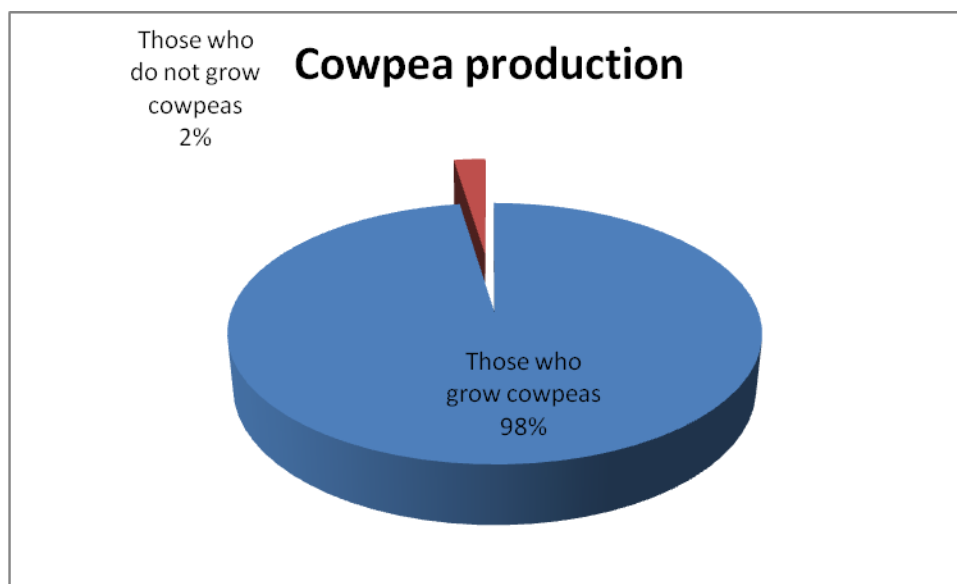


Figure 5.1 Showing percentage of cowpea growers.

Almost every respondent grows cowpeas. The farmers' practice was assessed to identify the gaps in good agricultural practices in cowpea production as baseline for potential interventions.

Table 5.4 Farm characteristics

Characteristics	Sites %	Characteristics	Sites %	Characteristics	Sites %	Characteristics	Sites %
Area grown to cowpeas		Cropping system		Type of fertilizer		Storage pests	
<0.5	88.3	Sole	93.5	Organic	10.8	Maize weevil	8
0.5	8.9	Intercropping	6.5	Inorganic manu	22.1	Lesser grain borer	8.5
>0.5	2.8	Weed operations		None	67.2	Grain moth	11.2
Soil testing		Manual	78.7	Grain treatment		Flour beetle	9.6
Yes	1.3	Mechanical	12.6	Fumigation	9.1	Training	
No	98.7	Chemical	8.3	Dusting	53.1	Yes	89.5
Farming implements used		None	0.4	Traditional meth	5.6	No	10.5
Hoes	31.6	Fertilizer operations		Others	32.2	Training received from	
Plough	67.5	Manual	97.3	Storage method		Extension workers	68
Tractor	0.9	Mechanical	2.7	Bulking	35.7	NGO	15
Use of certified seed		Common insect pests		Bagging	64.3	Seed companies	10.1
Certified seed	76.1	Cotton mealy bug	7.7	Storage structure		Neighbours	6.9
Retained seed	23.9	Aphids	34.3	Pole and mud	34.7	Access to credit	
Planting date(month)		Armoured crickets	9.1	Silo in house	2.1	Yes	0.5
November	7.2	Thrips	11	Improved brick	4.1	No	99.5
December	68.8	Pod sucking bugs	21.5	Ordinary room	55.8		
January	23.2	Cowpea weevil bruchids	16.5	Others	3.3		
After January	0.8	Common diseases					
		Viral	16.1				
		Bacteria	39.4				
		Fungal	44.5				

The above table (Table 5.4) shows that more than 80% of the respondents grow cowpeas on an area less than 0.5ha. Almost everyone (98.7%) highlighted that they have never had their soils tested. The plough (67.5%) is the commonly used farming implement by the respondents, this could be so because it is an implement that would have been purchased for other priority crops such as maize or tobacco.

Certified seed is used by 76.1%, through discussions it was noted that use of certified seed is justified by the number of NGOs who support programmes through provision of inputs and 23.9% commonly use retained seed. Majority (68.8%) usually plant in December as the district normally receives effective rainfall that month. Sole cropping (95.5%) is the most common cropping system used. The use of improved technology such as use of herbicides is not yet well adopted in the study area. Weed operations are still being done manually by majority (78.7%) whilst 8.3% use chemicals and 0.4% do not carry out any weeding operation. Manual application of fertilizer is the common method used (97.3%), however the study indicates that more than 60% do not use fertilizers, 22.1% use inorganic fertilizers and 10.8% use organic manure. Aphids have proven to be the problematic pest in the study area with 34.3% attesting to it. Many (44.5%) emphasize that there are various fungal diseases that affect the cowpea crop.

Cowpeas are easily affected by various pests whilst in storage, dusting (53.1%) is the common grain treatment method used in the study area whilst others use traditional (5.6%) and fumigation (9.1%). More than 60% of the respondents use bagging as a storage method whilst 35.7% just bulk their grain. The most common storage structure in the study area is the ordinary room (55.8%), the pole and mud is used by 34.7% of the respondents and a few use silos (2.1%). Various storage pests are common, respondents indicated that grain moths (11.2%) are the common storage pests. Almost 90% of the respondents have been trained on cowpea production and most of the training has been facilitated by agricultural extension workers (68%), respondents pointed out that 15% of trainings is offered by NGOs, 10.1% by seed companies and 6.9% by neighbours. Almost 100% emphasized that they have no access to credit.

5.4 Discussion

Knowledge, majority of the respondents indicated that they are aware of the benefits posed through cowpea production. More than half (56.5%) of the respondents have attained secondary level which illustrates why it is not difficult for many to comprehend new innovations. Sani *et al.* (2014) highlighted that education makes it is easier to acquire new information.

Attitudes, majority displayed a favourable attitude (75%) towards cowpea production. Sheik *et al.* (2003) and D'Emden *et al.* (2008) highlighted that farmers' perceptions do influence their adoption decisions. A positive attitude portrays a brighter cowpea production strategy for Rushinga farmers.

Practice, most of the farmers grow cowpeas on an area less than 1 ha. Ngalamu *et al* (2014) supports growing cowpeas as a sole crop highlighting that the rewards are huge as the grain attained could be selected for seed for the next season. Use of certified seed is justified by the support given by donor community otherwise retained seed is the common order of the day. Manual operations are usually practiced as many communal farmers are not yet advanced to purchasing improved implements. Use of improved technologies such as use of chemicals is still low. Of all the recommended cowpea production technologies Tijjani *et al* (2015) indicated that adoption level is at 3% which is in line with the findings of this study. Farmers still opt for traditional ways of farming as they are affordable. The farming practices can be worked on through trainings and demonstrations.

5.5 Recommendations

The study proposes the following in order to improve the level of farmers' knowledge, attitude, practices associated with the production of cowpeas. With reference to findings in Kasenzi (ward 6), Rutuka (ward 9), Kasanga (ward13) and Manetsera (ward 15).

Knowledge: The study has proven that farmers are knowledgeable about cowpea production, the problem lies in implementation. Learning centres should be made accessible for farmers where extension staff facilitate the trainings. Farmers are to be provided with as much information concerning cowpeas through posters, pamphlets, media and as advisory notes. A localised

knowledge hub can be initiated where farmers share their experiences and knowledge concerning cowpeas

Attitudes: Look and Learn tours are key for farmers to gain exposure and appreciate practices that are being done in other areas. The Government through its department of AGRITEX could provide ample resources for farmers to gain the exposure of cowpea production in a different setting. This may enhance the change of attitude towards cowpea production.

Practices. Demonstrations are key for farmers to put in practice what they will be taught as it is believed that we remember 80% of what we hear, see and do in practice. Availability of inputs through Government programmes or at subsidized prices will enhance improved cowpea technologies to be put in practice.

5.6 Conclusion

Baseline information has been provided by this study on knowledge, attitudes and practices among cowpea farmers. Farmers are knowledgeable and portray a positive attitude towards cowpeas. The farm practices must be exploited to boost cowpea production through use of improved technologies.

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CHAPTER 6

RESULTS

6.0 Factors affecting the influence of participation in production of cowpeas.

Abstract

The research investigated factors influencing participation decisions cowpea production in 4 wards of Rushinga district, Zimbabwe. Data for the study were collected through the use of structured interview schedule from a randomly selected sample of 252 farmers. Logit regression were used to analyze the data. The findings indicated that education (0.001), use of certified seed (0.003), time of planting (0.002), extension visits (0.031), market (0.001) and access to credit (0.001) positively and significantly influenced cowpea production at 5% level. The study has revealed that technical, socio-economic and institutional factors have influence on cowpea production.

Keywords: Cowpea, production, Logit regression and factors

6.1 Introduction

According to Tijjani *et al.* (2015) cowpea (*Vigna unguiculata* (L.) Walp) is one of the most important economic crops in the tropics for the fact that all of its parts are useful for human consumption and for the provision of livestock feed. However, despite the numerous benefits extracted from cowpeas there are various factors that affect its production in semi arid regions. This chapter is determined to evaluate the factors that influence cowpea production.

6.2 Material and Methods

Chapter 3 has given a full detail on the study area and methodology which encompasses sampling procedures, questionnaire, methods of data collection and data analysis. For the purpose of this chapter, only a summary is provided.

6.2.1 Description of study area.

Rushinga is a district found in the Mashonaland Central Province of Zimbabwe. Detailed information is found in Chapter 3.

6.2.2 Research design

A survey design was used for this research. A pre-tested questionnaire was used at household level for collecting data. Chapter 3 explains the design in detail.

6.2.3 Sampling procedure

Two hundred and fifty two households were randomly selected from four different wards in Rushinga. Face-to-face interviews were held by enumerators, full details are in Chapter 3.

6.2.4 Data collection procedure

A pre-tested questionnaire was used for collecting data in Rushinga. Data collection took place in not more than a fortnight. Section 3.5 explains in greater detail.

6.2.5 Data analysis procedure

A logit model was employed to analyse factors that influence cowpea production in Rushinga. Logistic regression sometimes called the logistic model or logit model, analyzes the relationship between multiple independent variables and a categorical dependent variable, and estimates the probability of occurrence of an event by fitting data to a logistic curve (Hyeoun, 2013). Analysis of the factors that influence cowpea production are explained in section 3.6.

6.3 Results

6.3.1 Evaluation of factors influencing cowpea production.

Table 6.1 Factors of technical, socio-economic and institutional influence

	B	SE	Wald	df	Sig.	Exp(B)
Technical factors						
Use of certified seed	4.057	0.8	25.696	1	0.003*	57.796
Time of planting	1.449	0.472	9.437	1	0.002*	4.257
Socio-economic factors						
Gender	0.051	0.406	0.016	1	0.901	1.052
Age	-0.078	0.242	0.103	1	0.749	0.925
Education	1.925	0.403		1	0.002*	6.858
Employment status	-0.147	0.407	0.131	1	0.718	0.863
Market	3.14	0.517	36.841	1	0.001*	23.114
Institutional factors						
Training	1.245	0.754	2.723	1	0.099**	3.472
Extension visits	1.103	0.51	4.678	1	0.031*	3.014
Access to credit	1.769	0.658	7.225	1	0.001*	5.866

Cox and Snell $R^2 = 0.43$, Model chi-square =22.027, Significance $p < 0.005^*$ $p < 0.10^{**}$

Overall percentage = 79.8

The logit model estimation indicates the correctly predicted value as 79.8% which is a good predictor value, signifying the variables included in the model are able to be explained by the

model employed. The model was found to be significant at 5% and 10% level using Hosmer and Lemeshow test. This means that all the explanatory variables included in the model jointly influence cowpea production. The Table 6.1 presents that cowpea production is significantly affected by technical, socio-economic and institutional factors. The technical factors such as certified seed and time of planting significantly affected cowpea production.

Education and market are the socio-economic factors that have a significant effect on cowpea production. The institutional factors that have an influence on production of cowpeas are extension visits, training and access to credit.

6.4 Discussion

6.4.1 Technical factors

The use of certified seed can be viewed as improved technology that has an impact on yield. In view of the survey results, use of certified seed has displayed a significant effect on production. 76.1% use certified seed because majority are being given the seed by the donor community. Majority do not afford to purchase certified seed as stated in section 2.6.2.4 by Bashir *et al.* (2018). The prohibitive costs of purchasing certified seed results in many resorting to use of retained seed (23.9%). The study results show that use of certified seed has significance to cowpea production at $p=0.003$, implying that an increase in use of certified seed by 1 unit increases cowpea production almost 57 times. Matova and Gasura (2018) supports the use of certified seeds when he highlighted that across years analysis of grain yield of cowpea data showed that year one was better than year two and certified cowpea varieties are better suited for diverse conditions in the country (CBI,2012).

Time of planting is positively significant to cowpea production at $p= 0.002$. This study has revealed that an increase in early planting by 1 unit increase is more likely to increase cowpea production by 4 times. Timing is critical and cowpeas need rain particularly at flowering and podding. Rainfall extremes, too much or way too little, can be problematic. The best times to

plant are December and January. Sowing early will lead to reduced yields.⁶ Evidence has been shown in section 2.6.2.5 in Chapter 2 that climate change has resulted in temperature, rainfall, and the length of day affect phenophases, or the timing of plant life cycle phases. Seasonal variations impact these phases, but climate change is altering temperature and rainfall patterns, extending growing seasons and shifting them⁷.

6.4.2 Socio-economic factors

Education indicated that it is positive and significant at $p=0.002$. This may imply a likelihood to increase cowpea production by 6 times. Tijjani *et al.* (2015) supports these findings when in their research also concluded that technology development adoption level is directly related to education. This is also supported in section 2.6.2.2 by Peterson (1997). It is also consistent with the study carried out by CIMMYT (1995) that education is important for easy understanding of improved methods of agricultural production and make farmers more receptive to advice from extension agency or be able to deal with technical recommendations that require a certain level of numeracy and literacy. On the contrary, Musemwa (2011) states the problem that may arise due to access to education. Most of the youths may be employed in the non-farm sectors in urban areas where most of them view agriculture as a dirty business, primitive and old fashioned. This then results in cowpea production being left for the elderly and when they pass on, cowpea production may still remain low.

Market has a significant ($p=0.001$) influence on cowpea production. An increase in availability of a market by 1 unit is likely to increase cowpea production by 23 times. This is in agreement with Mzyece (2010) who stated that in terms of production, market affect decisions about where and to whom to sell to. It is elaborated that market is affected by quantity of cowpeas produced. Therefore, if market is available production also increase. Conversely, in Chapter 2 Ddungu (2013) states that there is no market for cowpeas. In my view, rural communities use cowpeas as relish limited quantities are kept for sale if not lost to post harvest losses, this shows that

⁶ <https://www.africanfarming.com/cowpea-crop-tough-times/>

⁷ <https://blog.arcadiapower.com/effects-climate-change-plants/>

extension has a huge role to play in order to create demand for cowpeas so that markets are availed.

6.4.3 Institutional factors

Extension visits posed a significant influence to cowpea production at $p=0.031$. Frequency in extension visits has a catalytic effect on participation decisions in cowpea production. This concurs with Tijjani *et al.* (2015) in Chapter 2. An increase in extension visits by 1 unit may likely increase cowpea production by 3 times. Sani *et al.* (2015) reviewed that frequency of extension contacts increase rate of adoption on cowpea technologies. This result is in line with the findings of Obeta *et al.* (1991) which revealed that frequent contact with extension agent is likely to minimize doubts among farmers and ensure timely purchase of inputs.

Access to agricultural credit is positive and significant at $p= 0.007$. This may justify that credit is an important facilitating factor of cowpea production. The research findings indicate that an increase in access to credit by 1 unit has a catalytic effect on cowpea production by 5 times. Literature in section 2.6.2.10 (Agwu, 2004; Chiekeze, 2009) suggests that success of agricultural technology adoption depends partially on the ability of farmers to obtain credit facilities that would enable them procure the needed agricultural inputs such as improved seeds, fertilizer and insecticides/pesticides as well as storage facilities. (Abunga, Emelia, & Samuel, 2012) stated that this is consistent with the view that high poverty levels among farmers and lack of access to credit make it almost impossible for them to afford technologies (Ministry of Food and Agriculture, 2010). This is particularly so given that most modern technologies are expensive which makes it difficult for many farmers, especially those in rural areas where poverty is endemic to be able to acquire and utilise them without assistance in the form of supply of affordable credit and other financial services (Benin *et al.*, 2009).

Age (0.0749), training (0.099), gender(0.901) and employment status(0.718) were however noted to less likely increase cowpea production in this study as they are insignificant at $p=5\%$ level.

6.5 Recommendations

Certified seed, plant breeders should prioritise availing cowpea seed in local markets at affordable prices and in convenient packages so that farmers can have access to the seed on time.

Time of planting, it is essential for farmers to be well prepared for the season by stocking their input before the planting season starts. Therefore, agro-dealers need to provide access of the inputs especially cowpea seed on time so that the farmer is not affected by late rains.

Market, in support of market oriented agriculture, the Government should prioritise cowpeas just like other cereal crops and provide a market through its programmes or even more providing local buying points in the local communities so that farmers do not lose their profits to transport costs.

Access to credit, credit institutions should provide loans to local communities by creating awareness first and providing help desks that convey information to the farmers in their local languages. Personnel in credit institutions should also explain all the jargony on their forms to the local farmers so that a farmer is well aware of the terms and conditions required for them to access a loan.

Extension visits, these are becoming difficult to carry out on all farmers as extension staff are barely mobile. Motorbikes should be provided to field staff so that there is coverage on a larger proportion of farmers.

6.6 Conclusion

The chapter has looked at different factors that influence production and participation decisions towards cowpea production. The findings of the logit regression model indicated that the significant factors which explain participation decisions in cowpea production are use of certified seed, time of planting, education, market, extension visits and access to credit.

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CHAPTER 7

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

7.1 Introduction

This chapter gives a summary, conclusions and recommendations of the research that was conducted in 4 wards of Rushinga.

7.2 Research summary

This study aimed at analysis of factors that influence cowpea production. It explored the trend in cowpea production for the district; identified the livelihood strategies of communal farmers, investigated their knowledge attitude and practices regarding cowpeas. Lastly, the factors that influence cowpea production were assessed.

Data for the study were collected through the use of structured interview schedule from a randomly selected sample of 252 farmers. Logit regression were used to analyze the data.

It was identified that the common livelihood strategy is cultivation of food and cash crops. Moreover, farmers are knowledgeable and displayed a positive attitude regarding cowpeas. There is a call to improve on the knowledge so that there is great impact on sustainable good agricultural practices. The study results show that technical, socio-economic and institutional factors have significant effect on cowpea production in Rushinga.

7.3 Conclusions

Whilst food and cash crops are the leading livelihood strategy in Rushinga, the study has revealed that the Knowledge and Attitudes of the farmers towards cowpea production are favourable. Nevertheless, the practices of the farmers have indicated to be poor. All the factors studied revealed to be significant namely use of certified seed, time of planting, education, market, extension visits and access to credit. These can enhance the production of cowpeas in Rushinga.

7.4 Policy implication and recommendations

Availability of inputs, in an effort to increase cowpea production, since the study elaborated that food and cash crops are the popular livelihood strategy. Farmers must be supported with subsidized inputs through government programmes such as Command agriculture in order for the crop to be prioritized.

Training, training programmes must be structured to inform farmers on the benefits of participating in cowpea production especially in the wake of climate change. This may enhance the KAP of the farmers. There is need to introduce tailor made clubs and courses at all levels so that ancient crops like cowpeas are appreciated by the young and disperse within communities.

Extension support, there is scope to establish competitive extension system that values implementation of the technologies trained to farmers. There is need to provide extension staff with adequate resources in order to improve on coverage for cowpea production.

7.5 Areas for further research

Farmers expressed concern on storage pest infestation in cowpeas. Some pointed out that cowpeas is grown on a small piece of land to avoid wastage of resources and only for household consumption. Cowpeas are said to be easily infested with bruchids hence farmers grow enough for consumption and little for storage. There is need to explore if farmers are receptive towards using pesticides as an improved technology to reduce postharvest losses.

There is need to explore why farmers are knowledgeable about cowpeas and their perceptions are positive towards cowpeas but do not apply this knowledge to improve cowpea production.

Also, trainings held by extension staff have to be closely monitored and staff competence should be enhanced to motivate farmers to adopt improved technologies that enhance production.

APPENDIX 1

All information provided by interviewee will be treated as **STRICTLY CONFIDENTIAL** for mutual benefit of both the researcher and the respondents.

Questionnaire number..... Ward number.....

Enumerator name..... District name.....

Name of respondent..... Farming Sector.....

Date..... Name of Community/Farm.....

A. HOUSEHOLD DEMOGRAPHIC INFORMATION				
Head of household name:				
A1. Gender	Male			
	Female			
A2. Marital status	Married	Single	Divorced	Widowed
Other (Specify)				
A3. Age of household head (nearest year)				
A4. Highest level of education	None	Primary	Secondary	Tertiary
A5. Employment status	Unemployed	Informal	Formal	
A6. What is the size of your household?	1-3	4-6	>6	

B. CHARACTERISTICS OF A FARMING HOUSEHOLD

B1. Do you own land?		Yes	No			
B2. If yes, How much land do you own (ha)?						
B3. What is the type of land tenure of your land? 1. Owned with title deeds						
2. Owned without title deeds 3. Rented 4. Owned by parents 5. Communal 6. Government 7. Co-operative						
B4. Do you need more land? If yes what do you need it for? (Rank 1 as the most important)		Yes	No	Rank		
	Gardening					
	Grazing					
	Cultivation of food crops					
	Cultivation of cash crops					
	Others (specify)					
B5. What are your sources of income? (Rank one as the most important)						
Source	Yes	No	Approximate amount raised per year	Rank		
Crops						
Livestock						
Salary						
Pension						
Remittances						
Others (specify)						
B6. Do you keep any livestock? Yes.....No.....						
If yes, please specify the number of livestock						
Class	Cattle	Goats	Sheep	Chickens	Pigs	Others (specify)
Number						

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C.PERCEPTIONS AND ATTITUDES OF FARMERS

C1. Why do you grow cowpeas?

Reason for growing	Response	
	Yes	No
Source of food security		
Both income and food		
Source of income		
Cultural		
Both income and food/cultural		

	Strongly disagree	Disagree	Neutral	Strongly agree	Agree
C2. Women participate more in marketing of cowpeas					

C3. What are your production constraints?

Constraint	Severe	Moderate	Mild(low)
Drought			
Poor varieties			
Price fluctuations of inputs			

Weeds			
Diseases			
Lack of land			
Lack of market			
Seed scarcity			
Poor soils			
Access to seed			

Farmers' Knowledge on cowpeas

Cues to action	Don't know	False	True
<p><u>Nutritive and economic value</u></p> <p>C4. Cowpeas are high in protein content, they can eliminate malnutrition among children, pregnant women and the poor.</p> <p>C5. Overcooking cowpea leaves kills all the nutrients.</p> <p>C6. Cowpeas are a good source of livestock feed.</p> <p>C7. Cowpeas are an important commodity in providing Household food security.</p> <p>C8. Cowpeas generate income in families</p>			

<u>Agronomic</u>			
C9. Cowpeas adapt well to harsh climates.			
C10. Cowpeas provide a good soil cover and nutrients to the soil.			

Post harvest perceptions and attitudes.

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
C11. Cowpea farming is a woman's activity					
C12. Cowpea is a poor people's food.					
C13. Cowpeas is food for the elderly					
C14. Cowpeas are difficult to store					
C15. Cowpeas are unfashionable					
C16. Cowpeas taste is not good.					
C17. Cowpeas are time					

consuming to process.					
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D. COWPEA PRODUCTION

Technical Factors

D1. Do you grow cowpeas? YesNo.....

D2. If yes, how many hectares

<0.5	0.5	>0.5

D3. Have you ever taken your soil for testing? Yes.....No.....

D4. What farming implement do you use for your land preparation?

Implement used	Yes	No
Hoes		
Plough		
Tractor		

Give reasons for your answer.....

D5. What method do you use for your land preparation?

Implement used	Yes	No
Manual		
Mechanical		

D6. When did you prepare your land?

Month	Response
May-July	

August-October	
November-January	

D7. Do you use certified seed? Yes.....No.....

D8. When do you normally plant your cowpeas?

Month	Response
November	
December	
January	
After January	

D9. Which variety do you usually grow?

Variety	Yes	No
CBC1		
CBC2		
CBC3		
IT18		
Other (specify)		

D10. Which cropping system do you usually use?

Cropping system	Yes	No
Sole cropping		
Intercropping		

D11. What cropping patterns do you use?

Cropping pattern	Yes	No
Row cropping		
Mixed planting		
Strip planting		

D12. What is your common crop mixture?

Crop mixture	Yes	No
Cowpea/sorghum		
Cowpea/maize		
Cowpea/groundnuts		
Cowpea/bambara nuts		
Cowpea/drybeans		

D13. What method do you use for your planting operations?

Method used	Yes	No
Manual		
Mechanical		

D14. What method do you use for weeding operations?

Method used	Yes	No
Manual		
Mechanical		
Chemical		
None		

D15. What are the common insect pests in cowpeas?

Common pests	Yes	No
Cotton mealy bug		
Aphids		
Armoured crickets		
Thrips		
Pod-sucking bugs		
Cowpea-weevil(bruchids)		
Other(specify)		

D16. What are the common diseases found in your field?

Type of diseases	Yes	No
Viral		

Bacterial		
Fungal		

D17. Which type of fertilizer do you use?

Type of fertilizer	Yes	No
Organic		
Inorganic/manure		
None		

D18. What method do you use for fertilizer application?

Method used	Yes	No
Manual		
Mechanical		

D19. What method do you use for harvesting your cowpeas?

Method used	Yes	No
Manual		
Mechanical		

D20. How many tonnes did you harvest last season?.....tonnes

D21. What type of grain treatment did you use?

Type of grain treatment	Yes	No
Fumigation		
Dusting		
Traditional method		
Others specify		
None		

D22. What is your storage method?

Storage method	Yes	No
Bulking		
Bagging		
Other specify		

D23. What is your storage structure?

Type of structure	Yes	No
Pole and Mud		
Silo in house		
Silo		
Improved brick structure		
Ordinary room		
Other specify		

D24. What are the common storage pests?

Storage pests	Yes	No
Maize weevil		
Lesser grain borer		
Grain moth		
Flour beetle		
Rodents		
Mould		
Other specify		
None		

D25. Do you keep any records for cowpea production? Yes.....No.....

D26. What do you use cowpeas for?

Uses for cowpeas	Yes	No
Household		

consumption(relish)		
Livestock feed		
Manure		
Sale		

E. INSTITUTIONAL SUPPORT SERVICES

E1. Do you receive any agricultural extension services? Yes.....No.....

E2. If yes, from where?

Source of service offered	Yes	No
Agriculture Extension Workers(CLPD formerly known as AGRITEX)		
NGOs		
Seed Companies		
Neighbours		
None received		
Others specify		

E3. How often do agricultural extension workers visit you? Often(1).....Rarely(2).....

E4. Do you receive trainings on cowpea production from your extension workers?
Yes.....No.....

E5. In your opinion what is the quality of service offered by your extension workers?

Condition	Yes	No
Very poor		
Poor		
Satisfactory		
Good		
Very good		

E6. Do you belong to any Farmer's Organization? Yes.....No.....

E7. If yes, please state name of organization

Name	Purpose

E8. If yes, what are the benefits that you are receiving from the Farmer's Organization?

.....

E9. Do you receive any credit for your cowpea production? Yes.....No.....

E10. If yes, which facility offers that service?

Facility	Yes	No
Local Bank		
NGO		
Private Companies		
Others specify		

E11. If yes, how has the access to credit benefited your livelihood?

.....

E11. How far is the nearest tarred road?km

E12. How far is your nearest crop/livestock input and output market?.....km

F. Socio-Economic factors

F1. Do you belong to any social group? Yes.....No.....

F2. Who makes the decision to grow cowpeas in the household?

Decision maker	Yes	No
Father		
Mother		
Children		
Both		

F3. Who determines where the crop will be grown in the field?

Decision maker	Yes	No
Father		
Mother		
Children		
Both		

F4. Who is responsible for selling the crop?

Decision maker	Yes	No
Father		
Mother		
Children		
Both		

F5. Do you grow cowpeas for a known market? Yes.....No.....

Name your market

Market	Yes	No
Farm gate		
Local markets		
Seed fairs		
Informal buyers		
Road side		
NGOs		

F6. At what price did you sell your cowpeas last cropping season?.....\$/tonne.

F7. Form of cowpea sold.

Form of cowpea sold	Response
Fresh leaves	
Whole dried leaves	
Dry leaves	
Dried grain	

F8. Marketing constraints

Constraint	Response
Low prices	
Oversupply	
Packaging	
Distance to market	
Storage pests	
Others	

THANK YOU.

