

MIDLANDS STATE UNIVERSITY

FACULTY OF ARTS

DEPARTMENT OF DEVELOPMENT STUDIES



THE EFFECTIVENESS OF CONSERVATION FARMING AS A STRATEGY FOR ENSURING FOOD SECURITY IN ZIMBABWE.A CASE OF GWANDA SOUTH DISTRICT, WARD 19.

RESEARCH BY

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DECLARATION

I, Amie Dube, declare that this work is my own original work, that it has not been plagiarized nor submitted for similar degree in any other University.

Signed

Date

DEDICATION

To Malemane family, my father, my brothers, my sisters and all my relatives for supporting me and for being a source of inspiration.

ACKNOWLEDGEMENTS

I would like to thank the Almighty God for his mercy and protection. It is because of Him that I have managed to reach this level of education and compile this research. Thank you Lord.

My sincere gratitude to my supervisor, Dr I. Mudeka who sacrificing her precious time to give me constructive comments and guidance on this research. I could have not successfully compiled this document without her.

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ABSTRACT

The purpose of the study was to examine how the practice of conservation farming is impacting on household food security in Gwanda District. In particular, it examines four pillars of food security which are: food availability, accessibility, utilization and stability. Particular attention was given to also examine the extent of conservation farming on food security. A sample of 20 farmers under conservation farming was selected to as respondents. The major objective of the study was to examine whether the practice of conservation farming is effective in ensuring food security. Questionnaires, interviews and focus group discussions were used to gather data from the sampled households. Data was collected through qualitative and quantitative method. The findings from the research indicate that many farmers in Zimbabwe have adopted conservation farming. This has however ensured food availability, utilization, accessibility and stability within the households. This has been noticed through number of meals per day, assets ownership and types of crops being grown. Nevertheless, some of the challenges faced by farmers in their quest to practicing conservation farming include shortage of inputs, old age, shortage of labour and climate change. Regardless of these challenges, farmers have been persisting in practicing conservation farming.

ACRONYMES

AGRITEX.....Agricultural Technical and Extension

CF.....Conservation Farming

CFU.....Conservation Farming Unit

FAO.....Food Agricultural Organization

GNP.....Gross National Product

ICRISAT.....International Crops Research Institute for the Semi-Arid Tropics

NGOs.....Non-Governmental Organizations

UN.....United Nations

ZCFTF.....Zimbabwe Conservation Agriculture Tusk Force

ZNFU.....Zimbabwe National Farmers Union

Table of Contents

RESEARCH SUPERVISION ACKNOWLEDGEMENT FORM	ii
DECLARATION	iii
DEDICATION	iv
ACKNOWLEDGEMENTS	v
ABSTRACT	vi
ACRONYMES	vii
1.0 INTRODUCTION	1
1.1 DEFINITIONS.....	2
1.1.1 CONSERVATION FARMING.....	2
1.1.2 CLIMATE CHANGE	2
1.2 BACKGROUND OF THE STUDY.....	2
1.3 CONCEPTUAL FRAMEWORK.....	5
1.4 STATEMENT OF THE PROBLEM	6
1.5 MAJOR OBJECTIVE	7
1.5.1 RESEARCH OBJECTIVES.....	7
1.5.2 RESEARCH QUESTIONS.....	7
1.6 DELIMITATIONS.....	8
1.7 LIMITATIONS	8
1.8 SIGNIFICANCE OF WORK	9
1.8.1 GOVERNMENT AGENCIES (AGRITEX)	9
1.8.2 NON GOVERNMENTAL ORGANISATIONS (NGOs)	10
1.8.3 CHIEFS AND HEADMAN.....	10
1.8.4 RESEARCHERS.....	10
1.8.5 STUDENT	11
1.9 CHAPTER BREAKDOWN.....	11
1.10 CHAPTER SUMMARY.....	12
CHAPTER 2: LITERATURE REVIEW	13
2.0 INTRODUCTION.....	13
2.1 THEORETICAL FRAMEWORK	13
2.2 AGRICULTURE IN ZIMBABWE.....	15
2.2.1 Natural regions of Zimbabwe and their characteristics.....	16

2.3 CLIMATE CHANGE, AGRICULTURE AND FOOD SECURITY	17
2.4 CONSERVATION FARMING AND CLIMATE CHANGE	18
2.5 CONSERVATION FARMING IN EUROPE	19
2.5.1 CONSERVATION FARMING IN AMERICA	19
2.6 CONSERVATION FARMING IN AFRICA.....	20
2.6.1 CONSERVATION FARMING IN ZAMBIA	20
2.6.2 CONSERVATION FARMING IN ZIMBABWE	21
2.6.3 CONSERVATION FARMING IN GWANDA.....	22
2.8 CHALLENGES AND CONSTRAINTS IN CONSERVATION FARMING	23
2.9 CHAPTER SUMMARY	25
CHAPTER 3 METHODOLOGY	26
3.0 INTRODUCTION	26
3.1 RESEARCH DESIGN	26
3.1.1 QUALITATIVE METHOD	26
3.1.2 QUANTITATIVE METHOD	27
3.2 STUDY POPULATION	27
3.3 SAPLE SIZE	28
3.3.1 SAMPLING	28
3.3.2 PURPOSIVE SAMPLING.....	28
3.3.3 RANDOM SAMPLING.....	29
3.3.4 CONVENIENCE SAMPLING.....	29
3.4 SOURCES OF DATA	30
3.4.1 PRIMARY DATA.....	30
3.4.2 SECONDARY DATA.....	31
3.5 INTERVIEWS	31
3.8.4 TABLE	35
3.9 ETHICAL CONSIDARATIONS.....	35
3.9.1 INFORMED CONSENT AND VOLUNTARY PARTICIPATION.....	36
3.9.2 NO HARM TO THE PARTICIPANT	36
3.9.3 CONFIDENTIALITY.....	36
3.10 CHAPTER SUMMARY	37
4.1 INTRODUCTION	37

4.2 RESPONSE RATE	37
4.4.2 AGE OF HOUSEHOLD HEAD.....	39
4.4.3 LEVEL OF EDUCATION FOR HOUSEHOLD HEAD	40
4.4.4 MARRITAL STATUS OF THE HOUSEHOLD HEAD	41
4.5 THE IMPACT OF CLIMATE CHANGE ON AGRICULTURAL PRODUCTION AND FOOD SECURITY IN GWANDA DISTRICT	43
4.5.1 Rainfall seasons.....	43
4.6 CONSERVATION FARMING AS AN ADAPTATIVE METHOD IN THE FACE OF CLIMATE CHANGE	44
4.6.1 HOUSEHOLDS SOURCES OF FOOD	44
4.6.2 Household sources of food in Gwanda District	45
4.7 ROLE OF CONSERVATION FARMING ON FOOD SECURITY IN GWANDA DISTRICT.....	46
4.7.1 CONSERVATION FARMING AND FOOD ACCESSIBIITY	46
4.7.2 NUMBER OF MEALS A DAY	47
4.7.3 CONSERVATION FARMING AND FOOD UTILIZATION.....	47
4.7.4 ASSETS.....	48
4.7.5 Percentage of household asset ownership.....	49
4.7.6 CONSERVATION FARMING AND FOOD AVAILABILITY.....	50
4.7.8 CONSERVATION FARMING AND FOOD STABILITY	52
4.8 CHALLENGES OF CONSERVATION FARMING AND RECOMMENDATIONS	53
4.8.1Challenges faced by farmers in practicing conservation farming.....	53
4.9 CHALLENGES FACED IN DATA COLLECTION	55
4.10 CHAPTER SUMMARY	55
CHAPTER 5 RECOMMENDATIONS AND CONCLUSIONS.....	56
5.0 INTRODUCTION	56
5.1 RECOMMANDATIONS	56
5.2 CONCLUSSION	57
REFERENCE LIST	61
APPENDIX I	66
QUESTIONNAIRE	66
APPENDIX II	72
INTERVIEW QUESTIONS	72
APPENDIX III	73

NON-ADOPTERS OF CONSERVATION FARMING 73

CHAPTER 1

1.0 INTRODUCTION

Climate change has been seen as a major threat to food security worldwide as it causes a huge threat to agriculture in sub Saharan Africa. Several scholars postulates that climate change cannot be underestimated as a development threat .The impacts of climate change on farmers is increasingly high. The vulnerability of farmers to climate change, particularly in Zimbabwe is excercabated by high temperatures and relatively low precipitation levels that already exist.

Conservation farming (CF) being an agricultural technique has been adopted as a way of ensuring more sustainable agricultural production and food security. It consists of three principles which are: reduction in tillage, use of crop rotation, and retention of adequate levels of crop residues and soil cover. Nevertheless, agriculture is one of the major economic activities in Zimbabwe and one major problem that has been affecting farmers in sustainable production is the problem of climate change. It is in this context that food security has become a major concern for government and ordinary citizens in Zimbabwe. As such government and other stakeholders have sought various ways to mitigate the effects of climate change and conservation farming has featured prominently in such efforts. Therefore, the research examines conservation farming in promoting food security in the context of climate change in Zimbabwe. The study focuses on Gwanda South District, Ward 19.

The chapter particularly gives detailed information on food security and its indicators. It provides the definition of terms, the background of the study, the conceptual frame, and statement of the problem, research objectives, research questions, limitations, delimitations and significance of the work.

1.1 DEFINITIONS

1.1.1 CONSERVATION FARMING

Conservation Farming Unit Handbook (2003) defines conservation farming as a farming method that does not employ widespread tillage. FAO (2012) defines conservation farming an approach to managing agro-ecosystems for improved and sustained productivity, increased profits and food security while preserving and enhancing the resource base and the environment.

1.1.2 CLIMATE CHANGE

Climate change can be defined as the change of weather patterns over a relatively long period of time. According to National Research Council (2010) climate change is a change in the statistical properties of the climate system when considered over long periods of time regardless of cause.

1.2 BACKGROUND OF THE STUDY

Food security is an issue which emerged in the mid-1970s in the discussions of international food problems. Currently, global food crisis is a persistent problem millions of people go hungry every day and they lack access to sufficient amounts of nutritious food. Small holder farmers, as the majority of the population in developing countries, are frequently the most food insecure due to several challenges including climate change and poverty. The world food summit of 1996 highlights the multi dimensionality of food security basing on the view that food security exist when all people meet their dietary needs and food preferences for an active and healthy life(FAO,2000).

Food security has got many definitions to it and the concept has evolved significantly over time. The definition adopted from the world food summit held in Rome, which has been endorsed at global level stated that food security exists when all people at all times have physical and economic access to sufficient safe and nutritious food that meets their dietary needs and

preferences for an active and healthy life(USAID, 1992:2). This understanding of food security had viewed food security through the use of four indicators which are availability, access, utilization and stability. Food availability addresses the supply side of food security and is determined by the level of food production. Food Access measures the ability to secure entitlements which are defined as a set of resources including legal, political, economic and social, that an individual requires to access food. Food Utilization can be understood as the way the body makes the most of various nutrients in the food and is determined by people's health status. Food stability measures the importance of having to reduce the risk of adverse effects on the other three dimensions which are: availability, access and utilization

However, food insecurity in Sub Saharan Africa has remained a serious challenge, particularly in line with the global problem of climate change. The issue of climate change has been seen as a major global crisis affecting humans and the environment worldwide. It has been viewed as a major hindrance in the attainment of aims of sustainable agriculture. Climate change has led to water shortages in many parts of the world, particularly in Sub Saharan countries due to prolonged drought resulting in shortage of water over a long period of time. Also, there has been a rise in temperatures impacting negatively on agriculture. Zvigadza et al (2010) postulates that a recent workshop held in Zimbabwe in Domboshava area indicates that smallholder farmers are increasingly concerned about unfamiliar climate dynamics including uncertainty around planting, loss of crops and damage of infrastructure. He also says 80 percent of the respondents noticed that seasonal rains are starting later and ending prematurely. Agricultural production and food security in many African countries and regions are likely to be severely compromised by climate change and climate variability (IPCC 2007).

However, Conservation farming as an agricultural practice has developed as a need given by the declining productivity of land and increasing costs of inputs that is putting extreme pressure on the farming community. It has risen as a strategy of addressing the problem of food insecurity which is being caused by climate change. Conservation farming which is an approach to farming that seeks to increase food security amongst other things, strives to achieve goals of enhanced productivity while protecting natural resources and meeting the needs of farmers.

Recently in Zimbabwe, several initiatives have begun to notice the effectiveness of Conservation Farming as a means of improving crop production within the smallholder sector of Zimbabwe. In 2003, a Task Force on Conservation Farming known as the Zimbabwe Conservation Agricultural Task Force (ZCATF) was formed involving donor organizations, Non-Governmental Organizations (NGOs), International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), Food Agricultural Organization (FAO) and AGRITEX. These were formed with the aim of promoting conservation farming in Zimbabwe. The Task Force has noticed the importance of implementing principles of conservation farming in a way to promote sustainable agriculture.

The subject of food insecurity has been a serious threat especially in Africa and it has led to poverty, malnutrition and migration amongst other things. It is within the context of this background that the researcher seeks to examine the effectiveness of conservation farming which has been brought by government and non-governmental organizations in Gwanda District, to see whether the practice is effective in ensuring food security in the area.

1.3 CONCEPTUAL FRAMEWORK

Food security is a term that has been understood in different ways, despite the fact that all those definitions talk about the supply side to satisfy demand on one hand and on the other improving entitlements to food. World Bank defines food security as “access by all people at all times to enough food for an active and healthy life” (World Bank 1986:1). In brief, food security can be understood as a state where all people at all times have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life (FAO 2000). This definition has widely established four indicators of food security which are availability, accessibility, utilization and stability.

Food security, as a term which has originated in international development literature in the 1960s and 1970s, has undergone significant transformations in terms of definitions. Haddinnott (1999) is of the view that there are approximately 200 definitions and 450 indicators of food security worldwide. The concept of food security has emerged and expanded over time to integrate a wide range of food related issues and to more completely reflect the complexity of the role of food in human society. The early definitions of food security were mostly based on national food security, relating to the ability of a country or region to assure an adequate food supply all year around to meet their necessities. Such conceptualization of food security focused only on food production variables basing on the supply side and undermined the various forces on the demand side, that affect food access in many ways (Devereux, 1993, Sen 1981). The definition generally overlooks household level of food access and it did not talk about people's income and purchasing power.

In the early 1980s however, there were changes in thinking about food security being influenced by the concept of food entitlement, which is a view of food as a basic need. For that reason,

analyses began to include the concept of stability or secured food access as an essential element. This development reflects an attitude that society's goals should reach beyond the ability of a country to produce enough food. As a result, the issue of household became more and more the centre of food security concept. Maxwell and Frankenberger (1992) have however put together different phrases and definitions of food security to refer to the secure access at all times to enough food.

However, food insecurity can be understood in two ways, that is chronic or transitory .Chronic food insecurity indicates the continuous shortage of food as a result a country's inability to acquire food. On the other hand transitory food insecurity refers to a temporary decline in a country's access to food due to instability in food production, being caused by factors like drought, or short term variability in food prices and income shortfalls. This level of analysis is particularly important in understanding the use of the term food security. Basing from the above discussed concept of food security, the researcher will focus on four indicators of food security which are availability, accessibility, affordability and stability, to investigate whether these are attained through the conservation practice in Gwanda District.

1.4 STATEMENT OF THE PROBLEM

Climate change has been seen as a major problem affecting farmers in Africa and in Zimbabwe particularly. Agriculture plays a big part in improving people's livelihoods in Zimbabwe and is central to the quest for food security in the country. Various stakeholders have joined in efforts to find solutions so as to ensure food security in the country's rural areas in the context of climate change. Conservation farming has now become a common feature of rural agricultural production as rural people seek to implement it in an effort to curb the effect of climate change on food security. The extent to which conservation farming has led to the realization of food

security remains to be fully investigated especially in the context of climate change. The research therefore sought to examine whether the practice of conservation farming is an effective strategy to mitigate the impact of climate change on food security. It focused on Gwanda District, Zimbabwe.

1.5 MAJOR OBJECTIVE

To examine the effectiveness of conservation farming as a strategy for attaining food security in Zimbabwe focusing on Gwanda District, ward 19

1.5.1 RESEARCH OBJECTIVES

- ❖ To establish the impact of climate change on agricultural production and food security in Gwanda District
- ❖ To examine the effectiveness of conservation farming as an adaptation method in the face of climate change.
- ❖ To examine the extent to which conservation farming is ensuring food security in Gwanda
- ❖ To examine challenges and offer possible recommendations to ensure that conservation farming performs better as an approach to increase food security.

1.5.2 RESEARCH QUESTIONS

- ❖ How has climate change impacted on agricultural production and food security in Gwanda
- ❖ In what ways has conservation farming been effective as an adaptation method in the face of climate change

- ❖ To what extent has conservation farming ensured food security in Gwanda
- ❖ What are the challenges and recommendations that can be made to ensure that conservation farming performs better as an approach to increase food security.

1.6 DELIMITATIONS

The desire to examine the effectiveness of conservation farming has influenced this research. This is in the context whereby different aspects of addressing the problem of climate change have been in vain and farmers are being affected by these severe threats of climate change. Gwanda district is the selected area of study as it is one of the drought prone areas with very high temperatures. The research focuses on ward 19 and will address one out of six villages because the ward is so big and hence the researcher will not get enough time to attend the whole ward. Takaliawa village is the selected village as it is one of the villages with people practicing conservation farming. Therefore, the research will focus on conservation farming from year 2008 to 2015.

1.7 LIMITATIONS

There are some challenges which the researcher is likely to encounter during the course of carrying out the research. The first challenge might be financial constrain. Since the researcher has no external funding, bus fare is likely to be a challenge because Gwanda District is very far. To address this, the researcher worked mostly during holidays and mid semester break. The second challenge might be time factor for conducting research. Time is likely to be a challenge in that the researcher will have to go and collect data during the course of the semester, hence at the same time having assignments to take care of. Thirdly, the researcher is likely to have challenges in the study area when it comes to informants answering the questionnaires. This is because the targeted population comprises of many old aged people hence they might have

challenges in reading and filling in the questioners. Lastly, Ward 19 of Gwanda District is a big area which consists of six villages, hence addressing the whole ward will not be easy. To address this, the researcher will use only one village in carrying out the study.

1.8 SIGNIFICANCE OF WORK

The desire to examine conservation farming and its effectiveness in ensuring food security and adaptation drives this research. UN (2009) states that close to half of Zimbabwe's population are currently food and nutrition insecure. Also, agriculture is important in that it contributes 15 to 20 percent to gross national product (GNP) in Zimbabwe and it is the mainstay of the economy (Muir-Leresche2006).The research is important because it intends to explore the extent to which farmers in Zimbabwe are committed towards adapting climate change and promoting food security in the country. If one can closely look at the effects of climate change on agriculture on, it will be clear why the research targets agricultural industry. These includes poverty, and food insecurity as stated by UN (2009) which is of the view that close to half of Zimbabwe's population are currently food and nutrition insecure. Gwanda South District of Matabeleland is the selected area of study as it is one of the areas highly vulnerable to severe threats of climate change which have led to food insecurity in the area. The study will be crucial to the following stake holders:

1.8.1 GOVERNMENT AGENCIES (AGRITEX)

The research is crucial as it intends to explore the extent to which farmers in Zimbabwe are committed towards climate change adaptation and ensuring food security. Agriculture is one of the lucrative industries in Zimbabwe and it therefore has the potential to change the economic outlook of the country if climate change initiatives are being implemented in the sector. The study is of importance to government agencies as it will be a starting point in a way to develop

strategies of solving the problem of food insecurity within the country. It will also help AREX in formulating effective ways of coping with severe threats of climate change so as to meet requirements of food security.

1.8.2 NON GOVERNMENTAL ORGANISATIONS (NGOs)

The research will be of great importance to the non-governmental organizations like Agro German Action who are involved in issues to do with conservation farming. This will help them in their programing as they will be able to target the most susceptible population when carrying out their programs. Also, this will enable these non-governmental organizations in measuring utility of conservation farming for helping NGOs through viewing challenges and solutions

1.8.3 CHIEFS AND HEADMAN

The study will also contribute positively with knowledge for the chiefs and headman of Gwanda District. After carrying out the research, the chiefs and the headman will be enlightened on whether conservation farming practice is of importance or not in ensuing food security in their area. It will address strengths and weaknesses and offer recommendations which will be useful for the community to carry out conservation farming with adaptation information.

1.8.4 RESEARCHERS

The researchers is important to Midlands State University library as it will also benefit from this study, as it will help them to acquire knowledge on conservation farming and food security in the country. The study will also be a study or knowledge base in that some students may use it as a background for further research.

1.8.5 STUDENT

The research will be of significance to the student in accessing primary and secondary data. Also the study will enable the student to gain knowledge on issues of food security and conservation farming.

1.9 CHAPTER BREAKDOWN

CHAPTER 1 will contain introduction of the study, introduction of the chapter, background of the study and conceptual framework. Statement of the problem, research objective, research questions, delimitations, limitations and significance of the study will be discussed.

CHAPTER 2 will have literature review and theoretical framework. In this chapter, the researcher will bring review different relevant literature on climate change and food security. Definition of terms will be discussed. Theoretical framework will be discussed so as to illuminate the direction of the study.

CHAPTER 3 will consist of the research methodology .In this case, the researcher will employ various methods in carrying out the research, different data collection technics and instruments will be presented in this chapter.

CHAPTER 4 will deal with data presentations and findings. Information that would be acquired from the study area will be discussed and analyzed in this chapter in relation to the research objectives and questions.

CHAPTER5 will discuss conclusions and recommendations .The conclusions will be drawn from the research and recommendations would be directed towards stakeholders in conservation farming.

1.10 CHAPTER SUMMARY

The chapter deliberated the introduction, definition of terms background of the study, conceptual framework, statement of the problem, objectives of the study, research questions, delimitations of the study, limitations of the study and significance of work. The next chapter will focus on the literature review allied to the study.

CHAPTER 2: LITERATURE REVIEW

2.0 INTRODUCTION

Several scholars and academics have highlighted different ways in analyzing the effectiveness of conservation agriculture in promoting sustainable agriculture. Different farmers usually implement the concept of conservation farming in a way to promote sustainable farming there by ending poverty and promoting food security. This however has attracted many scholars and academics in analyzing the extent to which this concept works especially in addressing food security issues. Though the concept of agriculture appeared to be good in sustainable development, the concept itself suffers the consequences of climate change thus as a result conservation farming came as the possible strategy to these issues. In this chapter, literature will be retrieved using definition of terms and theoretical framework. Case studies on conservation farming will be presented with the use of different countries including Zimbabwe. Lastly, challenges and constraints to conservation farming will be discussed.

2.1 THEORETICAL FRAMEWORK

The researcher used the sustainability livelihoods approach in explaining the effectiveness of conservation farming as a strategy for ensuring food security in Gwanda District. According to Chambers and Conway (1992), livelihood comprises the capabilities, assets (stores, resources, claims and access) and activities required for a means of living. According to them, a livelihood which is sustainable is the one which can cope with and recover from stress and shocks, maintain or enhance its capabilities and assets, and provide sustainable livelihood opportunities for the next generation; and which contributes net benefits to other livelihoods at the local and global levels and in the short and long-term. According to Ian Scoones (1998) sustainable livelihoods comprise the capabilities, assets that is, both material and social resources and activities required

for earning a living. Thus livelihoods in brief encompasses of people's skills, income, assets and activities necessary for them to acquire necessities of life.

The sustainable livelihood is an approach which came into being as an attempt to go beyond conventional approach to poverty. The conventional approach has been found to be very narrow since it focused only on certain aspects of poverty such as low income and did not consider other vital aspects of poverty like vulnerability and social exclusion. However, the approach is founded on a belief that people need a variety of assets to attain positive livelihood outcomes that is to say, one single category of assets is not sufficient to various livelihoods outcomes that people strive for. According to Krantz (2001:2) there are three insights underpinning sustainable livelihoods strategy which are:

- ❖ Realization that while economic growth may be essential in poverty reduction, there is no automatic relationship between the two since it all depends with the capability of the poor to take advantage of expanding economic opportunities
- ❖ There is the realization that poverty as conceived by the poor themselves is not just a question of low income but also includes other dimensions like bad health, illiteracy, as well as state of vulnerability amongst other things
- ❖ It is now recognized that the poor themselves often know their situation and needs best, and must therefore be involved in the design of policies intended to benefit them.

In this research therefore, the practice of conservation farming is of important in improving people skills, their income as well as their asset base. The practice of conservation farming is highly encouraged in Gwanda District. This is because it is located in a drought prone area with

very high temperatures and relatively low rainfall that contribute to death of livestock and food shortages among the households. Most importantly, adoption of conservation farming practice in a way to ensure food security is a strategy that include people at large thereby enabling them to take responsibility of their lives. Thus through the practice of conservation farming, people are able to have and to access food amongst households hence enabling food availability and accessibility.

2.2 AGRICULTURE IN ZIMBABWE

Agriculture in Zimbabwe is one of the industries that greatly suffer as a result of climate change. This is because many people depend on rain fed agriculture for survival which makes them more susceptible to issues of food insecurity and poverty. The majority of the population in the country directly and indirectly depends upon agriculture for employment and among those who are directly linked to farming; there are some who rely on rain fed farming systems. Agricultural production both crop and livestock are a source of household income and food especially for smallholder farmers. The agricultural sector is composed of large scale commercial farming and small scale farmers. The small scale farmers occupy more land area but located in regions where land is less fertile with more unpredictable rainfall. Zimbabwe is a tropical country which normally experiences a dry savannah climate. The country is divided into five agro-ecological regions known as natural regions, being classified according to rainfall amounts, temperatures and soil types.

The table below shows 5 natural regions of Zimbabwe together with their characteristics.

2.2.1 Natural regions of Zimbabwe and their characteristics

Natural Region	Soil type	Average annual rainfall (mm)	Rainy season	Number of growing days
1	Red clay	750-1,000	Rainfall limited to summer: October/November to March/April	170-200
11	Sandy loams	750-1,000	Rainfall limited to summer: October/November to March/April	120-170
111	Sandy, acid, low fertility	650-800	Relatively high temperatures and infrequent, heavy falls of rain, and subject to seasonal droughts and severe mid-season dry spells	60-120
1V	Sandy, acid	450-650	Rainfall subject to frequent seasonal droughts and severe dry spells during the rainy season	60-120
V	Sandy, infertile	>450 mm	Very erratic rainfall. Northern low veldt may have more rain but the topography and soils are poor	>70-135

Source: ZCATF (2009); Vincent and Thomas (1962)

However in the case of Zimbabwe, climate change has led to decrease in agricultural production hence leading to food insecurity and continued poverty. In several African countries, Zimbabwe in particular, small holder farmers usually bears the heavy burden resulting from climate change

in that they depends on agriculture for different needs like food, jobs and incomes amongst other things(FAO,1999)

2.3 CLIMATE CHANGE, AGRICULTURE AND FOOD SECURITY

In the past few years, climate change adaptations have been broadly discussed and upheld as an essential goal for all human systems, particularly agriculture. However, the problem of climate change is likely to seriously reduce crop yields and increase yield variability in various regions worldwide. In southern Africa, maize production is likely to decrease by due to the global problem of climate change. Nevertheless, with the use of advance research and careful planning on agricultural systems, such risks could be significantly lessened. Deliberate action is however important in a way to reduce challenges that can affect food supply and this can be done through establishment of by agro ecosystems, institutions, and knowledge systems that can easily or quickly harness changing circumstances.

The negative effects of climate change are threatening to undermine development advances in many parts of the world especially in Sub-Saharan Africa. In the Sub-Saharan Africa, rainfall patterns have become less predictable, precipitation has decreased, and temperatures are rising. Evidence shows that that the upward trend of the already high temperatures and the reduction of precipitation levels will increasingly result in reduced agricultural production in Sub-Saharan Africa (Mano & Nhemachena, 2007). Agriculture is the mainstay of most rural economies in Africa. Negative developments in agriculture would adversely affect the rest of the livelihoods that depend on crop production. The overall impact of climate change on countries in the Sub-Saharan region has been negative. Relevant development programming will need to increasingly incorporate climate change adaptation in order to fully address developmental challenges pertaining to livelihoods in sub-Saharan Africa.

While several studies have been carried out on the strategies put in place to mitigate and adapt to climate change on local livelihoods, there is very little dedicated literature to understanding of conservation farming practice as a means of dealing with climate change in Zimbabwe particular. Existing studies cannot be generalized to include the Zimbabwean scenario due to several reasons. When looking at Zimbabwe, livelihoods differ according to provinces because they are naturally different. Naturally, some areas are more sensitive to climate change than others. Regional ecological differences mean that livelihood strategies and the impact of climate change on those strategies will differ as well.

Also, regional climatic variations mean that the impact would be experienced differently in different regions. For example, it has been suggested that while sub-Saharan countries will bear the brunt of climate change, Arctic regions stand to gain positively from climate change with the warming of temperatures enabling longer periods for growing crops. This argument shows the need for local studies on the impact of climate change on local livelihoods. Local assessment of vulnerability enables farmers to understand why and how communities respond to the same type of environmental stress in different ways. Since vulnerability varies across regions and sectors, the impact from climate change across the globe is also likely to differ.

2.4 CONSERVATION FARMING AND CLIMATE CHANGE

Conservation farming can increase the ability of smallholder farmers to address negative impacts of climate change through minimizing vulnerability to drought and enriching the local natural resource base on which farm productivity relies. Conservation farming aims at increasing the annual input of fresh organic matter, controlling soil organic material losses through soil erosion, and reducing the rate of soil organic material mineralization. Replacing the "slash and burn" system with a "slash and Conservation farming system" would allow farmers not only to use soil

nutrients more efficiently, but also to make more use of nutrients contained in the natural vegetation. This would mean that fields can be cultivated for a longer period of time, and with a higher productivity, thus potentially reducing the need for land conversion (FAO, 2011).

Conservation farming is an effective tool to adapt to climate change through increasing resilience to drought and increasing water-use efficiency. Climate change is understood to have a great bearing on soils. Increasing temperature would increase oxidation of the organic carbon in soil. Its levels will go down further. Incidence of runoff wind erosion may increase due to increase in extreme events. These changes may reflect themselves in poorer soil fertility, loss of soil biota, water stress and ground water depletion (FAO, 2011)

2.5 CONSERVATION FARMING IN EUROPE

2.5.1 CONSERVATION FARMING IN AMERICA

The United States of America (USA) has been in the forefront in research on soil conservation methodologies following the persistent devastating droughts in the 1930s. Alternative techniques of farming such as conservation farming were introduced in a way to increase yields and food for consumption. The USA further produced low tillage mechanized equipment and agronomic practices (Hudson, 1981). In the 1970s the reduction in oil prices further increased the interest in conservation farming as alternative for economic growth. The use of minimum tillage facilities reduced fuel consumption by 50% to 80% (Epplin, et al, 1982).

The reduction in soil compaction, soil erosion and improved water infiltration was also an advantage to the implementation of conservation farming. Conservation farming in the USA covered 35% of the total area and had an 80% production of crops such as Soya beans. Since

then the USA has greatly invested in the research of minimum tillage farming methods. In the 1970s, regions such as South America and Southern Africa developed an interest in conservation farming following the advances in the USA. Brazil also spearheaded conservation farming in South America by establishing conservation tillage research programs.

2.6 CONSERVATION FARMING IN AFRICA

2.6.1 CONSERVATION FARMING IN ZAMBIA

The practice of conservation farming in Zambia took place in various important stages. Leading players in the technology development and dissemination included the Conservation Farming Unit (CFU) of the Zambia National Farmers Union, the Golden Valley Agricultural Research together with their partners at the extension service of the Ministry of Agriculture and Cooperatives (MACO), and NGOs (Haggblade et al., 2003). The hand hoe comparison of minimum tillage systems was introduced to Zambia in 1995 by a Zimbabwean farm manager brought in as a consultant to the Zambia National Farmers Union (ZNFU) to help set up low-tillage farm trials at the newly established Golden Valley Agricultural Research Trust (GART). In the course of this work, he related his success in applying a system of permanent planting basins for hand hoe farmers on the estate he managed in Zimbabwe (Oldrieve 1993). Inspired by the notion of six to eight tons maize yields under hand-hoe cultivation, the ZNFU established a Conservation Farming Unit (CFU) in late 1995 to adapt the hand hoe basin system to Zambian conditions and to actively promote it among smallholders. With modest early funding from a variety of supporters, including the World Bank, the ZNFU Conservation Farming Unit moved rapidly to develop guidelines and conduct on farm trials with maize and cotton farmers in Central and Southern Provinces (Haggblade et al., 2003). In 2009, adoption has been increasing each year, and it is expected that by end of 2012 there will be 250, 000 adopters (Haggblade et

al., 2003). Farmers who have adopted conservation farming are more food secure, have surpluses to sell, can avoid labour peaks and produce good crops in all but the very driest seasons. Independent research in Zambia has shown that yield increases range from 25% to over 100% for all crops in the first year. In seasons of poor rain distribution such as the 2009/2010 season, conservation farming makes a difference between total crop failure and a reasonable yield. Studies conducted by Haggblade and Tembo (2003) confirmed that conservation farming increases yields by 60% for both maize and cotton growers

2.6.2 CONSERVATION FARMING IN ZIMBABWE

The recognition of positive impacts of conservation farming on crop productivity and mitigation of environmental degradation in other parts of the world such as USA has led to the adoption of the approach in Zimbabwe. In Zimbabwe, the approach was first practiced on a large scale commercially by Brian Oldrieve at Hinton Estates in North Eastern Zimbabwe in the late 1980s. The farm and the surrounding areas were able to vastly increase yield levels and reduced soil erosion through the use of conservation farming. This was followed by intensive promotion of conservation farming initiatives by many non- governmental organisations (NGOs) as a response to donor calls to improve food security among communal farmer. However, the continued support of conservation farming initiatives by the government and the donor community improved crop yields through intensification of production, improved management, increased resilience to dry spells and more efficient use of organic and inorganic fertilisers. This led to widespread adoption of conservation farming across all agro- ecological regions in Zimbabwe.

Conservation farming that has been promoted in Zimbabwe by the Zimbabwe Conservation Agricultural Taskforce (ZCATF) comprised of the following eight synchronized practices: winter weeding, digging planting basins, application of crop residues, application of manure,

application of basal fertilizer, application of top dressing, timely weeding and crop rotation (Twomlow et al., 2008).

The practices are done in synchronization starting with winter weeding. The importance of weeding before land preparation is to ensure that the plot is weed-free at basin preparation and also to prevent the dispersal of weed seeds. Crop residues are left in the field and applied on the soil surface in the dry season, soon after harvesting. The residues must provide at least 30% soil cover. The mulch buffers the soil against extreme temperatures, cushions the soil against traffic, and suppresses weeds through shading and improves soil fertility. Planting basins are then prepared in the dry season from July to October.

The basins enable the farmer to plant the crop after the first effective rains when the basins have captured rainwater and drained naturally. Seeds are placed in each basin at the appropriate seeding rate and covered with clod-free-soil. The advantage of using basins is that they enable precision application of both organic and inorganic fertilizer as it is applied directly into the pit. Fertility amendments are applied soon after land preparation in the dry season. Application of top dressing is done at 6 weeks after crop emergence. Timely weeding in combination with mulch should eventually lead to effective weed control. Rotating crops is one of the key principles of CF. Cereal/legume rotations are desirable because there is optimum plant nutrient use by synergy between different crop types (Twomlow et al., 2008).

2.6.3 CONSERVATION FARMING IN GWANDA

Conservation farming in Gwanda district was first introduced by Agro German Action in 2008. Farmers were taught how to measure, dig basins, mulch and when to plant. Conservation

farming was introduced in a way to reduce soil loss and mitigates land degradation. Also it was aimed at increasing productivity per unit area which ensures that farmers can produce enough food in the presence of climate change. Before the introduction of conservation farming farmers used to practice conventional farming which usually led to undesirable effects like poor harvest due to the problem of climate change which has been resulting in high temperatures and low rainfall.

2.8 CHALLENGES AND CONSTRAINTS IN CONSERVATION FARMING

The practice of conservation farming has been met with several challenges in developing countries. One of the challenges has been labour distribution amongst several activities particularly in weeding. Riches et al (1997) states that weeding accounts for 60% of labor required for maize production and requires proper planning and effective management. These problems of labour distribution affected women more than men in that in most traditional farming systems in the regions of Mozambique, women and children are responsible for weeding. The burden becomes worse among smallholder farmers who lack capital to purchase herbicides and pesticide.

Bolliger (2007) argues that farmers in the regions of Mozambique only temporarily adopt conservation farming as long as a project is running, but soon abandon the practice once the project is terminated. Also the time delays in the realization of the full benefits of conservation farming due to problems sometimes encountered during the earlier years can be discouraging to farmers expecting immediate benefits from the new technologies. Donor fatigue is also manifested where donors financing projects like conservation farming do not understand why

full benefits of conservation farming may be delayed, thereby requiring sustained funding during the first 3-5 years (Derpsch, 2005).

Hobbs (2000) argues that overcoming the mindset of farmers in relation to changing the traditional ways of farming especially in systems where tillage is considered essential and serves various purposes can be very challenging. Most farmers in Mozambique continued with their traditional practices in other parts of the field even after they were introduced to conservation agriculture, which was implemented only on some sections of fields. To add on this, Giller et al. (2009) argue that ‘the plough has become a symbol of agriculture such that many people involved including, farmers, extension agents, researchers, university professors and politicians find it difficult to believe that agriculture can be possible without tillage’.

Other constraints directly relate to the principles of conservation farming, particularly the permanent soil cover with crop residues for moisture retention, increased soil biological activity and better protection of the soil. Many farmers in Southern Africa collect crop residues and use them as stock feed especially in mixed farming systems where livestock are a major source of household income (ICRISAT, 2006). Crop residues are also removed by livestock that roam freely in the fields after harvesting in countries like Zimbabwe, Mozambique, Botswana and South Africa. So, for crop residues to effectively provide permanent soil cover or mulching farmers are forced to fence their fields. Twomlow (2008) argues that ‘in systems where farmers are used to grazing cattle on other people’s fields in winter, suddenly stopping it for purposes of conservation farming would be socially unacceptable. Furthermore, in Ruaca and Pumbuto communities in Mozambique, crop residues are decomposed by ants such that by the time the cropping season begins there will be no residues left in the field. Thus since mulching using crop residues improves infiltration, reduces surface erosion and water run-off and suppresses weeds

then that would mean shortage of residues for mulching would be a constraint in conservation farming practice.

Inexperienced personnel and inadequate access to government extension services is a common problem in Southern Africa (Pretty, 2000). In some remote communities in many countries in Southern Africa government agricultural extension services are unknown and due to resource limitations NGOs cannot reach out to all farmers. In some instances where extension services are provided, extension workers look at their involvement in the conservation farming projects as extra work for which they should be remunerated separately. Since conservation farming is a knowledge intensive technology, it would be difficult to successfully promote this technology without the help of well-trained and experienced extension workers.

However, it is in the context of this reviewed literature that the researcher suggests that strategies like conservation practice can be of effective in addressing address the problem food insecurity through ways of adapting to climate change.

2.9 CHAPTER SUMMARY

The chapter discussed literature which was reviewed from different scholars. This is done in a way to understand the role of conservation farming in relation to food security. This chapter presented the definition of terms, theoretical frame work, climate change and food security, conservation farming and food security and agriculture in Zimbabwe. Also, it discussed conservation farming in USA, Zambia and lastly in Zimbabwe.

CHAPTER 3 METHODOLOGY

3.0 INTRODUCTION

This chapter focuses on the research methods and technics used in the study. Research methodology provides a clear map of how the study was conducted. This chapter explores different research designs, population, and data gathering techniques, data sources and research instruments used to collect data. Also ethical consideration and data analysis and presentation techniques are high lightened.

3.1 RESEARCH DESIGN

The research was carried out through the use of qualitative and quantitative research method. Research design is the framework that assists the researcher to come up with solutions to problems and thus gives a guideline in carrying out a research. It also looks at what data is needed to address the research questions and how it is going to be analyzed.

3.1.1 QUALITATIVE METHOD

According to Nicholas (2011), qualitative research methods serve to provide a bigger picture of a situation or issue. The method makes use of open ended questions and gives the participants the chance to respond in their own words rather than making them select from given fixed answers. This enables the respondents to give meaningful answers of their own rather than selecting answers from those already anticipated by the researcher. It again allows for a more detailed investigation of issues addressing questions like what, who and why. In this research, qualitative data was collected through the use of interviews and focus group discussions.

3.1.2 QUANTITATIVE METHOD

Quantitative research method is a way of gathering or collecting data in the form of numbers. This method makes use of the numbers that represent opinions or concepts. This can be done through the use of methods such as questionnaires or structured interviews. The use of quantitative method strengthens the design and enables the researcher to interpret the results and the findings. In this research, quantitative data was gathered through the administration of questionnaires to 10 households.

3.2 STUDY POPULATION

Population is the group upon which the researcher is interested in making inferences (Leedy, 2010). Study population can be defined as a study of a group of individuals taken from the general population who share a common characteristic such as in the same type of business or operate in the same area of research. The research was conducted in Gwanda district ward 19 which is in Matabeleland south province, Zimbabwe. The district is divided into 20 wards which are made up of 112 villages, with each ward having 6 villages. The ward has 6 villages but it only focused on one village due to time limit. The target population comprises of approximately 3219 households and out of this population 204 households are engaging on conservation farming practice. The research targeted mainly farmers under conservation farming though it also included those under conventional farming in a way to provide relevant facts or evidence related to the study. However, the study population managed to provide information on how the communities produce food, how they adapt to climate change, amongst other things thus addressing the objectives of the study.

3.3 SAPLE SIZE

With the large numbers of farmers participating in the agricultural sector in ward 19, Gwanda district, it would have been a difficult task to address every farmer participating in conservation and conventional farming. Thus, only a sample size was used as a representation of other farmers. Sample size refers to a representative subsection of a precisely defined population. A sample size of 20 respondents was drawn under conservation. In this research, the sample size of 20 was drawn from 204 households engaging on conservation farming. Also, 10 farmers under conventional farming were sampled so as to draw conclusions on whether conservation farming is an effective strategy for ensuring food security. This enabled the researcher to gain information and make conclusions about the whole population.

3.3.1 SAMPLING

Sampling can be generally defined as an act of selecting a part from a whole for the purpose of providing insight on the characteristics of the whole (Fridah, 2002). Sampling method is important as it enables the researcher to source evidence from which to make conclusions about that particular population. Thus sampling was crucial as it served time and resources during the research.

3.3.2 PURPOSIVE SAMPLING

This is one of the most common sampling strategies where groups participate according to preselected criteria relevant to a particular research question (FHI, 2006). Purposive sampling is used when the researcher has adequate information of the population in question pertaining to the problem and chooses the people for inclusion in the sample. In this research, a purposive sampling was firstly implemented through choosing Takaliawa village known to be practicing conservation farming as a result of promotion by NGOs like Agro German Action. This was

followed by listing of farmers known to be practicing conservation farming. Two sub samples were drawn from the selected village, namely farmers who engage on conservation farming and those who engage on conventional farming. This was done in a way to clearly assess the effectiveness of conservation farming and to come up with conclusions on whether conservation farming is a viable farming strategy. This was useful in that it enabled the researcher to collect much data against the time available for the data collection in the area of study. More so, it allowed the researcher to collect data from the relevant respondents hence saving time and resources as well.

3.3.3 RANDOM SAMPLING

Kothari (2004) postulates that random sampling is a probability sampling technique in whereby each and every item in the population has an equal chance of inclusion in the sample and each one of the possible samples, in case of finite universe, has the same probability of being selected. This is a sampling technique where a group is selected from a large population for the purposes of the research. In this study, random sampling was used to select households from conservation and conventional farming. Since the researcher was given a list of those under conservation farming, households were randomly selected for data collection. This enabled the researcher to avoid being bias in that every individual in the village had an equal chance of being selected.

3.3.4 CONVENIENCE SAMPLING

The researcher made use of convenience sampling technique. Convenience sampling is a method whereby subjects are selected because of their convenient accessibility and proximity to the researcher. Convenience sampling enabled the researcher to save time through targeting the

farmers who were nearer. Also, it enabled the researcher to cut costs and to be able to extract data successfully.

3.4 SOURCES OF DATA

There are two sources of data which were used by the researcher. These are primary data and secondary data, and they shall be explained.

3.4.1 PRIMARY DATA

Primary data is the original source of data that the researcher collects from the respondents. Remenyi (2009) alludes that primary data is data collected from original sources and not already published sources such as directories or databases. In simpler terms, primary data means the original data that has been gathered specially for the purpose in mind. The researcher will use questionnaires, interviews and focus group discussions as primary data mining tools in this research. The advantages of primary data are that it can lead to new understanding and greater outcomes of the research and that it addresses particular research matters as the researcher will be in control of the research design to fit his or her needs. The researcher has control over how the information should be gathered or collected. The primary data used in this research was gathered through interviews, focus group discussions and questionnaires for the purpose of collecting qualitative and quantitative data. Some of the data required for the research was not very accurate since most of the farmers do not have records on all operations they do, thus it was so difficult for them to remember some of the data.

3.4.2 SECONDARY DATA

Secondary sources refer to sources that are already collected for other purposes but have significant contribution to the research. These sources include Newspaper, media reports, Article materials, corporate journals, and management reports. The advantages of using secondary data involve the fact that incase the researcher have fewer resource requirements in a particular research, he or she is guaranteed of enormous savings in terms of time and money. Saunders (2007) postulates that if one needs data more quickly or hurriedly, secondary data may be the only viable alternative. Also, through the use of secondary data, there is likely to be higher quality data than could be obtained by collecting the researcher's own data. In this study, secondary data from previously published studies was also collected. These provided a swift and fairly easy process of attaining a good complete understanding of the field.

3.5 INTERVIEWS

The researcher used interviews in carrying out the research. Conservation farming is one of the topical issues, hence through the use of interviews; the researcher was able to get in depth information on the concept through the use of interviews. An interview is a technique that allows the researcher the flexibility to get an in depth understanding of the interviewee's response and therefore develops the themes as they arise (MacDonald and Headlam, 2008).The researcher interviewed 20 farmers who engage in conservation farming and 10 farmers under conventional farming. The interviews are very important and particularly effective at producing data which deals with the research in depth and detail. They enable questioning to be channelled or directed as one wants and one can simply points out anything that need to be clarified in the course of an interview. Interviews allow the researcher to have direct contact with the respondent. Hence, the researcher will be able to read the non-verbal cues of the respondent. Thus interviews in this

research enabled the researcher and the respondent to talk face to face about issues concerning the study. The interviews could have led to wrong or false information as respondents may have wanted to impress the interviewer thinking to get aid since the conservation farming practice is known to be aligned with NGOs who provides inputs like hoes and seeds. To avoid such, the researcher specified the research objectives before carrying out the interviews.

3.6 FOCUS GROUP DISCUSSIONS

Focus group discussions were conducted as one of the data gathering instruments for this research. The purpose of focus group discussions was to lure respondents' reactions in a way which would not be feasible using other method. Focus groups depend on interaction within the group created on subjects that are brought by the researcher. The unique feature of focus group discussions is the fact that understanding and data is produced by means of interaction between participants of those particular groups. Focus groups enable interaction between participants in that they highlight their views about a situation using the simple language. Thus focus group discussions were used in a way to gather data from farmers in ward 19. Focus groups discussions were used to gather information concerning food security and conservation farming. These consisted of stakeholders like counsellors, village heads and local farmers. 4 groups were constructed, each consisting of 4 people. The researcher made sure that every member on every group participates in the discussion in a way to extract different opinions. The focus group discussions sought to gather data on community opinions about conservation farming and how the concept contributes to food security. Questions were asked on how they practice conservation farming. Also concerning to how conservation farming is contributing to food security was also asked.

3.7 QUESTIONNAIRES

This is a method of collecting or gathering data through the use of written questions, where respondents provide answers to the questions. Saunders (2005) defines a questionnaire as a set of pre-set questions. Questionnaires are important because they save time and enable the researcher to gather both qualitative and quantitative data from a wide range of respondents. The researcher made use of questionnaires to provide understanding of the farmer's experiences before and after they started practicing conservation farming. 10 questionnaires were distributed to farmers, councilors and village heads. The questionnaire enabled one to analyze data in a quantifiable way using closed-ended questions. On the other hand open ended questions were incorporated in the questionnaire to give the respondents a chance to present their responses as the researcher was not aware of certain aspects.

The questions in the questionnaire sought to find the opinions and ideas, information and facts that the target group has in relation to the research. This enabled the researcher to investigate the role of conservation farming in food security and the impact of climate change on agriculture and food security. The researcher was able to gather information from those not involved in conservation farming but equally affected by climate change impacts. However, since the target population consists of elderly people who have challenges in interpreting the questioner, the researcher designed questionnaires with the use of simple language and short questions that were very specific when designing individual questions. Decent wording with well-mannered instructions was considered at the beginning of the questionnaire as a way to increase the number of respondents. There might have been errors encountered in filling in the questionnaires since the target population consist of people who have challenges in reading and interpreting the

questionnaire. The researcher therefore, had to read the questionnaire on behalf of the respondent and interpreted in a simple language they understood. The reason for household questionnaires was to get an understanding of how farmers practice conservation, challenges they face, how they access food, amongst other things.

3.8 DATA PRESENTATION AND ANALYSIS

Data presentation and analysis indicate the method in which data is designed and structured in a way to allow the researcher to draw conclusions from it. Data presentation and analysis are deliberated below.

3.8.1 Data analysis

The gathered or collected data was analysed in relation to the research objectives. The researcher made use of triangulation method in data analysis and presentations where by both quantitative and qualitative data analysis was applied. The quantitative method was largely used where there are figures in the data collected and qualitative method was applied where data was collected through interviews and focus group discussions. The triangulation method enabled the researcher to draw inferences from the date and to analytically reflect different issues basing on the responses given by respondents. Also, the data from interviews and open ended questions was analyzed through a quantitative method in a way to enable the researcher to identify emerging features and concepts.

3.8.2 DATA PRESENTATION

Data was presented in the form of graphs, charts and tables. In presenting qualitative data, a

narrative logic was used. Quantitative data was used to number respondents from questionnaires, responses from interviews and focus group discussions. To add on, content and narrative logic was used in data presented in the form of graphs and charts.

3.8.3 CHARTS

Charts enabled the researcher to illustrate the findings and results of the research. A narrative logic was also used to present qualitative data. The research made use of pie charts. Under pie chart data is presented in the form of charts which are divided into segments according to available data. Charts enabled an easier interpretation of the findings as they provided a pictorial view for the results or findings.

3.8.4 TABLE

The researcher used tables to present data in numbers .In the tables, data was displayed with the use of rows and columns. Tables are used for presenting numerical figures where the exact statistics are essential. In this case, tables were used to analyze demographic characteristics of the farmers and also to present results from the research, like number of meals per day, sources of food and challenges faced by famers under conservation farming were also presented with the use of tables.

3.9 ETHICAL CONSIDARATIONS

The researcher's ethical considerations included voluntary participation and informed consent, protection of participants, and confidentiality. A sense of expertise was prompted in out giving the respondents respect. To add on, the researcher sought authorization from the responsible local authorities before conducting the research. The participants were guaranteed that the

information they provided will be confidential and will be used only for the purposes of the study.

3.9.1 INFORMED CONSENT AND VOLUNTARY PARTICIPATION

Participants' informed consent was also considered. Before answering the questioners, participants were ensured that the purpose of the research was purely academic and the procedures used to collect the data were also assured. In this case, participants were told that the participation is on the voluntary basis. They were informed of their right to willingly participate or withdraw as there will not be charged for that. Participants were informed about the objectives of the research, data gathering procedures and were also assured that there won't be any risk or costs involved.

3.9.2 NO HARM TO THE PARTICIPANT

Since some of the questions asked were very sensitive, the respondents were assured that the information they provide will be used solely for the research objectives stated. The researcher considered a decent way of asking questions to the respondents. Questions like how do you earn a living and how many meals do you take per day were however asked in a not to provoke pain or in a way that respondents could not be shy to tell the truth about their households livelihoods.

3.9.3 CONFIDENTIALITY

The researcher identified people's responses and promised that their responses would not be publicised. To honour this, only numbers and narration were used to present data and people's names were not jotted. The researcher assured the respondents that the information they provided would be kept with confidentiality and would be solely used for the objectives of the study.

3.10 CHAPTER SUMMARY

The chapter discussed the research methodology, research designs and techniques. Interviews, focus group discussions and questionnaires were conducted to gather data for the research. The chapter also deliberated on ethical considerations that were observed. Also, data analysis and presentation procedures are high lightened.

4.0 CHAPTER FOUR: DATA PRESENTATION AND ANALYSIS

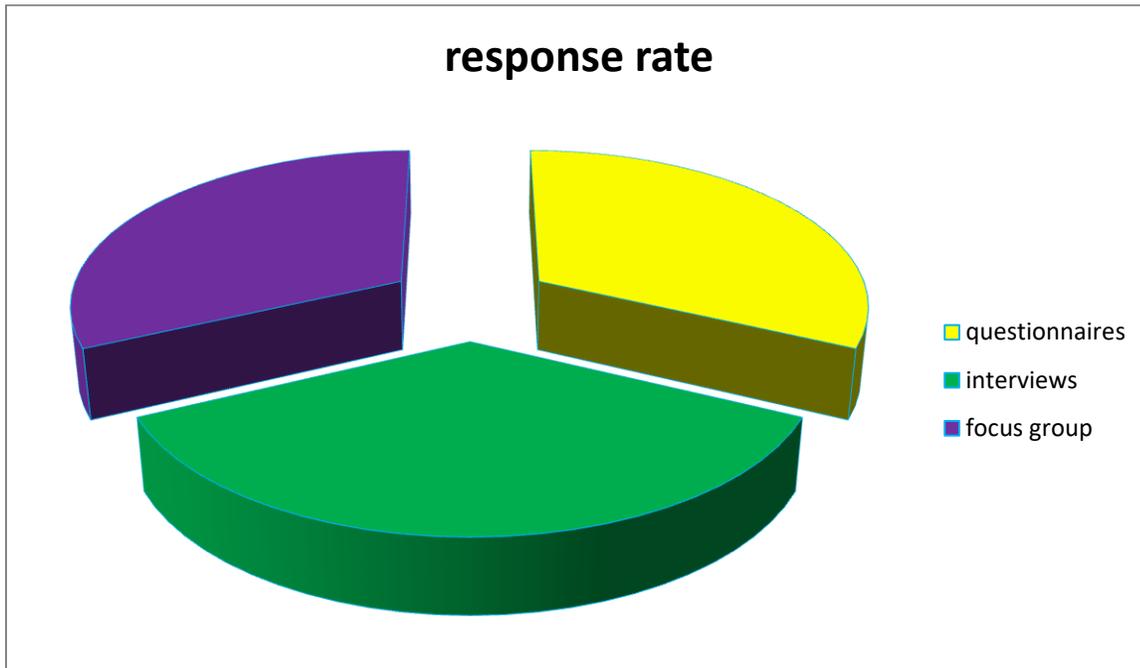
4.1 INTRODUCTION

This chapter focuses on the analysis and presentation of data that has been collected from the respondents. Charts, graphs and tables are used to present the results and findings. Data is presented in line with the research questions answered. The chapter begins with looking at the delimitation and demographic characteristics of the population. It then proceeds to address the research objectives in line with the research questions for the study.

4.2 RESPONSE RATE

The response rate in this case entails the actual number of the population which took part in the research against the sample size. Out of 20 sampled households, the researcher managed to collect data from 20 respondents under conservation farming and other stake holders, hence the response rate was 100%.Also, 10 households under conventional farming were interviewed. The high response rate minimized the risk of being bias thereby enabling the validity and reliability

of the research finding. Below is the table which briefly summarizes response rate for interviews, questionnaires and focus group discussions.



10 questionnaires were distributed to stakeholders including counselors, village heads and local farmers. Out of 10 distributed questionnaires, 8 were returned which therefore translates to 80% of the returned questionnaires. Out of 20 interviews which were scheduled to be conducted, only 18 were carried hence making the response rate to be 90%. Finally, out of 20 householders who were to participate in 5 focus groups under, 4 groups were conducted hence amounting to 80% of people participated. Each group had 4 participants.

4.4.1 SEX OF HOUSEHOLD HEADS

Sex of household head	Percentage
Male	60
Female	40
Total	100

The above table represents sex of household heads which were sampled. Data from the sampled households shows that many households are male headed (60%) with 40% households being headed by females. During data collection, it was noticed that households dominated by males are the majority of those who have adopted conservation farming.

4.4.2 AGE OF HOUSEHOLD HEAD

Age	Percentage
18-35	15 %
36-55	50%

56+	35%
-----	-----

Generally, the majority of the respondents are aged between 36 and 55 years. This category is indicated by the 50%. 35% of the interviewed farmers were people with 56 years and above. Lastly, 15% of the respondents were aged between the age of 18 and 35. Hence this shows that the practice of conservation farming requires able bodied personnel and that it is mainly practiced by middle aged farmers.

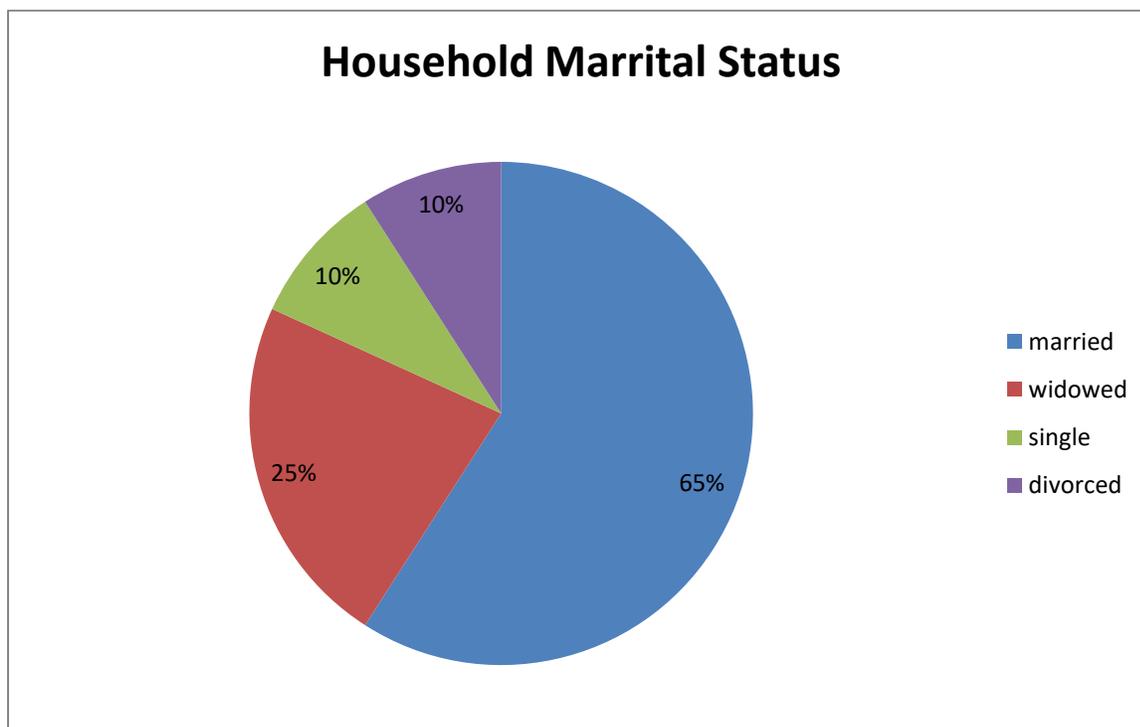
4.4.3 LEVEL OF EDUCATION FOR HOUSEHOLD HEAD

LEVEL	PERCENTAGE (%)
Standard 6	25
Grade seven	20
O Level	40
A Level	10
Diploma	3
Did not attend	2

The highest level of education for sampled household heads is Ordinary Level with 40% of the population falling under this category. The second level with 25% comprises of elders who attended school long back and ended at standard 6. Few household heads ended at grade 7, A'Level and at tertiary level, as highlighted in the table. 2% of the household heads are farmers who did not attend school. The findings revealed that the less educated household heads are the majority practicing conservation farming. This might be because they have limited

options in terms of their livelihood sources, thus conservation farming enables them with an opportunity to advance in their livelihood status through high production. The less percentage of educated respondents consists mainly of farmers who did not adopt conservation farming. This might mean they have means of diversifying their livelihoods in times of poor production in farming.

4.4.4 MARRITAL STATUS OF THE HOUSEHOLD HEAD



Of the sampled household, 65 % are headed by married people, 25 % are widowed and the remaining 10% is equally shared between single and divorced household heads. The majority of the married household heads are men whilst most widowed and divorced household heads comprised of females. Though some household heads are widowed or divorced and others are

single or married, they all pointed out that they work harder under conservation farming to produce food for their households regardless of the amount of labour required.

4.4.5 SOURCES OF SEEDS

SOURCE	PERCENTAGE OF RESPONDENTS
Farming	30
Buying	40
Gifts	15
Begging	15
Total	100

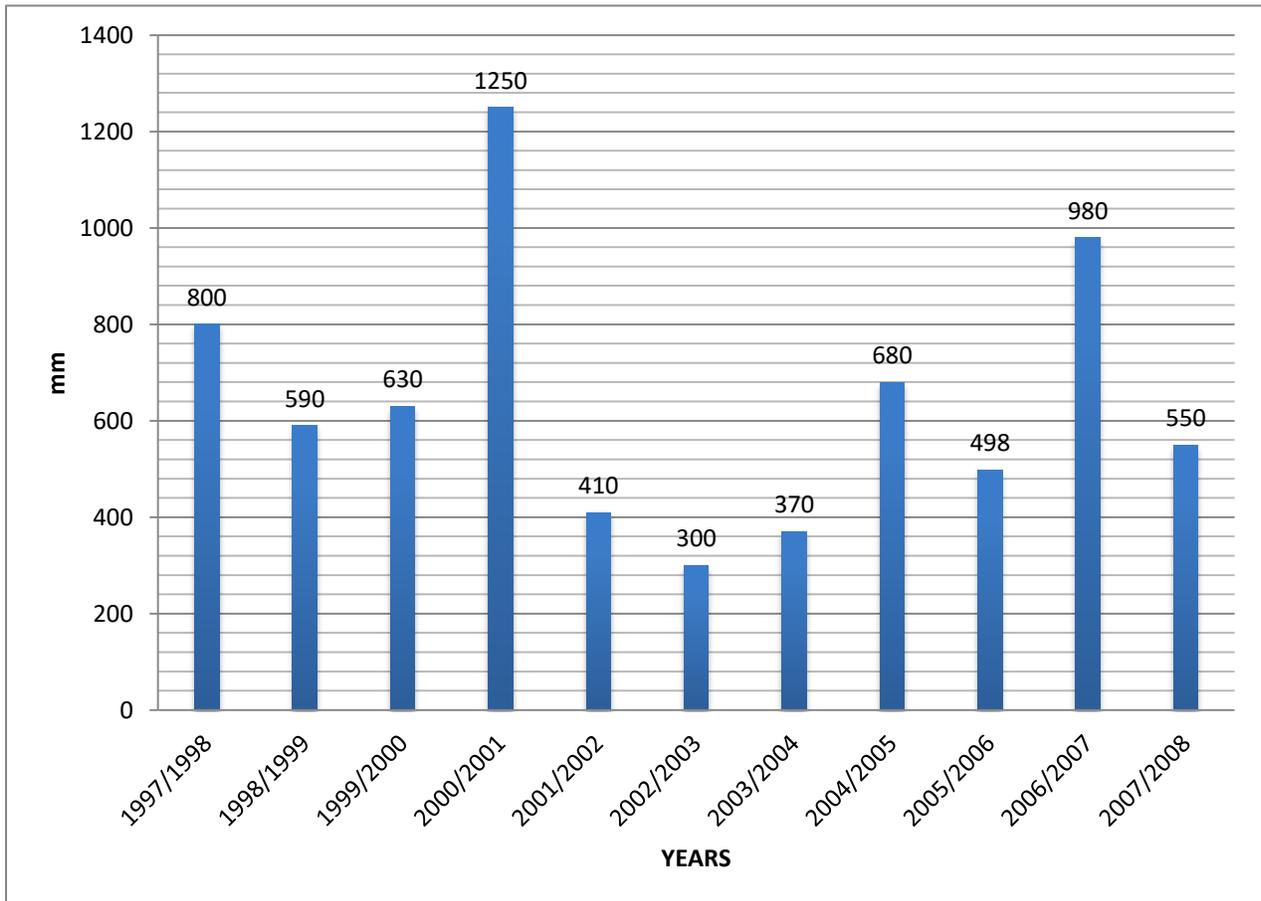
Generally, the majority of farmers (40%) pointed out that they get their seeds from buying. 30% of farmers revealed that they get seeds from farming, 15% rely on begging and another 15% rely on gifts. The analysis revealed shows that the majority of farmers who get seeds from their farm produce are those under conservation farming. Probably the farming practice enables them to produce enough hence being able to keep seeds for the next farming seasons. Those who relied on buying are mostly under conventional farming. Perhaps this is because the farming type does not enable them to produce enough that they can keep some outputs as seeds.

4.5 THE IMPACT OF CLIMATE CHANGE ON AGRICULTURAL PRODUCTION AND FOOD SECURITY IN GWANDA DISTRICT

4.5.1 Rainfall seasons

An assessment of rainfall seasons in Gwanda district is of importance in the analysis of food security within households. Drought has been a major threat in agricultural production as it has led to withering and dying of crops hence contributing to low and poor agricultural production.

Below is the graph highlighting rainfall patterns from 1997 to 2008 in the district.



It is of importance to analyze rain fall patterns in Gwanda District as a way to understand the significance of conservation farming in food security. The above chart shows six years of drought

in Gwanda District, with rainfall being below 650 mm. The assessment of conservation farming will thus be observed from a climate change perspective.

Climate change in Gwanda district has greatly affected negatively on food security. Shortage of rainfall together with high temperatures in the area has resulted in crop failure. Also, it has resulted in death of domestic animals due to shortage of drinking water and shortage of food for grazing. Thus climate change seriously undermines agricultural production and food security amongst the farmers as crop failure leads to low yields hence food insecurity. To add on, death of domestic animals undermines food security in that farmers would not have any means of diversifying in their livelihoods to make food available and accessible within their households.

4.6 CONSERVATION FARMING AS AN ADAPTATIVE METHOD IN THE FACE OF CLIMATE CHANGE

Conservation farming in Gwanda district came into being in 2008. It was introduced by a non-governmental organization called German Agro Action. Farmers were provided with training at a ward meeting and they were trained as a ward. They were taught how to measure their fields using rows and columns. They were taught on how to dig basins, how to put manure, how to mulch, when to plant and how to control weeds within their crops. They were also supplied with agricultural inputs like hoes and seeds. The nature of conservation farming practice in Gwanda District has the potential to produce high yields since mulching, putting manure and also digging of basins enables soil fertility, high water holding capacity in the soil and the control of weeds.

4.6.1 HOUSEHOLDS SOURCES OF FOOD

Communities in Gwanda district have not been harvesting enough from farming activities because of the problem of climate change which has led to shortage of rainfall and very high

temperatures during the farming seasons. Thus this has resulted in poor or very low yields from farming. The sampled household indicated that the problem of climate change has led to poor agricultural productivity hence resulting in food shortages and starvation amongst their households. Below is the table showing households source of food in Gwanda District.

4.6.2 Household sources of food in Gwanda District

SOURCES OF FOOD	CONSERVATION FARMING (%)	CONVENTIONAL FARMING (%)
Farming	40	30
Buying	40	50
Sawing mats	5	5
Remittances	10	10
Part-time jobs	5	5
Total	100	100

The table above shows sources of food for farmers within Gwanda Districts. Most farmers in Gwanda district highly depend on farming and buying food for their households. The percentage rate of buying is relatively high because of the problem of climate change which has been resulting in crop failure. Of the farmers who depend on buying, 50% of them are farmers who use the conventional type of farming and 40% of farmers who practice conservation farming. This however shows that conservation farming has a potential for ensuring food security within the household in Gwanda District hence is a viable adaptation method in the face of climate

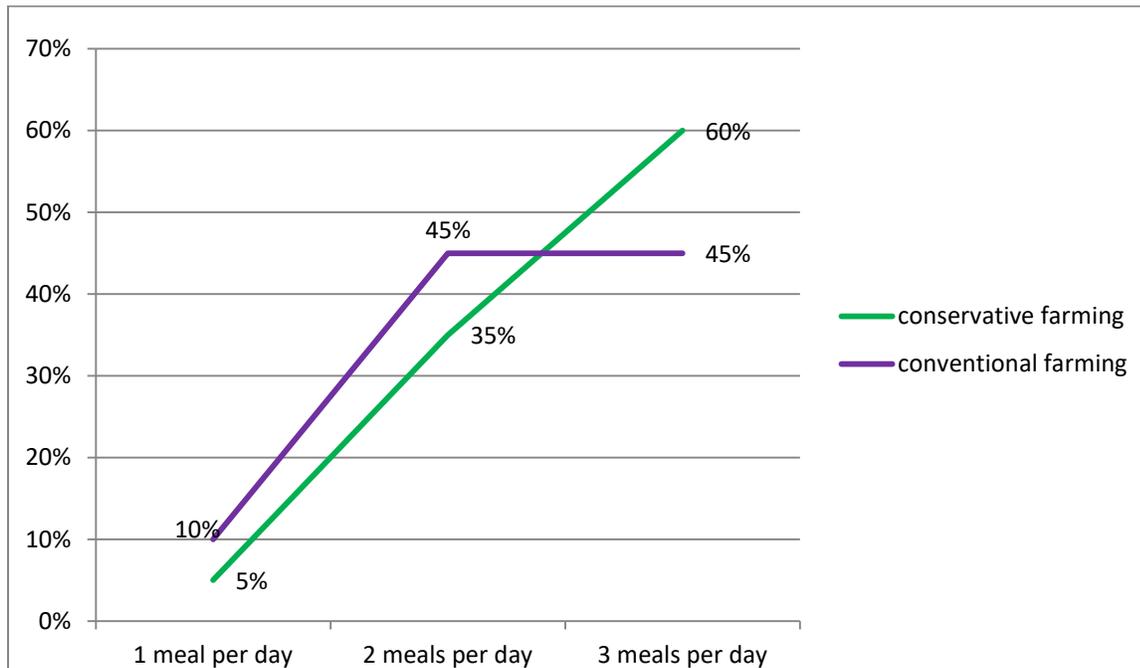
change. Nevertheless the local communities also depend on part time jobs, sewing mats and on remittances in order to access and make food available within their households.

4.7 ROLE OF CONSERVATION FARMING ON FOOD SECURITY IN GWANDA DISTRICT

4.7.1 CONSERVATION FARMING AND FOOD ACCESSIBILITY

As discussed in the first chapter, food accessibility measures the ability to secure entitlements which are defined as a set of resources that an individual requires to access food. The negative impacts of climate change threaten to undermine food security through reducing people's access to entitlements. In Gwanda district, NGOs have empowered small holder farmers on conservation farming principles hence enabling them to farm and access food. The research findings revealed that conservation farming is positively contributing to food accessibility within households in Gwanda district for the farmers who have adopted the practice. Some farmers pointed out that in times of high yields they even sell the produce in exchange for money. This enables them to generate income hence enabling them to diversify in their livelihoods. Thus high production would mean generation of income and access different types of food hence promoting food security.

4.7.2 NUMBER OF MEALS A DAY



The above graph shows the number of meals per day for the sampled households. The research shows that the majority of the population (60%) under conservation farming takes 2 meals per day while under conventional farming the percentage of those who take 2 and 3 meals is the same (45%). Also only 5% of households under conservation farming take 1 meal a day and under conventional farming 10% take one meal per day. Most farmers under conventional farming pointed out that they usually reduce the number of meals a day so that they cannot run short of food within their households. Thus conservation farming is a viable way of ensuring food accessibility in Gwanda.

4.7.3 CONSERVATION FARMING AND FOOD UTILIZATION

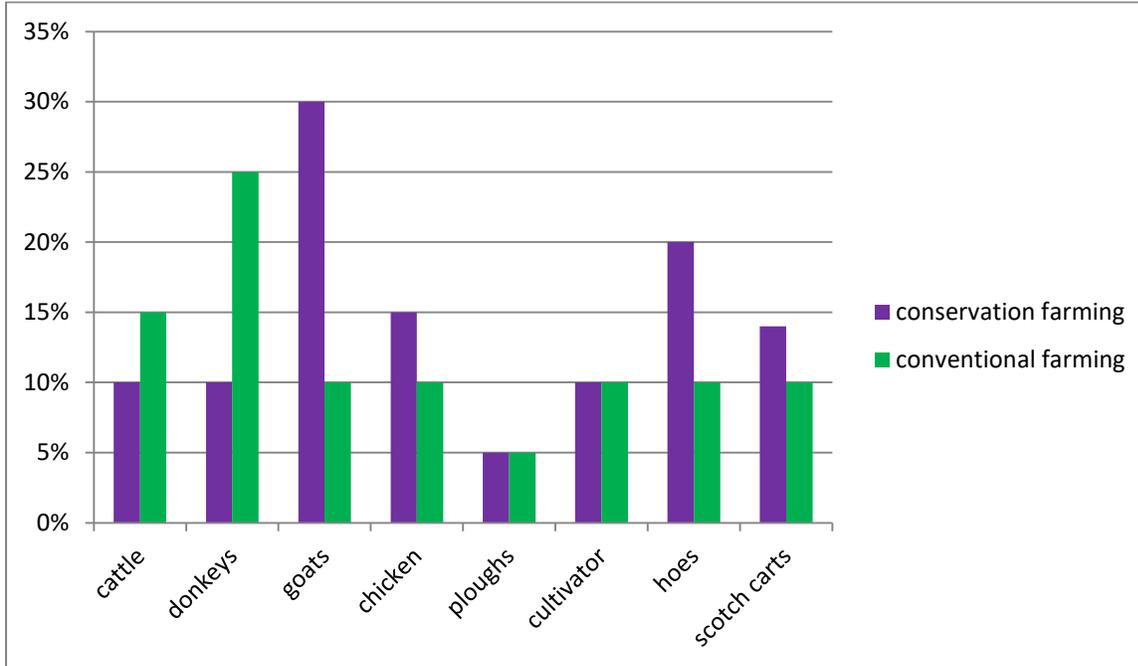
Food utilisation as discussed in the first chapter, it refers to the way the body makes the most of various nutrients in the food and is determined by people's health status. In Gwanda district, the

findings revealed that the negative impacts of climate change which are; drought and high temperatures has resultantly affected people's nutritional status in different ways. Farmers pointed out that nowadays, due to drought, they consume food for the sake of filling their stomachs regardless of whether they like the food or not and regardless of whether the food contains nutrients or not. This generally affects nutritional status in that most of the food does not contribute many nutrients in the body. Thus, this usually leads to health illnesses and malnutrition due to lack of variety needs to satisfy nutritional requirements. However, the coming in of conservation farming practice in Gwanda district has been seen as a viable way of enabling food utilization

4.7.4 ASSETS

The graph bellow shows assets owned by farmers who are under conservation farming and those under conventional farming. Also percentage on each category is also shown.

4.7.5 Percentage of household asset ownership



The bar chart represents different assets owned by farmers under conservation and conventional farming. The highest percentage is 30% which represents goats owned by farmers under conservation farming. This is followed by 25% representing donkey ownership under conventional farming. Also many farmers under conservation farming own hoes, scotch carts and chickens while under conventional farming many of them own cattle. Most of the adopters of revealed that during the years of high produce, they usually sell the out puts and buy assets and sometimes they engage in batter trade, with exchange for goats and chickens, hence enabling them to diversify in their livelihoods. Most of the farmers who did not adopt conservation farming own cattle, ploughs and donkeys. Probably the reason for not practicing conservation farming it's because they would rely on selling their livestock in order to afford food for their households. In this case assets ownership was used to analyze food utilization within different households. From the findings one can come to the conclusion that through ownership of assets

like goats, chickens and cattle, farmers are able to get nutritious food like meat and milk necessarily relying only on farm produce. Thus this enables farmers to grow healthier hence minimizing diseases like malnutrition.

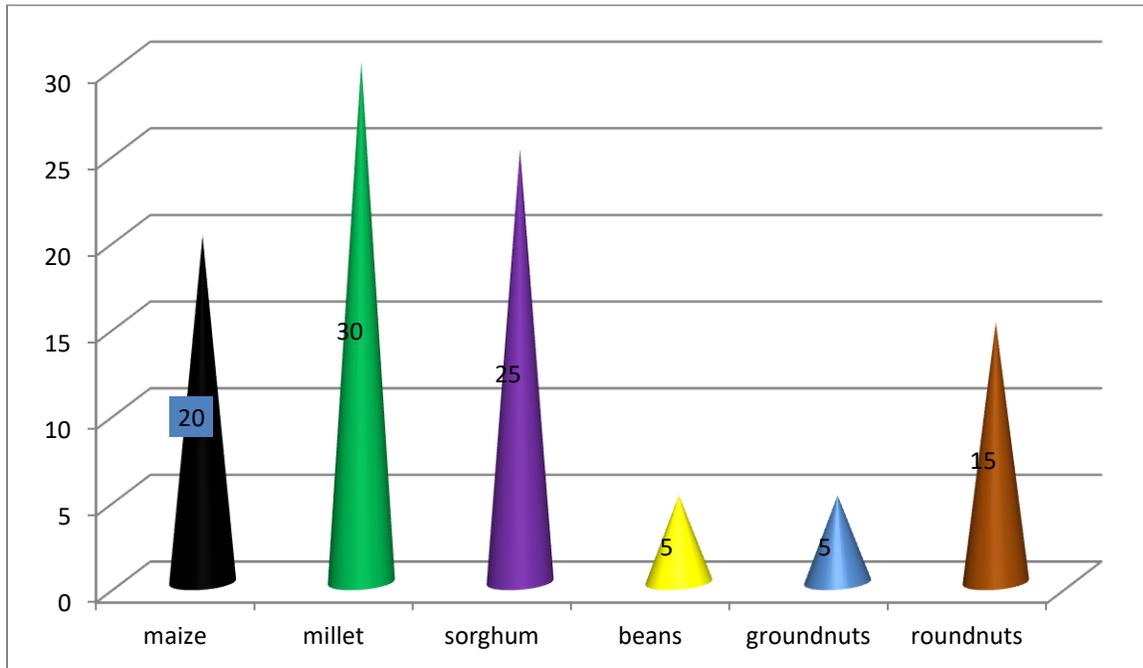
4.7.6 CONSERVATION FARMING AND FOOD AVAILABILITY

Gwanda district has been adversely affected by climate change which has undermined food availability amongst several households. Thus the coming in of conservation farming was a positive way of harnessing threats from climate change and to enable farmers to farm and make food available, regardless of drought. Food availability is determined by quantities of food that are produced, stored or exchanged. The research findings revealed that drought has been adversely affecting food availability amongst house holds under conventional farming than those under conservation farming.

Conservation farming proves to be of effective in ensuring food availability through its principles which include digging of basins and mulching. It also requires the growing of drought resistant crops which can be stored for a long period of time without going bad. To add on, crops like round nuts and ground nuts enables food availability in that households are able to diversify in their diets. Also, respondents pointed out that mealie-meal from millet and sorghum suppresses hunger for a long period. Conservation farming enables even those farmers who are regard as poorer, who cannot afford draught power and fertilizers, to make food available within their households in that its principles does not require too much rainfall nor the use of draught power. Most of the respondents pointed out that Gwanda district is no longer much suitable for conventional farming as it used to be, the reason being harsh effects of climate change.

Comparison of conventional and conservation farming showed that conservation farming should be highly considered in a way to ensure food availability.

4.7.7 Crops grown and percentage of households cultivating



The findings show that a large percentage of sampled household, which is 30%, cultivates millet while 25% of farmers cultivate sorghum and maize is cultivated by 20 % of farmers. Also 15% of farmers cultivate round nuts, 10 % is shared equally by those cultivating beans and groundnuts. Most of the farmers have been cultivating millet in their fields since long back due to the negative effects of climate change which has resulted in drought and high temperatures during farming seasons in the area.

In Gwanda District, farmers under conservation farming cultivate drought resistant crops like millet and sorghum so as to avoid crop failure. Since drought resistant crops do not require too much rainfall for them to grow and produce, farmers have been growing such crops and they have succeeded in ensuring food availability within their households regardless of negative

effects of climate change. Though 20% of interviewed farmers openly pointed out that they grow maize during farming seasons, they all stated that maize is grown in just a small piece of their fields knowing that it requires high rainfall for it to produce high yields. Therefore, it can be said that conservation farming enables food availability amongst the households due to the growing of drought resistant crops which enable high produce.

4.7.8 CONSERVATION FARMING AND FOOD STABILITY

Conservation farming is a viable farming strategy which has been adopted by several farmers in Zimbabwe. Food stability exists when food is available, accessible and utilizable. Conservation farming as noted in Gwanda District reveals that it empowers farmers from losing access to food as a result of climate change threats. Severe droughts in the area have undermined food stability amongst several households as low production has led to shortages of food within rural households. Nevertheless, the coming in of conservation farming has proved to be an effective way of ensuring food stability. This is because the farming strategy requires digging of basins that contain water during rains and the mulching which maintains soil moisture for a longer time hence enabling farmers to obtain high yields and be able to make food available, accessible and utilizable. However this has been enabling food stability to households that have adopted the practice.

4.8 CHALLENGES OF CONSERVATION FARMING AND RECOMMENDATIONS

4.8.1 Challenges faced by farmers in practicing conservation farming

Challenge	% rate of respondents
Shortage of labour	40
Shortage of farming equipment	15
Climate change	25
Shortage of seeds	10
Shortage of manure	5
Old age	5

The majority of the respondents pointed out that they have challenges with shortage of labor(40%).Other farmers indicated shortage of farming equipment (15%), shortage of seeds (10%), climate change (25%), shortage of manure(5%) and old age (5%) as challenges to practicing conservation farming.

The major challenge affecting farmers under conservation farming is shortage of labor especially when weeding. The respondents pointed out that weeding is labor intensive because they are required to weed at least three times during the farming season. They also stated that agricultural extension officers sometimes visit them to monitor their farming activities so in that case they are required to maintain weeds. Some farmers pointed out that they have adopted the collective farming strategy or concept “Amalima”, their local term meaning working in partnership. This

has enables them to address the problem of labour shortages within families, especially during digging of basins and during weeding.

On focus group discussions, farmers stated that agricultural inputs are also a challenge in their quest for practicing conservation farming. The farmers high lightened that they lack seeds for farming as sometimes due to drought, they eat seeds they would have reserved for farming. They also outlined that they have shortage of hoes for weeding. Since conservation farming requires farmers to weed time and again, during group or collective farming some farmers will not be having hoes. Mulching has always been a challenge to farmers. They pointed out that it is their usual practice that immediately after harvest they open farms so that their cattle can graze because there will be food shortages in grazing lands. Thus mulching and manure have been a challenge to farmers.

Climate change has also been another challenge facing farmers under conservation farming. Though the principles of conservation farming like digging of basins and mulching are aimed at harnessing negative threats of climate change, farmers postulated that sometimes they just receive very little rainfall that cannot be collected in basins and hence this leads to crop failure and very low production. Lastly, old age has also undermined conservation farming. Since the target population comprises of old aged people, some respondents from interviews said that though conservation farming is a good strategy, they are now old and unable to practice. Some of the respondents pointed out that they practice conservation farming in a small space of land and then engage in conventional farming in the remaining bigger piece of the field.

4.9 CHALLENGES FACED IN DATA COLLECTION

There are several challenges which were faced by the researcher during data collection. Firstly, farmers do not have records concerning the amount of yields they had been harvesting as from year 2008 when conservation farming was introduced in the area. Thus the researcher relied on the information which the farmers had in mind. Secondly, some farmers at first were refusing to be interviewed pointing out that they are not educated and thus they won't be able to answer the interview questions. To address this, the researcher managed to use the local language and to explain the purpose of the study there by convincing the farmers to participate. Lastly, most of the farmers wanted to provide ID numbers thinking that the researcher was organizing a donor for the community. To address this, the objectives of the research were clearly explained to the farmers.

4.10 CHAPTER SUMMARY

The introduction of conservation farming amongst farmers is a panacea to food security and climate change problem as well. The role of conservation farming on food security amongst small holder farmers in Gwanda district is discussed in this chapter. Although conservation farming has been said to have different challenges, the respondents pointed out that the practice positively contribute to high yields. Number of meals per day and asset ownership was used to measure food security within households.

CHAPTER 5 RECOMMENDATIONS AND CONCLUSIONS

5.0 INTRODUCTION

The chapter gives the conclusion of this research. On the other hand, it also offers recommendations based on the empirical results of the study. Recommendations are for interventions in future and research related to conservation farming as a strategy for food security or any kind of research related to these aspects. Lastly, the chapter presents challenges that were faced during data collection.

5.1 RECOMMENDATIONS

- ❖ To increase skills of farmers in conservation farming, annual workshops should be conducted by Agritex officers or courses on conservation farming should be offered. Farmers should receive better trainings in relation to different principles of conservation farming. Workshops to do with conservation farming will assist farmers especially those who do not have draught power and those who live in drought prone areas to effectively farm and make food available and accessible within their households. It will also assist farmers who practice conventional farming to realize benefits of conservation farming which amongst other things include, addressing the negative impacts of climate change.

- ❖ For conservation farming to be a more successful strategy for addressing food insecurity, farmers should address the problem of labour intensity by making use of collective farming strategy or ‘Amalima’ so that farmers can practice it in a large part of their field.

- ❖ Ministry of Agriculture together with NGOs like Agro Germany Action and CARE should encourage farmers to adopt conservation farming looking at how the strategy has impacted in Gwanda District. This might ensure sustainable agricultural production and might address negative effects of climate change on agricultural production worldwide
- ❖ Monitoring and evaluation of conservation farming adopters during the farming seasons should be conducted rather than waiting for researchers to highlight performances of such farming which can take long before challenges are addressed
- ❖ The government should ensure that farmers easily access agricultural inputs like seeds and hoes for them to effectively engage in farming in a way to ensure sustainable farming since many respondents pointed out that they lack farming inputs
- ❖ Farmers in Gwanda District should increase the space where they practice conservation farming for them to realize sustainable agricultural production because some of them pointed out that they practice it in a small piece of land. Since climate change has led to the decline in agricultural production, farmers should increase space for conservation farming in their fields so they can realize high outputs and get enough yields for sale. This will enable them to earn more income thereby improving food security through accessing other types of foods they do not produce in farming.

5.2 CONCLUSION

The effectiveness of conservation farming as a strategy for ensuring food security in Gwanda district was the research topic. Chapter 1 of this study delivered the background of the study, the

conceptual framework, statement of the problem which highlighted the reasons for conducting the research and the gap that the research sought to cover, research objectives and questions which were the guidelines for the research, delimitations of the study which gave the scope of the research, limitations of the study and the significance of the study stating how the research is going to benefit different stake holders. Therefore, the first chapter gave an overview of the research through these components.

The objectives that guided the research are: to establish the impact of climate change on agricultural production and food security in Gwanda District; to examine the effectiveness of conservation farming as an adaptation method in the face of climate change; to examine the extent to which conservation farming is ensuring food security in Gwanda and to examine challenges and offer possible recommendations to ensure that conservation farming performs better as an approach to increase food security. Climate change has been a major problem affecting agriculture which is the major contributor to people's livelihoods. Conservation farming has however become a prominent feature in agricultural production as it seeks to address the effects of climate change on food security. Due to the problem of climate change, a research was carried out in Gwanda District ward 19, in a way to examine whether the practice of conservation farming is an effective strategy to mitigate climate change impacts on food security. As such, the researcher found out that the research speaks to various stakeholders like AGRITEX, NGOs, local communities, chiefs and village heads, other researchers and the students.

The second chapter of the research focused on the literature review. The literature review of this study was divided into different stages of understanding. The chapter began with giving the definition of terms which are: climate change, food security and conservation farming. Secondly the chapter discussed the sustainability approach under the theoretical framework. The chapter then proceeded to look at agriculture in Zimbabwe and under this category; natural regions and their characteristics are discussed. Also, the chapter proceeded to look at agriculture and food security in this case the negative impacts of climate change on agriculture and on hindering food security is discussed. Role of conservation farming in addressing climate change is also discussed. Lastly, the chapter provided empirical case studies where conservation farming has been practiced.

The third chapter focused on the research methodology. The researcher used a triangulation methodology which made use of both qualitative and quantitative research designs as a way of engaging with stakeholders in Gwanda District. Of the targeted population, the researcher established a sample size of 20 respondents. Sampling techniques were used in a way to get a sample size and to gather data against time. Questionnaires, interviews and focus group discussions were used as data collection instruments so as to gather data from the respondents. The research also made use of secondary data collection instruments to provide data for the research.

Finally, the researcher went to Gwanda for data collection. The researcher managed to collect data from 20 respondents. The findings from the gathered data are presented through the use of tables, graphs, charts and narratives. Some of the findings include the fact that in Gwanda district, conservation farming is an effective strategy for ensuring food security, households under conservation farming harvest more compared to those under conventional farming, the

district is prone to climate change and thus conservation farming is a viable for curbing the negative effects including drought and high temperatures. However, the researcher noticed that many farmers in the area are adopting the practice because of the problem of climate change which undermines food security within their households. It has been observed that conservation farming promotes food availability, accessibility, utilization and stability. Hence, the researcher has drawn a conclusion that practice of conservation farming is a viable strategy for ensuring food security in Zimbabwe.

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APPENDIX I

QUESTIONNAIRE

INTRODUCTION

Good day Sir/Madam

My name is Amie Dube, a student at Midlands State University currently studying Development Studies Honours Degree. In partial fulfillment of this degree, i am carrying out a research on “*the effectiveness of conservation farming as a strategy for ensuring food security in Zimbabwe*”. I respect and appreciate your valuable time but could you please help in answering the questions to follow. Your cooperation is greatly appreciated and your responses will be treated with high levels of confidentiality.

SECTION A: DEMOGRAPHIC INFORMATION.

Question 1: What is your gender? *Please tick (☐) appropriate answer.*

Male	<input type="checkbox"/>
Female	<input type="checkbox"/>

Question 2: What is your current status? *Please tick (☐) appropriate answer.*

School Learner	<input type="checkbox"/>
Unemployed	<input type="checkbox"/>
Employed	<input type="checkbox"/>
Self employed	<input type="checkbox"/>

Question 3: What is your age range? *Please choose the age of your last birthday.*

Please tick (☐) appropriate answer.

18-35	<input type="checkbox"/>
36-55	<input type="checkbox"/>

56+	
-----	--

Question 4: What is your highest educational qualification? *Please tick (☐) appropriate answer.*

Grade 7	
Standard 3-6	
O level	
A Level	
Diploma	
Degree (Bachelors and Honours)	
Higher degree (Masters and above)	

Question 5: What is the size of the household and assets?

LIVESTOCK AND ASSET OWNERSHIP

LIVESTOCK CLASS	CURRENT NUMBERS
Cows	
Goats	
Sheep	
Donkeys	
Chickens	
Plough	
Cultivator	
Scotch curt	
Hoe	

SECTION B

EFFECTIVENESS OF CONSERVATION FARMING IN FOOD SECURITY

Question 6: Are you aware of conservation farming in your area? *Please tick (☐) appropriate answer.*

Yes	
No	

(If no, please terminate the interview)

b) How did you get to know about conservation farming? *Please tick (☐) appropriate answer.*

At school	
Community gatherings	
Non-governmental organisations	
News papers	
Others(please specify)	

Question 7: Have you received any training in initiating and practicing conservation farming? *Please tick (☐) appropriate answer.*

Yes	
No	

a) If your answer is Yes please state the institution which provided the training and name the type of training you received

.....

 b) If your answer is No, please state what can be done to ensure that farmers get to know about conservation farming.....

SECTION C: TO EXAMINE THE EXTENT TO WHICH CONSERVATION FARMING IS ENSURING FOOD SECURITY IN GWANDA

Question 9: Are you aware of the term food security? *Please tick (☐) appropriate answer.*

Yes	
No	

- a) If no please terminate the questionnaire
- b) If yes , state your definition or your understanding of food security

.....

Question 8: Is your household food secure? *Please tick (☐) appropriate answer.*

Yes	
No	

- a) If Yes, please move to the next question
- b)If No, state the reasons for food insecurity within your household.....

Question 9: Do you think conservation farming is ensuring food security in Gwanda? *Please tick (□) appropriate answer.*

Yes	
No	

a) If your answer is Yes please state indicators of food security and how they were attained

.....

b) If your answer is No, please state what can be done to enhance its effect.....

.....

Question 10: Has conservation farming been effective as an adaptation method in the face of climate change? *Please tick (□) appropriate answer.*

Yes	
No	

a) If your answer is Yes then state in what ways it has been effective.....

.....

b) If your answer is No, what can be done to ensure that conservation farming can become an adaptation method to farmers

.....

SECTION D: CHALLENGES FACED BY FARMERS PRACTICING CONSERATION FARMING IN ENSURING FOOD SECURITY

Question 11 Are there any challenges you face in practicing conservation farming? *Please tick* () *appropriate answer.*

Yes	
No	

a) If your answer is Yes please state the major challenges you have encountered

.....
.....
.....
.....

b) If your answer is No, please continue to the next question

Any additional comments you would like to make?

.....

End of Questionnaire Thank you for your co-operation

APPENDIX II

INTERVIEW QUESTIONS

1. What do you understand by the term food security?
2. What qualifies as food insecurity?
3. How can you tell a household is food insecure?
4. What methods are you using to promote food security in Gwanda?
5. What do you understand by conservation farming?
6. When did you start practicing conservation farming in your area?
7. Is the climate in Gwanda still conducive for agricultural production?
8. Why is conservation farming promoted in drought prone areas like Gwanda?
9. To what extent can conservation farming promote food security?
10. Is Gwanda community adopting conservation farming practice?
11. How are households in Gwanda responding to a shift from conventional to conservation method?
12. What changes have you noticed from shifting from conventional farming to conservation farming?
13. What challenges are you facing in your quest of promoting conservation farming in Gwanda rural?
14. What do you think should be done to ensure that conservation farming becomes a very effective strategy for promoting food security in Gwanda District?

APPENDIX III

NON-ADOPTERS OF CONSERVATION FARMING

- 1.Are you aware of conservation farming?
- 2.What do you understand by conservation farming?
- 3.What are the reasons for not adopting conservation farming?
- 4.What do you understand by food security?
- 5.How many meals do you take per day?
- 6.Do you produce enough to sustain your household?
- 7.Are you aware of climate change in your area?
- 8.How is food security in Gwanda District?
9. How is the state of food security in Gwanda District?
- 10.How do you earn a living?
11. Have you ever received food handouts from the government of non-governmental organizations?
- 12.Do you think conservation farming is a good strategy for promoting food security in Gwanda District?

