An Assessment of the role of home/backyard gardens (micro gardens) in alleviating household food insecurity and improving dietary diversity in Tsholotsho district Zimbabwe

A dissertation submitted in partial fulfilment of the requirements for the master of science degree in food security and sustainable agriculture

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DECLARATION

I hereby declare that the research project entitled AN **ASSESSMENT OF THE ROLE OF HOME/BACKYARD GARDENS (MICRO GARDENS) IN ALLEVIATING HOUSEHOLD FOOD INSECURITY AND IMPROVING DIETARY DIVERSITY IN TSHOLOTSHO DISTRICT ZIMBABWE** submitted to Bindura University of Science Education, Department of Agricultural Economics, Education and Extension is a record of an original work done by me under the guidance and supervision of **Dr. N. Mafuse** and this work is submitted in partial fulfilment of the requirements for the award of a Master of Science Degree in Food Security and Sustainable Agriculture. The results embodied in this thesis have not been submitted to any University or Institute for the award of any degree of diploma.

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DEDICATION

To the honour of my beloved late parents Robert Tauya and Lynette Masuku Tauya, for the love of home gardening you shared and impacted on me, l am grateful. May your dearest souls rest in eternal peace.

To those in the community development work especially striving for food security, keep going and inspiring the community. To sustainable production of food and zero hunger.

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ABSTRACT

In most developing countries food security has always been a challenge. The most affected are those that are in drought-stricken areas where there is low rainfall. The case has been made worse by the deteriorating economic and social conditions in which unemployment has been making the situation of food security and dietary diversity a nightmare, particularly in the rural areas. The main objective of the study was to assess the role of home/backyard gardens (micro gardens) in alleviating household food insecurity and improving dietary diversity in Tsholotsho district in Zimbabwe. The research adopted a multi-stakeholder participatory approach to gather both quantitative and qualitative data, primary and secondary data from randomly selected 87 households within the district. Data was collected using questionnaires and interviews were also conducted with key informant participants. In determining the contribution of household gardens, the researcher made a comparison of the means scores of Household Food Insecurity Access Scale (HFIAS) and Household Dietary Diversity (HDD) of garden and non-garden owners. The results indicated that there was a significant mean difference between the two measures indicating that households with home/backyard gardens were more food secure and had a wider range of food choices than non-garden owners. In determining factors affecting garden establishment, a binary logistic regression model was employed. In this regard, farm size, household size and employment status were found to be statistically significant in influencing garden establishment. The study therefore recommends that households establish backyard gardens in order to be more food secure and generate income. The government and other donors or organisations should intervene and assist households to deal with challenges faced in gardening.

Keywords: Household, Food security, Dietary diversity, Backyard Garden, Socio-economic

LIST OF ACRONYMS AND ABBREVIATIONS

AGRITEX	Agricultural Research and Extension Services.
ANOVA	Analysis of Variance.
CTDO	Community Technology Development
FANTA	Food and Nutrition Technical Assistance Project
FAO	Food and Agriculture Organisation
FNC	Food and Nutrition Council
FNSP	Food and Nutrition Security Policy
HDD	Household Dietary Diversity
HDDS	Household Dietary Diversity Score
HHS	Household Hunger Score
HFIAS	Household Food Insecurity Access Scale
KII	Key Informant Interviews
MAD	Minimum Acceptable Diet
NGO	Non-Governmental Organisation
NNS	National Nutrition Survey
RLA	Rural Livelihoods Assessment
RA	Research Assistant.
SDG	Sustainable Development Goals
SPSS	Statistical Package for Social Scientists
WHO	World Health Organisation
ZimVAC	Zimbabwe Vulnerability Assessment Committee

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CHAPTER 1

1.0 Introduction

Climate change in the Sub-Saharan African countries has found it increasingly difficult to produce enough food that matches the with ever growing population due to factors such as droughts and climate variability. One of the key threats of climate change is the potential that it will undermine humanity's ability to feed itself as it is a major fuel to food insecurity. According to Von Braun, (2008) since 2006, consumers in Southern African countries have faced the detrimental consequences of the most recent rise in national and global food prices, which peaked in 2008. At the home and personal scale, massive food shortage issues exist (Altman et al., 2009).

To address the issue of food production and security, multiple techniques are required. The relevant social, political, and economic conditions, as well as the resources available to plan and implement the intervention, determine whether techniques are possible. Home gardens are a tried-and-true local technique that community groups with constrained capacity and support mechanisms have extensively accepted and adopted in a variety of settings. Home gardens are clearly a component of many poor nations' agriculture and livelihoods, and they are commonly utilized as a cure for hunger, malnutrition, enhancing livelihoods, and reducing micronutrient deficiencies, according to Kumar et al, (2015). FAO (2010) acknowledged that home gardens were an essential additional source for ensuring food security, as well as livelihoods, around the world. The oldest and most durable form of farming is food production on tiny plots next to human settlements.

Home gardens have been linked to improved food availability and nutritional richness in studies conducted in a variety of contexts (Galhena at el, 2013). Home gardening can improve food security status by offering access to a variety of nutritious foods, greater buying power from food contributions and money from garden product sales, and fall-back food supply in times when producing food through farming is not viable (Iannoti et al, 2009). Nevertheless, the precise details of how house gardens ameliorate food insecurity and enhance diet quality are both experimentally and conceptually understudied, and are likely to vary between locations. Placement of home gardens within the larger diet and nutrition system ecosystems that determine household diets and food security is crucial. This entails looking into the relationship between socioeconomic characteristics and home gardens, as well as whether

home gardens have an impact on nutritional and food supply in communities. Moreover, despite agriculture's prevalence, rural communities in many emerging nations suffer from poor dietary consequences and lag behind in social and economic indicators. (International Journal of Agricultural Extension and Rural Development Studies, Volume 16, Issue 5, May 2016).
Food and nutrition insecurity continue to be a challenge in these rural conditions, despite efforts to increase availability and access to different and nutritious foods in order to achieve a balanced diet. The increased use of home gardens for indigenous vegetable crops and pulses could increase the availability and accessibility of healthy, domestically options available. Kumar et al, (2015) postulates that food insecurity, malnutrition, and dietary diversity in poor rural regions can be addressed by the promotion of household food gardens and the use of nutrient-dense crops with low water consumption, that is, high nutritional water productivity.

The Project aim

The goal of this study is to look into the role of home gardens in reducing family food insecurity (food access and availability) and increasing dietary diversity among rural households in Tsholotsho, a region plagued by droughts, environmental issues, food insecurity, rural poverty and malnutrition

1.1 Background of study

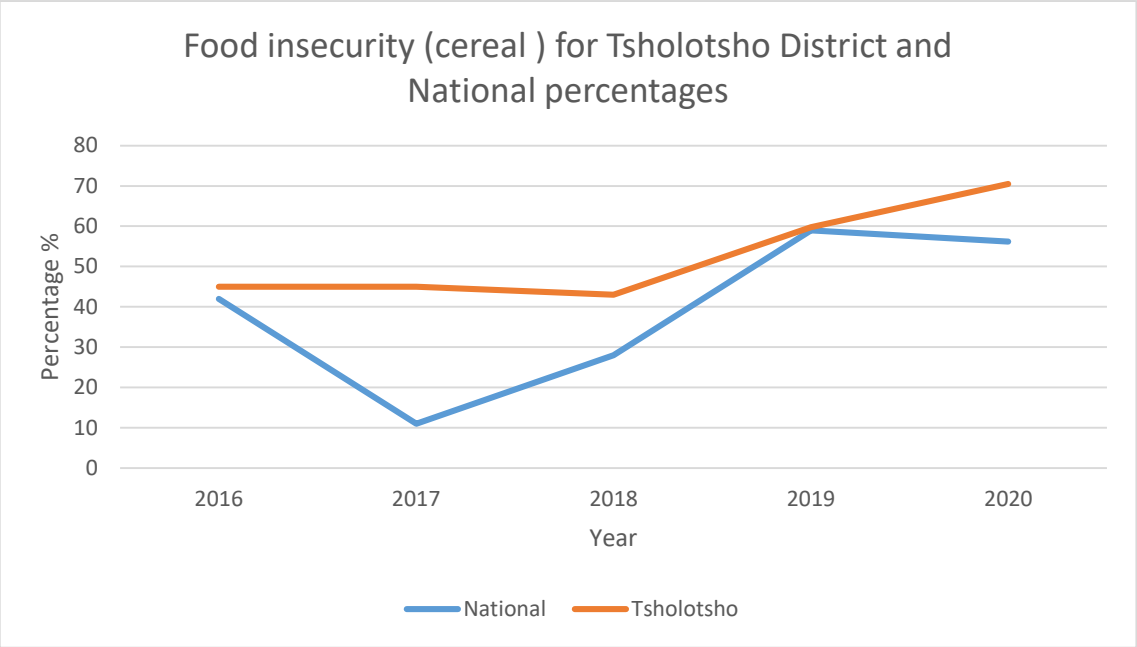
Agriculture is the primary source of income for about 80% of the world's poorest people (FAO, 2005). Rural areas are home to the majority of these resource-poor populations. Their livelihoods are mostly based on livestock and crop farming methods (Homann et al., 2007). Malnutrition and poor income levels are two of these people's biggest problems (Peacock, 2005). As a result of fast population expansion, climate change, and low agricultural productivity, the disparity between food production and consumption has widened (FAO, 2010).

Food security

According to the ZIMVAC evaluation (ZIMVAC, 2020), 70 percent of residents in rural Tsholotsho are food insecure, with limited access to food during the acute hunger season. Drought, poverty, climate changes, and a deteriorating business climate have all contributed to the highest occurrence of food insecurity in the last decade. Food safety exists if all people have access to food in a healthy and active way at any time, physical, social or economic, that is safe and consumed in sufficient quantities and quality to meet their dietary needs and food preferences (Food and Nutrition Security Policy, 2012). In order to measurement the

household's prospective access to enough food to establish its food security status, various livelihood options available to the household are considered first. The graph below depicts the current state of food insecurity in Tsholotsho District and the country as a whole.

Figure 1.1: Food insecurity status (cereal) for Tsholotsho and National



(ZIMVAC 2016-2020, RLA)

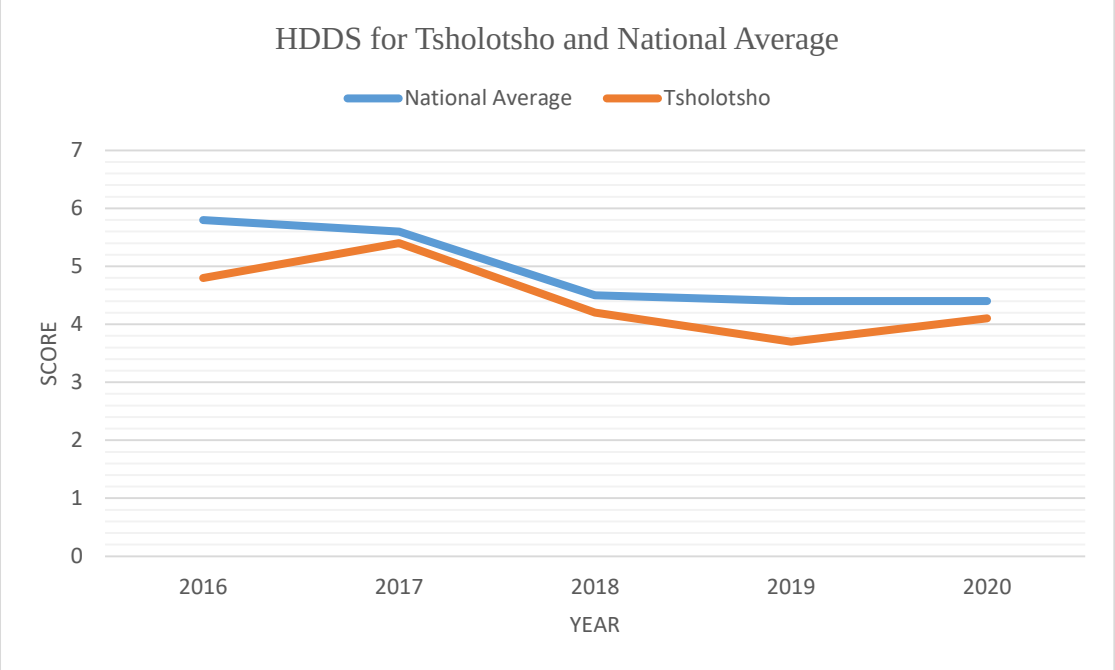
Dietary diversity

The indicator of dietary diversity is the number of food groups consumed during a given time period. The quality of the diet is estimated. The Household Dietary Diversity Score (HDDS) displays the proportion of household food groups in 12 food groups and serves as a food access indicator. Even those who consume a non-diversified, unbalanced and unhealthy diet can be considered as food insecure in households that meet the caloric requirements. (Sijot, 2001)

Dietary quality remains poor in many developing countries and food consumption is dominated by cheap, starchy foods and there is limited consumption of energy rich nutrient-dense foods (fruits, vegetables and animal protein) (Kumar *et al.*, 2015). Increasingly, there is a growing recognition of the need to also account for dietary diversity, by taking into consideration the number of different food groups consumed in a household over a given reference period. Previous research shows that diversity indices reflect overall dietary quality, and is positively associated with measures of food security (FAO, 2010). It is in this context that access to home gardens can play a critical role in improving household food security and dietary diversity.

However, the diversity of livelihood and agro-environmental contexts among communities across different contexts means that the role of home gardens varies across settings. The graph below shows the trends in HDDS in Tsholotsho District and National

Figure 1.2: Household Dietary Diversity Score for Tsholotsho and National



(ZIMVAC 2016-2020, RLA)

COVID-19 had a significant impact on Tsholotsho rural households, resulting in reduced incomes, food scarcity, and inability to access essential goods. In essence, their income generating activities were harmed, resulting in restricted discretionary income and, as a result, a threat to their food security. As a result, the government's decision to save lives by executing the lockdown comes at a cost to the economy, raising the government's burden of duty, particularly in terms of people's food security. Reduced income sources (51.5%), reduced food sources (50.1%), and failure to get basic necessities (21%) are the most commonly cited effects of COVID-19 on families.

1.2 Statement of the Problem

Tsholotsho rural district is associated with poor sandy soils, drought conditions, floods, lack of pastures and higher incidence of HIV, ensuring a decent standard of living for all households within available physical, resource, and time restriction is the main concern of all families. Due to the risky circumstances, home gardens can be considered an affordable way of producing nutritious vegetation and fruit that is adapted to the local climate and tradition, by providing a

better opportunity for living by offering a food buffering resource in the case of reduced incomes, reducing the risks facing the Tsholotsho residents (Pritchard at el, 2017). Tsholotsho Districts has shown a different picture given the investments and efforts that has been put towards supporting establishment and existence of home gardens by the Government and Non-Governmental Organisations. Tsholotsho district has been recording the lowest minimum acceptable diet, dietary diversity, high malnutrition rates and a large populace depended on food aid compared to other districts in Matabeleland north province in the years as shown by the ZimVAC surveys. The study seeks to identify the significance of home gardens in enhancing food availability, access and improving the dietary diversity of households in Tsholotsho district given the scarcity of food, poor dietary diversity and poor nutrition levels experienced.

1.3 Objectives of the study

1.3.1 Main objective

To determine the contribution of home gardens to household food security and dietary diversity in Tsholotsho District.

1.3.2 Specific objectives

- To identify the socio-economic characteristics of home garden owners and non-garden owners
- To compare food access and availability of the garden owners and non-garden owners in Tsholotsho
- To compare the Household Dietary Diversity of the garden owners and non-garden owners in Tsholotsho
- To identify the factors affecting garden establishment in Tsholotsho

1.4 Research Questions

1). Is there any difference in food access and availability between garden owners and non-garden owners?

2). Is there any difference in Household Dietary Diversity between garden owners and non-garden owners?

3). What are the major factors affecting household garden establishment in Tsholotsho?

Research Questions should follow the order of the objectives

1.5 Hypotheses (optional)

H0 (Null hypothesis): Availability and plant diversity in home gardens contribute in alleviating household food access, availability and improving dietary diversity in Tsholotsho.

H1 (Alternative hypothesis): Availability and plant diversity in home gardens does not contribute in enhancing household food access, availability and improving nutrition quality in Tsholotsho

1.6 Justification of the Study

This research aims to explore the role of home gardens on alleviating household food security (food access and availability) and improving dietary diversity in rural households Tsholotsho district. Tsholotsho district has seen many organisations to mention but a few that include AGRITEX, Community Technology Development Organisation, Amalima support by USAID and PLAN International supporting the establishment of home gardens, supporting through suppling varied seeds and investment of knowledge through the use of Agritex extension workers and Nutrition ward coordinators. Despite all the work that has been invested and is continuing to be invested in home garden, Tsholotsho is still faced with low dietary diversity, low minimum acceptable diet an indication to food insecurity. Households in Tsholotsho strongly rely on food aid and diet solemnly based on starches.

Previous Food and Nutrition Security surveys and assessments have adequately described the problem from a quantitative perspective (availability of the home gardens), but have not been able to answer the how aspects (the influence of these garden on house hold food availability, access and dietary diversity). The study will thus employ mixed methods to understand the various contributions made by home gardens on household food security and dietary diversity in Tsholotsho.

It is the researcher's aim that while the study may be specific to a particular district, the results will give an insight into the roles of home gardens on food security and dietary diversity in Zimbabwe and stimulate further research of this nature. Understanding the role of home gardens on food and nutrition security will also inform food and nutrition security programming and contribute to the Government and National Food and Nutrition Council (FNC) policy recommendation on designing strategies in achieving the National Food and Nutrition Council Strategy 2019-2021 strategic objectives towards addressing prevailing food and nutrition challenges in Zimbabwe.

1.7 Delimitations of Study

Due to the complex nature of the food safety measure, it is a challenge to achieve all four categories at the same time (availability, access, utilisation and stability). In solving the problem of food security complexity, scientists and food security agencies have suggested using more than one valid indicator to support each other when measuring food security (FAO, 2016). During the Covid 19 pandemic period, the study data are collected when the majority of respondents meet the Covid 19 limitations and directives. In order to solve this, during the interviews the researcher will ensure rigorous compliance with Covid 19 restrictions.

1.8 Thesis Outline

Six chapters are in the thesis. The first chapter introduced the study. Chapter two is devoted in the first chapter to the literature review. The third chapter shall cover the presentation of the methodology of the research and the description of the field of studies. The results are presented and discussed respectively in Chapter 4,5 and 6. Chapter seven is the last chapter to sum up and conclude the results and to reflect certain recommendations and policy implications of the study.

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CHAPTER 2
LITERATURE REVIEW

2.1.0 Introduction

The United Nations Economic and Human Rights Agency (UNDESA, (2019) emphasize that medium-variant projections indicate that the world population could grow to about 8,5 billion by 2030, 9,7 billion by 2050. In order to meet the growing food demand for the growing population, food production and buffer stocks must be steadily increased. Sustainable Development Goal 2 aims to achieve zero hunger, in accordance with the Sustainable Development Goals (SDGs). This is one of the 17 Sustainable Development Goals set by the UN in 2015 (St. Jackson, 2017). SDG 2 states that food security should be achieved by 2030 by ending starvation and poor dietary standards. This can be made possible if small-scale food manufacturers, especially women, increase agricultural production and vulnerable developing communities, ensure the sustainable food production systems and improve land and soil qualities gradually; (SDG 2017). SDG 2 emphasizes the interconnections between food security, nutrition, food supply, rural tranformation and sustainable agriculture. Countries worldwide use different counter-strategies to respond to meet demands and prevent food insecurity and hunger to prevail. The interest in strengthening and intensifying local production of food has increased in recent years to alleviate the harmful effects of global food shocks and price fluctuations.

As a result, there is a lot that can be done with home gardens as a way to increase household food and nutrition security. Food security is recognized as a vital aspect in reaching "zero hunger" in the Sustainable Development Goals, and international agricultural strategies have been developed over the last decade with a significant emphasis on ensuring food security in the home. One of the approaches to improve the availability of healthful and nutrient-rich fruit and vegetables at a cheaper cost was to promote home gardens and provide input and knowledge that encourages households to manage household gardening (Dissanayake et al, 2017).

2.1.1 Definition of key terms

a) Food and Nutrition Security Concepts

Food and nutrition security is a natural progression from food security and nutrition security. When the motive was to differentiate between necessary actions at the international, federal, and local levels from actions needed at the community and household level, the term “food and

nutrition security" was more commonly used. "Food and nutrition security" have been used to focus attention on actions needed to mainline nutrition issues at all points throughout the food chain, particularly at the community and household level (Committee on World Food Security, 2012).

b) Food and nutrition security

Food and nutrition security combine two important definitions: food security and nutrition security. "Food security exists when all people at all times have best access to sufficient, safe, and balanced diet to suit their dietary needs and food preferences for an active and healthy life," according to FAO 2011/AGN (2011). The four components of food security have been recognized with this definition: availability, access, stability, and utilisation. It covers both the food and the care components of good nutrition.

Nutrition security

Nutrition security is described as a condition in which all human beings, at all times, eat food of adequate quantity and quality in terms of variety, diversity, nutrient content, and safety to meet their nutrition requirements for an active and healthy life, in conjunction with a sanitary atmosphere, satisfactory general wellbeing, literacy, and care (FAO (2011), /AGN (2011)).

Food and Nutrition Security

According to FAO, (2011) "Food and nutrition security exists when all people at all times have physical, social and economic access to food of sufficient quantity and quality in terms of variety, diversity, nutrient content and safety to meet their dietary needs and food preferences for an active and healthy life, coupled with a sanitary environment, adequate health, education and care."

c) Household Dietary Diversity

The Household Dietary Diversity Score (HDDS) is a significant indication of dietary patterns that demonstrates access to a variety of foods in the residence. HDDS is not intended to be used in determining diet quality at individual level. The HDDS came as an intervention from FANTA(2006) to come up with an easy and simple way to calculate household as well as inter household food security a huge gap which had been present in research (Bilinsky & Swindale, 2006). The HDDS survey consist of 12 questions asking frequency of consumption of a food

group and the recall period is 24 hours to improve accuracy of the data collected.(FANTA, 2006).

d) Household/Home gardens

Although there is no universally accepted definition of a home garden, it is often defined as the gardening of a small patch of land near the family home or within close proximity. Galhena et al, (2013) stipulates that home gardens are a type of mixed farming system that includes medicinal plants, herbs, spices, fruits, crops, vegetables, and livestock that can augment one's diet and revenue. Household or home garden is defined by Musotsi et al., (2009) as an agricultural system that integrates physical, social, and economic purposes on the land surrounding the family home. The region serves as a worksite, as well as a storage and processing facility for farm food. It also serves as a residence and a garbage disposal facility. It is typically a location where the family grows their food, most usually vegetables, ornaments, and herbs, all of which are crucial for meeting the nutritional needs of the home.

2.2 .0 Food security in context

Food security has become one of the world's most pressing concerns. The goal of achieving zero hunger for all is a major concern, since policies and organizations have a duty to assist countries in eliminating hunger, food insecurity, and malnutrition. Food security is one of the most important Sustainable Development Goals that most countries are aiming to achieve.

2.2.1 Food Security Status in Sub Saharan Africa

Malnutrition is a severe problem that billions of African households are dealing with. Global warming is worsening the crisis by increasing weather variability and prolonging mid-season and in-season droughts. According to the World Bank (2007b) drought and other climate extremes are frequently identified as significant elements determining food insecurity; nevertheless, they do not solely stand out as the major determinants of food crises.

According to the Development Association, (2020) the impacts of climate change on the production of food range from direct effects of precipitation caused by drought or overflows, warmer or cooler temperatures on food production, to changes in market, food price and supply chain infrastructure. Hence Sub-Saharan Africa's future growth prospects have been closely associated with climate with low diversification economies and reliance on rain fed agriculture. This explains why malnutrition is still pervasive at the home level in most African countries which is further exacerbated by environmental and financial hardships. Food insecurity is a

major problem for the entire population in underdeveloped countries (FAO, 2011). A variety of factors that have recently come into play and influence food prices have exacerbated the problem of household food insecurity in Sub-Saharan Africa. Food costs would gradually rise over the next decade, aggravating household food insecurity, according to Chijioke et al. (2011), even though there are periodic swings and price decreases. Providing food security to people is now a worldwide concern, especially in developing countries, due to a variety of factors. In developed countries such as Australia, however, the majority of the population benefits from a plentiful national food supply and a well-established social security safety net (NSW Ministry of Health, 2013)

The extreme state of food insecurity has serious consequences for citizens' basic rights, such as access to sufficient food and safe drinking water. Food security is a fundamental human right, according to the United Nations Food and Agriculture Organization (FAO) (2005). Despite international and domestic efforts to eliminate food insecurity and hunger, individuals in most developing countries, particularly in Sub-Saharan Africa, continue to encounter barriers to food access. Rising unemployment and poverty rates, high dependency ratios, inflation, soaring food prices, and the overall disintegration of the formal food system all contribute to household susceptibility to malnutrition. Food insecurity has continued to be driven by a weak and extremely fluctuating macroeconomic climate, as well as a poor agricultural season, in both developed and developing countries.

2.2.3 Food Security Situation in Zimbabwe

El Nio impacted the first phase of the agricultural season (October-December 2018-2020), delaying the start of the season, while the second half was marked by persistent dry spells and floods. These climate shocks, compounded by the Fall Army Worm's effects, resulted in a drastically lower crop production. Between October and December 2019, the food security situation was predicted to worsen, with a projected 3.58 million individuals in need of food assistance (ZimVAC, 2019). The ZimVAC (2020) stated that countryside livelihoods have been impacted by a mix of climate-related shocks, the COVID-19 pandemic, and economic circumstances (particularly the impact of the lockdown restrictions), and lowering disposable income available to households for food and nutrition security.

The number of people in Zimbabwe who are food insecure was expected to soar to 5.5 million. (ZIMVAC, 2019). Zimbabwe used to be food secure since it was a net exporter of agricultural commodities, but the country is now facing food insecurity owing to droughts, inflation, and other difficulties. To make matters worse, it is a land - locked country where rural communities

have had their sources of income, food supplies, and access to essential staples reduced as a result of the Covid epidemic. The extreme levels of food insecurity are primarily caused by a sharp fall in the indigenous cereal crop in 2020, as well as significantly high food costs, which have caused severe food insecurity (ZIMVAC, 2020). As a result, because food is their primary expenditure, poor households are substantially more exposed to price fluctuations (Labadarios et al., 2011).

Fertilizer prices have remained at historically high levels, and this could have a significant impact on future food production level in the country. Due to shortages of essential necessities such as flour, cooking oil, and fuel, households' purchasing power is eroding. The prices of most food commodities on the market are constant in US dollars but extremely high in Zimbabwean dollars. Although the Zimbabwean dollar has been declared the sole legal denomination within the country's borders, border areas, towns, and cities continue to trade in other currencies (ZIMVAC, 2019). Food supply and access have been harmed as a result of market systems.

Food Access and Availability

Food insecurity can develop when people do not have enough food or cannot get it in a socially acceptable manner. Food access is determined by two factors: economic and physical access (FAO, 2013). Physical access is determined by the physical infrastructure that supports access, whereas economic access is dictated by disposable income, food pricing, and social support accessible (Castetbon, 2017; Headey & Ecker, 2012). The availability of funds, the distribution of funds, and the cost of food all influence access (FAO, 2011). Accessibility is determined by available income, income distribution, and food prices (FAO, 2011). For example, food may be produced solely for export markets or priced out of reach of the poor and disadvantaged populations.

Food insecurity occurs when a household's access to food is unpredictable or limited. Many of the places facing food insecurity consistently cite ‘food availability and access as a major, perhaps life-threatening issue (Koch, 2011). The fundamental problem is a lack of household food access caused by a variety of variables, including low income levels and higher-than-average prices. The condition of food insecurity is exacerbated by the loss of purchasing power of significant segments of the population. Moreover, rural residents face a greater danger since they are further disadvantaged by their lack of purchasing power, which makes it harder to obtain vital food items from marketplaces. 2011 (Koch).

2.3 .0 Global Overview of Household gardens

With a projected worldwide population of nearly 9 billion people by 2050, there will be a constant need to boost food production and buffer reserves (Galhena et al., 2013). In this environment, nations around the world, particularly in low - income countries where famine and food shortages are more prevalent, are employing a variety of counter-strategies to fulfil rising demand and avoid food shortages and famine. In order to offset the negative effects of global food shocks and food price volatility, there has been an increasing interest in strengthening and intensifying local food production throughout the years. Government agencies and other development organizations in both developed and developing nations have emphasized the need of strengthening local food production systems as an integrated strategy and a safety net for food security and poverty reduction in recent years. (Galhena et al, 2012). As a result, home gardens are receiving a lot of attention as a way to improve household food security and nutrition. Home gardens are an important aspect of local food production systems for the socio-economic development of resource-poor and subsistence populations. There are developing country agricultural landscapes all around the world that have stood the test of time.

Home gardens have been documented as an essential supplemental source contributing to food and nutritional security as well as livelihoods, according to Galhena et al., (2013). The oldest and most durable form of farming is food production on tiny plots next to human settlements. Home gardens have been an important part of family farming and local food systems for millennia. Gardening at home is a centuries-old and widely practiced activity all around the world. Home gardens according to various literature are characterized as multipurpose, kitchen, backyard, farmyard, compound, or homestead gardens.

Subsistence production systems, which began in small garden plots surrounding the family, can be traced back to the beginnings of modern agriculture. These gardens have stood the test of time and continue to provide the family with food and revenue. Since the early studies of home gardens in the 1930s on mixed gardens in Java, Indonesia, by Dutch scholars Osche and Terra, there have been numerous commitments to the subject synthesizing interpretations, species inventories, functions, structural characteristics, composition, socio-economic, and cultural relevance (Galhena et al., 2013).

Asians have cultivated household gardens throughout antiquity and have continued to do so as a way of preserving their customs. In Asiatic societies, the types of plants grown in these

nourishing family gardens carry cultural implications. Asian societies have a prevalent practice of planting crops in their backyards that comply with religious and traditional practices. Some Hindu civilizations in Asia are completely vegetarian, hence they have nutritious gardens to help them keep their vegetarian lifestyle (Chiwanza et al., 2015).

In North America there are groups which join together and they establish community gardens which have ornamental properties (Ghose & Pettygrove, 2014). Some of the gardens especially in America according to (Musotsi et al., 2009) are mostly for decoration purposes, hence majority use their backyard and front yard gardens for ornamental crops rather than for food crops. These gardens are referred as floral gardens since the majority of these gardens will mostly have flowers and they serve a certain type of business called floriculture. (Chiwanza et al., 2015).

The challenges to home gardens are the same across the globe and there are similarities in their extent. The biggest challenge in North America is that gardening is somehow a prestigious activity and all the gardening endeavours are not available for the poor and the underprivileged citizens who have limited access to the resources (Bongiwa & Obi, 2015). They are some of the affluent citizens who can afford to have these gardens whilst some of the citizens are short of resources and are underprivileged to have these gardens. Shortage of land is one key critical issue in the running of these gardens, with land in Europe considered prime and very expensive. Where there is available land it is either not arable or flat. In many underdeveloped nations, the lack of land has been cited as a major barrier to home gardening. Lack of land is the single most important barrier to home gardening for households that do not have enough and secure access to land. (Dissanayake at el, 2017). Other issues with these gardens include a lack of water, funding to ensure sustainability, crop loss by wild animals, pests and diseases, and a lack of education about basic farming methods to ensure food security. Since there are also family managed and run gardens, financing is a huge blockade to facilitate the smooth running of the gardens (Mitchell & Hanstad, 2004).

2.3.1 Household Gardens in Africa

According to Chauke, (2016) household gardens evolved since prehistoric times where irrigation was also done. These gardens provided foodstuffs for household consumption and the overall goal of these gardens was to provide basic vegetables for household consumption with surplus sold for household income benefits (Muzawazi, 2015). These gardens were also meant to provide food and nutritional security for the household throughout the whole year.

Population pressure as well as food insecurity, unemployment and climate change which are the major issues in the developing world context necessitated the establishment of the backyard gardens as a solution (FAO, 2005).

The World Bank (2007) suggested that home gardening remains a well-accepted activity in the rest of Africa especially among the low and middle income groups to supplement household incomes as well as to boost their household nutrition security. Gardening has a lot of potential in impoverished nations for increasing household food security and reducing micronutrient deficiencies. Home gardens have been linked to improved food security and nutritional diversity in studies conducted in a variety of contexts.

To minimize the effects of persistent droughts and chronic illnesses like HIV/AIDS, low-income people frequently organize themselves to conduct community-level and backyard nutritious gardens (Chiwanza et al., 2015). However, the majority of those who live in the communal areas both participate in community gardens as well as home gardens. African gardeners generally lack support and resources to run these gardens and are greatly impacted by unavailability of water to sustain the gardens all year round (Shisanya & Hendriks, 2011).

In humid places, home gardens remain multi-story and diverse, but they become less complicated and diverse as rainfall decreases and becomes less dependable. Gardening in densely populated areas is easier and smaller, with only a few fruit trees and crops like amaranth and okra. The growing emphasis on cash crops in field agriculture has given the home garden a stronger subsistence function; African gardens cultivate more staple foods like sorghum, cassava, yams, groundnuts, and oil crops than Asian or Latin American gardens. In the Sahel region, where rainfall is unpredictable, compound livestock and tree gardens are extremely significant; research studies have found their yields are far less dangerous than field animals. Gardens are a good way to protect oneself against catastrophic crop failure due to drought or pests. Because of an ancient connection with tree gardens in eastern Africa, they self-produce and require little or no maintenance, giving rise to the name nonculture, which is the polar opposite of dangerous monoculture. (World Food Security Committee, 2012).

2.3.2 Status of Gardening in Zimbabwe

Home gardens or backyard gardens are a common type of food production in many rural and community settings in Zimbabwe. Home gardening can improve household food security by offering access to a variety of nutritious foods, greater purchasing power from food bill savings and money from garden sales revenue, and fall-back food provision during seasonal lean

periods. Home gardening is already fairly widespread in rural communities, especially among the disadvantaged families.

Nonetheless, because the methods are not widespread, they do not provide sufficient items for all-year sustenance. There are three types of home gardening: "conventional," "enhanced," and "modern." Seasonal and with a few traditional fruits and vegetables such as pumpkins, traditional gardens are maintained on fragmented areas. Improved gardens produce more fruit and vegetable kinds than conventional gardens, but only during specific times of the year and on set areas (Uzokwe et al., 2016).

Home gaeening activities have been practiced in the country for a long time. They have recently gotten increased notice and funding from donors and other institutions, especially since the effects of HIV/AIDS and the resulting malnutrition have become more visible. The Food and Agriculture Organization of the United Nations (FAO) published a report in 2005. Chronic droughts, the Covid pandemic, cash shortages that lead to food shortages, and the desire for households to maintain their food security have all been major motivators for establishing household gardens in Zimbabwe. Household gardens were a source of a strong base for food security for disadvantaged people in the districts, according to ZIMVAC (2020). It also is worth noting that these home gardens are crucial in addressing issues like malnutrition, which is caused by frequent food shortages. NGOs, the Zimbabwean authorities, and other business sector players have been at the forefront of horticultural support, pioneering the construction of communal gardens and supporting the growth of individual household gardens (Bornnard, et al., 2010). In light of recurrent crop failures of mainstays and climate change, such as pulses, as well as healthy vegetables and fruits, these actors have pushed community and household gardens activities such as yield-enhancing technology (Makumire, 2011).

The other relevant explanation for the surge in household gardens in Zimbabwe is the provision of marketing opportunities to rural people facilitated by the various NGOs in the environment (Tanyanyiwa & Bakasa, 2018). Mass Establishment of these gardens was done in Tsholotsho recently in a program facilitated by the Government of Zimbabwe and Partners with the farmers getting various seed packs, inputs and capacity building of the participants so that they do not only meet their food needs but go on to generates wealth. The various NGO players then facilitate market linkages for the farmers encouraging health harvest and consumption as well as improvement of household income.

Chazovachii et al., (2013) highlighted that some gardens are also established but with ornamental crops, which is mainly done for income generation as well as decoration purposes. These however play an indirect role in food and nutritional status since the income generated is converted to support household food needs. Some gardens are established with crops that are used for spice making. Herbs which are available in many markets in Zimbabwe are produces in household and community gardens. These gardens play an integral role in their contribution to the health and welfare of the communities as well as their food and nutrition security.

2.4 .0 Measuring Food security impact of household gardens

In terms of measuring the actual food security of the community or household, there is a big gap in the research. Quantitative indicators of household nutrition and food security are sorely needed. According to Shisanya and Hendriks (2017), there is no single, direct measure of food security, and its assessment is based on three interconnected dimensions: food supply, food access, and food consumption. The Food and Nutrition Technical Assistance (FANTA) set up a project to find a scientifically proven, practical, and user-friendly strategy to measuring the implications of food security interventions in the world (FANTA, 2006).

In the interest of this study, Household Dietary Diversity (HDD) and Household Insecurity Access Score (HFIAS), Food access and availability will be used as a measure of food security between those with household gardens and those without household gardens.

Household Dietary Diversity is a metric that assesses the variety of foods consumed over time in a household. A more varied diet is a reflection of caloric and protein adequacy, according to (FANTA, 2006). The better and more nutritious the diet is, the more varied it is. The HDDS questions can be asked at both a community and household level, making it ideal for assessing the HDDS of a community. It is also easier to question respondents about their dietary diversity, making this a highly simple and reliable strategy to use. Because employing a longer period can lead to erroneous data, this food security measurement method can only be utilized for a 24-hour period. However, extension of the recall period is at the discretion of the researcher and the intended use of the data.

To better reflect a quality diet, the number of different food groups consumed is calculated, rather than the number of different foods consumed. Knowing that households consume, for example, an average of four different food groups implies that their diets offer some diversity in both macro- and micronutrients. This is a more meaningful indicator than knowing that

households consume four different foods, which might all be cereals. The following set of 12 food groups is used to calculate the HDDS:

A. Cereals B. Root and tubers C. Vegetables D. Fruits E. Meat, poultry, offal F. Eggs G. Fish and seafood H. Pulses/legumes/nuts I. Milk and milk products J. Oil/fats K. Sugar/honey L. Miscellaneous

The HFIAS is an adaptation of the approach used to estimate the prevalence of food insecurity in the United States (Coates et al., 2007). The technique is premised on the theory that the food insecurity causes predictable responses and answers that can be collected and measured in a survey scale and summarized in a scale identified by a set of questions.

Such questions appear to be fundamental areas of experience in household food insecurity (access) and can be applied to assign families and groups to a continuum that ranges, from food safety to serious food insufficiency. HFIAS can be employed to measure the incidence (for example, for regional targeting) of malnutrition and to detect changes in a population's household food insecurity status over time (e.g., for monitoring and evaluation).

For all cases where the answer was given to the corresponding event the frequency of occurrence questions was coded as 0. A household has a maximum score of 27. Household response to all nine questions concerning frequency-of-occurrence, coded with 3 reply code. The minimum score is 0 (household replied; the greater the score, the household experienced more food insecurity. The lower the score, a household has less food insecurity (Saint-Marie, 2007).

2.5.0 Contribution of Household Gardens

Domestic gardens play a significant role in helping families to survive as well as food and nutrition security. Several authors suggested the gardens' impact without measuring the actual contribution. Due to the direct contribution they make to household food and nutrition security, increased availability, accessibility and use of food products is a major social benefit of home gardening (Galhena et al., 2013). Home gardens are retained in both cities and towns for easy access to fresh plant and animal food sources. Food from homemade gardens substantially contributes continuously to family energy and nutrition needs

Shisanya & Hendriks, (2017) and (Chiwanza et al., 2015) postulate the following benefits of nutritional gardens,

• Psychological well-being by positive aesthetic changes in the environment – gardeners get a sense of pride and achievement which in turn encourages a sense of self-worth and autonomy.

• Food crops autonomous from gardeners save money and make horticulturists feel self-confident from purchasing vegetables or fruit from a commercial source.

• Opportunities arise for impoverished people to unite as active members in community groups and to take on leadership roles in order to achieve collective objectives.

AFSIC (2007) also highlights the following benefits of home gardens

- Fresh nutritious products accessible,
- Encouragement of fitness,
- know-how and expertise in plant cultivation
- skills development, such as joint decision-making
- Gardeners' problem resolution and negotiation

2.5.1 Food and nutritional security contribution

Household food insecurity which is dominant in developing countries results from household failure to meet daily food and nutritional requirement and to produce or to access food in the future (Shisanya & Hendriks, 2017). Although household gardening is practiced, very little information is available on the actual contribution to food and nutritional security. Household nutritional gardens are believed to enhance food and nutritional security through their contribution to increased access to diverse nutritional foods, increased income necessitating purchase of other food stuffs and provision of stock of food from consumption during the lean season (Adekunle, 2013; Algert et al., 2016; Musotsi et al., 2009; Uzokwe et al., 2016).

Scoones, (2015) postulated that gardens have benefited women through specialization and they obtained vegetables, groundnuts and Bambara nuts for the household food consumption. The gardens contribute to food and nutritional security through two ways. The first way is that the gardens improve access and availability of food by providing an immediate source of food which usually is a few meters away from the homestead. These gardens prevent households from facing starvation and hunger since they are source of food. These gardens also provide vegetables which are rich in nutrients providing the household with a nutritious source of food. The other way which the gardens contribute to household and nutritional food security is through its income generating properties. When the households sell the surplus, the income generated can be used to buy other food stuffs they cannot produce, for example cooking oil

and sugar which are also essential for livelihoods. The herbs and the various ornamental crops sometimes produced in the gardens.

Awareness program help promote vegetable gardens in order to ensure food security for disadvantaged individuals and affected households (FAO, 2005). These nutrition gardens helped families and chronically ill individuals to improve nourishment across the year. These gardens offer herbs and vegetables. These are also activities for women where it is easy for them to generate income. Medical plants such as garlic and onion found in those house gardens have the role to play with the treatment, digestion and appetite symptoms related to HIV (Raleting & Obi, 2015). Gardens are for income generation and food producing activities. These are necessary for the contribution to food security and nutrition.

Guti, (2015) cited that home gardens make an important contribution to food and nutrition security as an additional source of food supplying sufficient food to cover the off-season period. In the harshest of environments which usually experiences cold and dryness, vegetables through supplementary irrigation can provide for the household all year round. Trees are also an integrated part of the gardening system and can bear fruits and nuts at different times of the year compared to staple crops which are seasonal. These fruits can actually provide the household with the required nutrition and food intake curbing hunger as well as malnutrition.

Vegetable production and aquaculture also play an important role in the garden system, and they can thrive whether the climate is humid or dry providing household food throughout the year. In home gardens, land and aquatic animals can produce high production and incomes while contributing to waste management and the recycling of water and nutrients, and improve the family's nutrition. Animals are a cost effective food source containing proteins, fats and micronutrients in many countries. In many countries. The cuyes are filled with cooking scraps supplemented with fresh fodder in Latin America; the snails are a source of protein in Asia feeding on fish pond weeds and kitchen scraps.

Home gardens are very important in their role in reducing food losses from foraging animals due to their proximity to home. There is also massive prevention of theft as well as flood risk since they are located in the home settlement area. Most staple meals are normally supplied by one or more fields of a crop in the household farming system (Bongiwa & Obi, 2015). Fields like these are usually far from home, and a family member may have to stay there overnight in a temporary hut to secure it during harvest.

Furthermore, there is a lot of diversification in these home gardens rather than monoculture practiced in the fields were staple foods are grown year in and year out. Plants that repel pests include the onion family (Allium sp.) and the neem tree (Melia azedarach). In contrast to open fields, shade and cover for the home help safeguard the home garden crops. A secure space to process and store crops is also available in the home garden. Preventing losses increases food availability, while safe harvesting and postharvest processing guarantees that the produce is consumed in the most nutritionally beneficial quantities and quality.

2.5.2 Social contribution

Household gardens are very important for their socio-economic production role in the community (Chazovachii et al., 2013). Guti, (2015) divides the benefits into 2 citing social and economic benefits of household gardens. Enhancing dietary diversity in a variety of socioeconomic and political situations, improving family health and human capacity, promoting equality, promoting social justice and equity, and maintaining indigenous knowledge and culture are just a few of the many social benefits of home gardens. Household micro gardens, according to the author, offer social mending properties. Relationship establishment and society cohesion is one of the chief benefits of the gardens. As people meet to sell their produce and also as other customers come on field for the produce, they are exchange of ideas and germination of relationships.

Vegetable horticulture has a variety of personal and cultural advantages and applications. Cities gain from local food production in three ways: 1) it provides socio-educational functions, 2) it contributes to urban employment, and 3) it reduces social inequality (Olajide-Taiwo et al., 2010). Residents in a southern black neighbourhood in the United States identified both concrete (trees, flowers, fruits and vegetables) and intangible (a connection with the earth) benefits from their dooryard gardens, according to Wilhelm (1975). Curiosity, personal fulfilment, social recognition, beauty, and awe at nature's wonders were some of the reasons given by study participants for home gardening. Gardening was done primarily to increase the homeowner's standard of living and to supply food, notwithstanding the intangible benefits. Local plant specialists had an important role in the community, both in terms of gardening success and the transmission of knowledge to newer generations.

Adekunle, (2013) supports the claim citing that household and community garden are not only production sites but are also sites where people of all ages meet family, friends or neighbours to relax and share what is going on in the community. In some areas like Asia, household

gardens do not only confer a productive role but are also important in conservation of tradition because of the crops grown in them (Kearney, 2009). Gardens also offer therapeutic effect to the community and households who emanates from the sense of success in the growth of the gardens as well as watching the beauty of the crops planted and harvesting for food. Nutrition gardens also offer youth with a deviation from other deviant activities such as crime, violence and prostitution, through giving them a form of employment and something to keep them occupied and also instilling in them a sense of purpose (Trendov, 2018).

2.5.3 Economic contribution

By the conclusion of the depression during the end of the Second World War, the subsistence gardens had generated over $2.8 million worth of food, and the food administration had established a nutrition victory garden program, which saw significant benefits (FAO, 2012). Low-income persons and at-risk youth may benefit from entrepreneurial gardens by gaining human capital, specifically job training and education. In an entrepreneurial garden program, home gardens produce tiny but significant financial rewards for program participants.

According to the Food and Agriculture Organization of the United Nations (FAO), (2011) sustainable agriculture development initiatives promote food security, self-sufficiency, and self-reliance (such as income generation from non-farm sources to purchase food) by giving communities more control over agriculture and food systems. Home gardens provide economical, nutritious, and diverse local food that can improve food intake, smooth consumption, and save money by allowing households to buy items they do not produce as well as other home necessities. The production and access to this food depends however on a number of production or procurement rights (FAO, 2005). These include access to natural production resources: water, seeds, and environmental services; a wide array of resources and knowledge of various kinds (including traditional and indigenous knowledge, current best practice, local research and site-specific information).

Rural Enterprise promotion projects in Senegal involving product handling, processing and preservation were developed by garden participants. The extra revenues were used to educate their children. Community group's involvement increased ownership and management of natural resources because of its involvement in collective action which is the best path for sustainable food security by enabling the pooling and sharing of resources to promote efficiencies and equity in the use of scarce resources. Parry et al, (2005) argues that participants in the home garden are more prepared to share resources by working together. For resource-

poor families with limited access to production inputs, the fact that domestic production is less costly and requires less input and investment is extremely important. But it was evaluated that moderately rigorous production of plant and livestock in house gardens could produce as much income per unit area as production on a field basis (Galhena et al 2013). With innovative tools for the efficient use of space, where land constraints exist.

2.6 Constraints in garden sustainability

Although the figures suggest that more people are engaging in home gardening, these figures do not reflect the contribution to home gardening to boost household food security. Different constraints in gardening and in the sustainability of homemade gardens have also been identified. (The Summer of Jesus, 2017)

In many past studies, the single most major barrier to home gardening that prevents impoverished households from benefiting from it is a lack of land. It is not feasible for families without sufficient and safe access to land to practice gardening. Water shortages for gardening and water scarcity have also been mentioned in several research. The most time-consuming and arduous gardening tasks include fetching, transporting, and hand-irrigating home gardens. Animal destruction of crops is a significant concern impacting home gardens. According to the National Horticultural Research Institute of Nigeria's study of the benefits and constraints of home gardening in the Neighbourhood, the primary garden restrictions were animal destruction of crops followed by insect attack damage. (Olajide-Taiwo et al, 2010)

Mitchell and Hanstad (2004) found that interventions that seek to educate families on appropriate ways for enhancing home garden productivity may discover that home gardening families lack enough access to seedlings and other necessary items. Lack of proper and timely knowledge could stymie the growth of home gardens at any level, whereas good advice and technology delivered at the right moment can have a significant impact on the progression of a home garden. Experiment has shown that agricultural extension can greatly help with home garden productivity.

Access to finance or credit, access to water, seeds and planting supplies, insufficient extension and consulting services, access to labour, and access to markets are the key challenges that rural and urban inhabitants confront. Home gardening's societal acceptance is also a significant stumbling block.

According to Masendeke & Shoko, (2013), over 80% of home garden participants face the following obstacles in their production activities: Storage facilities are in scarce supply: Majority of the households and communities lack storage facilities exposing their produce to predators and thieves as well as risking loss of quality due to harsh unfavourable conditions. Lack of markets: In good times, produce and good yield are attained, however there is lack of good marketing structures and channels leading to poor prices as well as deterioration of produce as the farmer waits for market. Lack of government support: government supportive policies and programs leads to a huge strain in the sustainability of the household nutrition gardens. Lack of synergies; there is lack of synergies between partners as well as between sectors with a lot of parallel approaches being implemented in the establishment and the promotion of the gardens.

2.7.0 Theoretical Framework

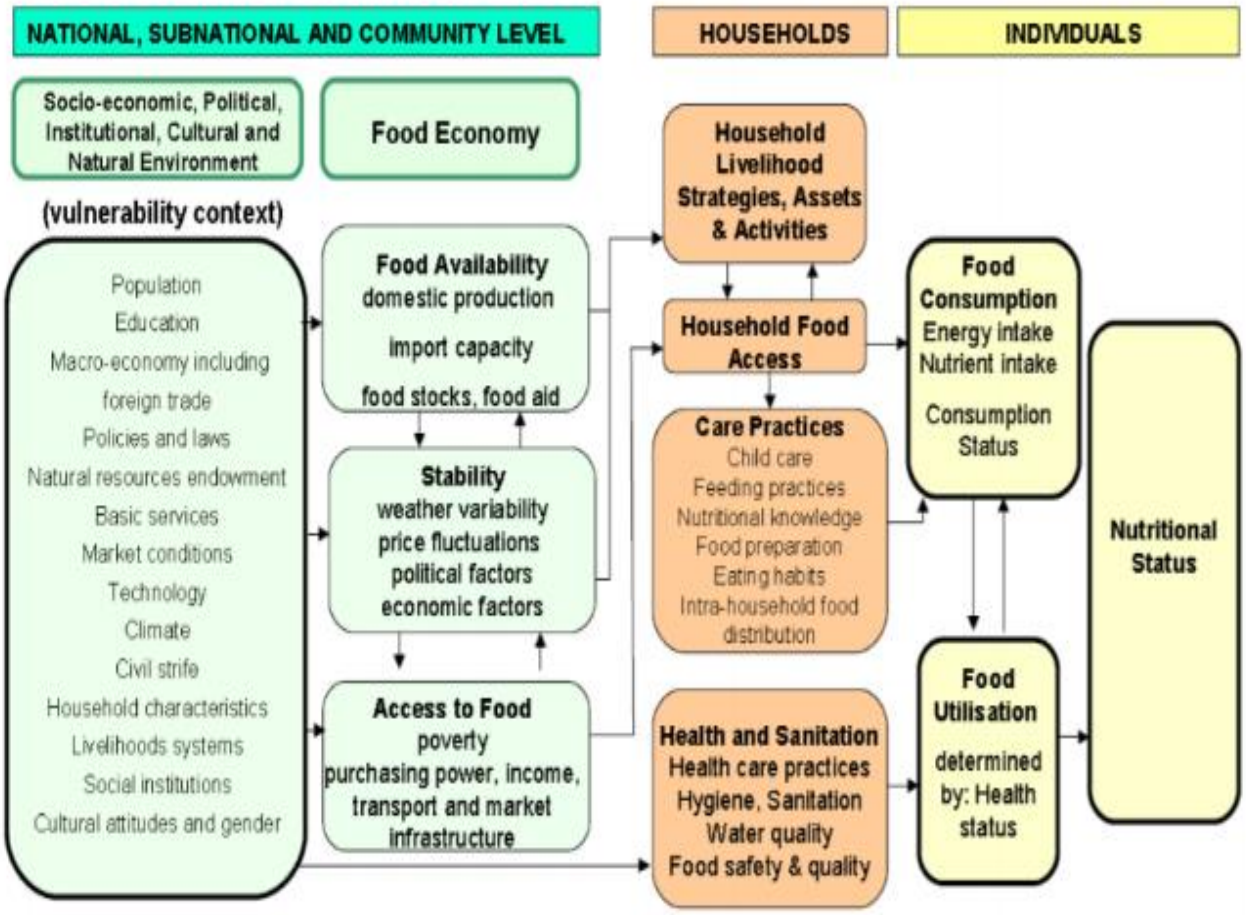
The FAO -FIVIMS (Food Insecurity and Vulnerability Information and Mapping System) is a multi-agency project created to track progress toward the World Food Summit aim of ending hunger and attaining food security. For achieving the desired food and nutrition security scenario, the theory involves a series of inputs, outputs, processes, and an enabling environment. In terms of political, social, economic, and technical context, it encompasses local, national, and international enabling environments (Security, 2009).

Food security, occurs when all individuals and societies can access enough, economic, physical and social resources to meet their dietary needs and food preferences for an active, healthy life at all times (FAO, 1996). The implementation of this notion at the family level, with individuals within households as the center of concern, is known as household food security. The four pillars of food security, namely availability, supply stability, access, and body usage, are fundamental to this notion. While nutrition considerations and components are not necessarily apparent in each pillar, they are critical to the linkages in the connection between national food economies, households, and individual well-being (Security, 2009)

The FIVIMS examines the links between food and agriculture and nutrition, with the goal of addressing the core causes of hunger and malnutrition in the long run. It promotes the recognition that, in order to achieve food and nutrition security, agricultural output, relative supply stability, livelihoods, incomes, and access to food, health, and care must all be addressed at the same time. (NSW Ministry of Health, 2013).

FIVIMS incorporates health and care components, but it goes beyond mother and child health to encompass all population categories, with a particular focus on the food economy. Furthermore, FIVIMS places a strong emphasis on individual consumption. This is an important part of food and nutrition security, and one that the United Nations is well positioned to promote. One of the most critical responsibilities is to ensure that increased food availability, stability, and access at the aggregate level leads to increased energy and nutritional consumption at the community and household levels. The comparative advantage of FIVIMS is that it promotes food and agriculture-based measures to boost access to and consumption of properly diverse diets. Individual eating habits according to Security, (2009) are the last link in a chain that starts with improved national food security and concludes with better household and food nutrition outcomes.

Figure 2:1 Food Insecurity and Vulnerability Information and Mapping System (FIVIMS)

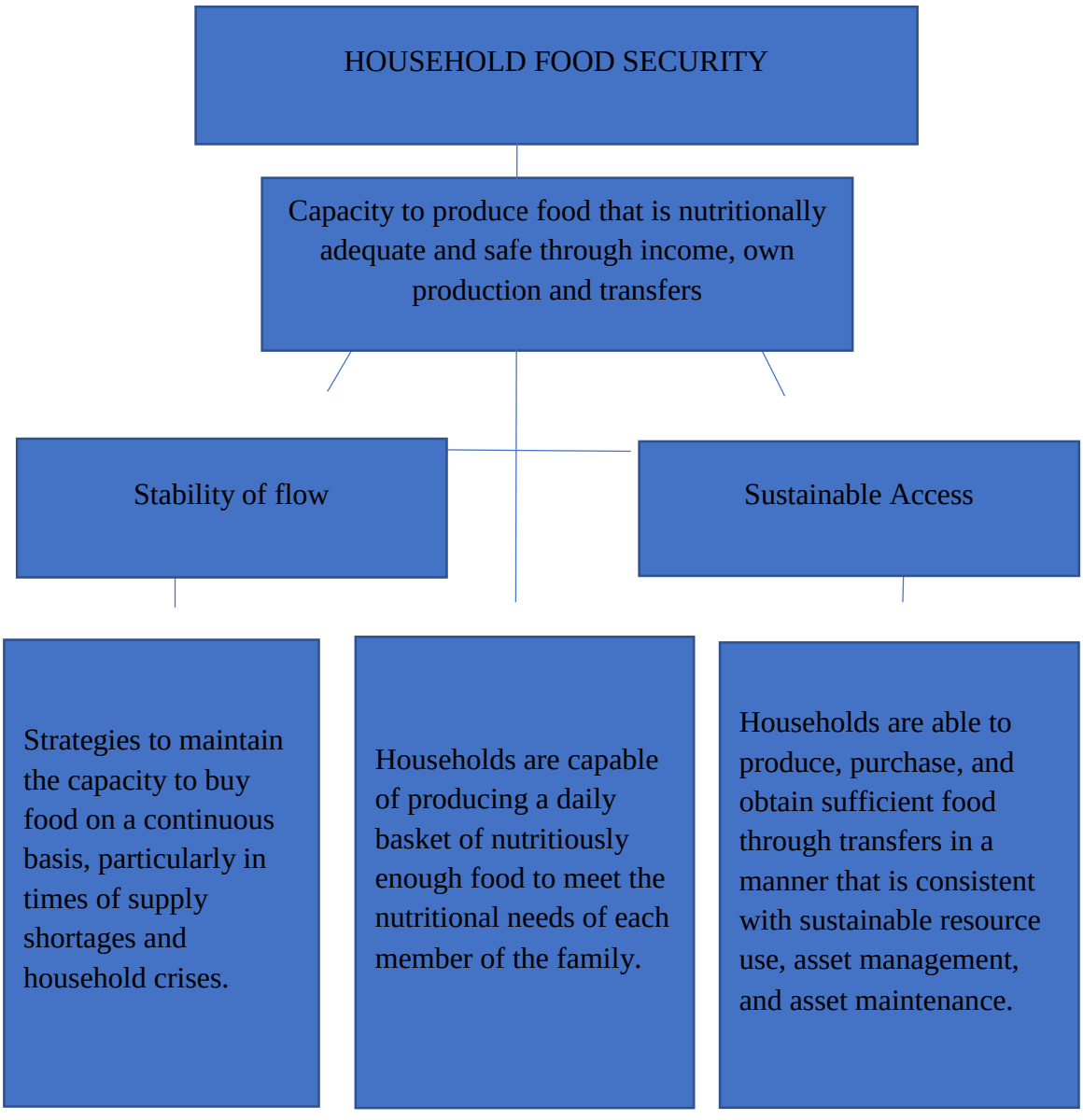


Source: (Security, 2009)

2.7.1 Conceptual Framework

In countries around the world where severe food shortages are common, such as those susceptible to water shortage, heavy rains, and cash shortages, agricultural programs are frequently supplemented by public measures such as employment and income generation programs, as well as direct food transfers, to maintain household food security and nutrition levels for the poorest. In recent years, there has been an increasing motivation in Zimbabwe to improve and deepen local food production in order to reduce the negative impacts of increased food shocks and food price volatility. There has been much attention towards home gardens as a strategy to enhance household food security and nutrition from the government of Zimbabwe through Agritex department, NGOs like CTDO, Sustainable Agriculture technology, World Vision, FAO and other partner consortiums. Participation of the community in achieving household food security has been recognized as a technique for overcoming the food shortages that plague most African nations.

Figure 2.2: The normative dimensions of household food security conceptual frame work



Evaluating home gardens

Despite the fact that home gardens have been extensively discussed, Nair (2006) has claimed in earlier studies that there is a dearth of quantitative data on their advantages. They haven't been investigated since there are not any rigorous, generally applicable techniques, and those that have been established for single-species systems are not appropriate to such complex systems (Nair, 2006). The goal of this study is to evaluate the contributions and role of home gardens in dietary diversification and household food security.

2.8 Summary

The chapter reviews numerous literatures on household gardens and its relationship with food and nutritional security. The chapter resumes with explanation of key terms, food security in context, Global to Zimbabwean situation and then goes into the history of household gardens. It then goes into the explanation of the measurement of food security and the research gap that exists. It then goes into the socio-economic as well as nutritional benefits of household gardens and the various constraints and sustainability issues. The chapter concludes with the theoretical and conceptual framework.

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CHAPTER 3
METHODOLOGY

3.1 Introduction

This chapter explains the research methodology that was employed in this study and provides a framework for it. It includes description of the study region, the sampling technique, how the data were gathered, presented, and analysed, as well as information on the testing of assumptions to validate the results. It also includes ethical considerations as well as the study's limitations.

3.2 Study setting

Tsholotsho district is one of the 7 districts in Matabeleland North province, under ecological region 5. The district is located 120 Km from Bulawayo. It covers an area of about 120 square kilometers and has a population of 115889 according to census 2012 and a total of 22 administrative wards. The district is bordered by Lupane district on the north, Hwange district on the east, Umguza district on the west and Plumtree district to the south. The district is vulnerable to shocks and hazards such as drought and flooding this is mainly due to the lowveld nature of the area. High temperature and low rainfall characterize the district. Despite receiving an average annual rainfall of 350mm, the district experiences flash floods with very minimal harvesting of this water. The livelihood activities in the district are based on inconsistent and erratic rain cultivation of maize, sorghum, pear millet, legumes such as cowpeas, ground nuts, Bambara nuts and mixed animal husbandry. Under horticultural production the most popular grown horticulture crops are various leafy vegetables, tomato and onion, they are both grown in community and backyard nutrition gardens across the district. Food from own production generally lasts for 4 months. According to reports from (ZIMVAC, 2020), household gardens play a pivotal role in substantiating income at household level through sell of produce such as vegetables, as well as providing high nutritious food for the household

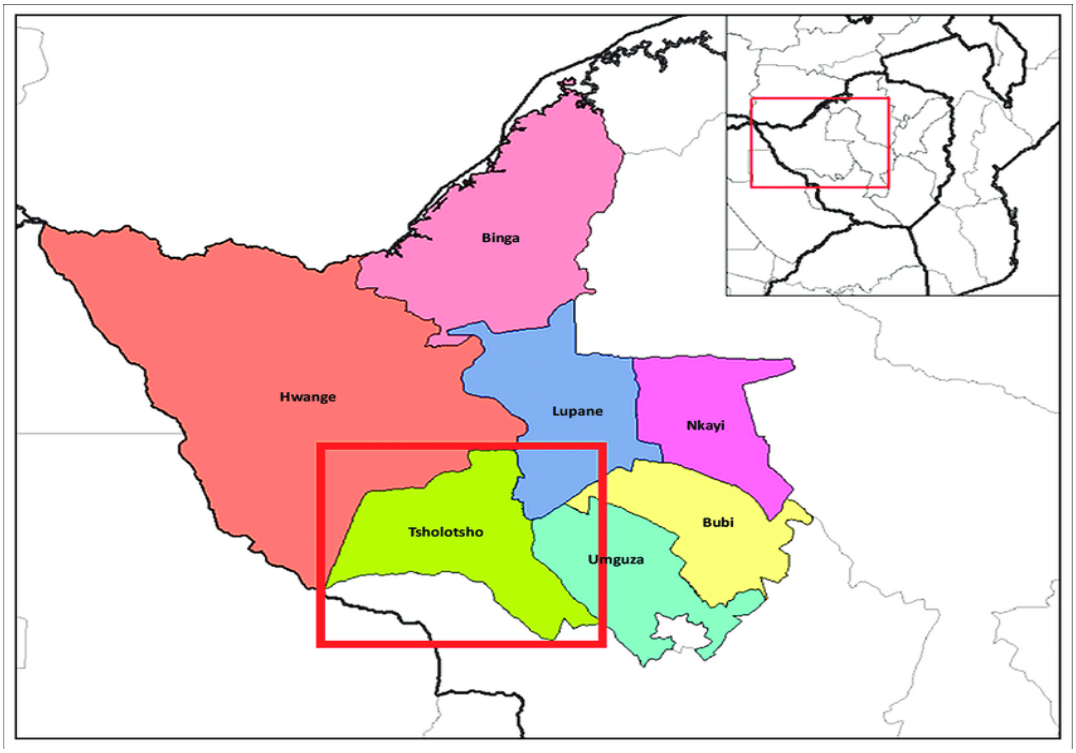

Figure 3:1 The position of Tsholotsho district on the map of Zimbabwe

(researchgate.net, accessed February 2021

3.3 Study design

The research adopted a multi-stakeholder participatory approach to gather both quantitative and qualitative data, primary and secondary data. The use of multiple methods facilitated the validation of data through cross verification from the wide range of available sources (triangulation). Informal discussions were held with various key players supporting backyard gardens (farmers, AGRITEX, MOHCC-Nutrition, DFNSCs and NGOs). The household survey informs the bulk of the study. The basic research tool consisted of a structured household questionnaire with open and closed questions. Key informant discussions were held with AGRITEX, MOHCC-Nutrition, NGOs, DFNSCs farmers and kraal heads to complement the information gathered from the household survey.

3.4 Study Population

The study was carried out in 3 wards in the district namely ward 22 ,17 and 9. The total household population for these three wards is 1867, 964, and 1469 according to data from AGRITEX ward profile.

3.4.1 Research Assistants training

Three Research assistants (RA) were trained on research ethics and administration of the questionnaires. The instruments were modified after research assistant training, which involved discussions of each question. Sample training period ensured that the RA knew the overarching aims of the project as well as the precise information that each inquiry was seeking to gather in order to reduce data collecting errors. Practice sessions guaranteed that all RA asked similar questions, and that information was collected consistently from the very same databases. The purpose of each question was explained and instructions on how to fill out the questionnaires were also reviewed.

3.5 Sampling Considerations

Qualitative Study

Consistent with qualitative research, non-probability sampling methods were used for sampling.

- Purposive sampling was used to select the district based on available data
- Purposive sampling was used to select 3 wards in Tsholotsho two which received most support and with most back yard gardens (according to the AGRITEX department in consultation with the Tsholotsho District Food and Nutrition Security Committee (DFNSC) identified was ward 22,17 and 9.
- Purposive sampling was used to select the Key Informants at District and Ward level.

Quantitative study

Multi-stage sampling was employed for the quantitative study (see Figure 4 below). Purposive sampling was used to select ward 9, 17 and 22 as well as 2 villages from each of the wards. The wards were selected because they received support in terms of backyard gardens making them suitable for valid data collection. At the Village level, a line listing from the village head was used to identify households with backyard gardens and used to constitute a line listing for the study with eligible households. The researcher also requested the AGRITEX extension officers register to complement the village head list for quality assurance purposes. Systematic random sampling was then used to select study households from the study household listing.

Determination of sample size

To determine the sample size of participants for the study, a sample size determination formula was used. In total, there were 2130 households in the three wards. The initial sample size was calculated using the procedure below to select a representative sample from the population:

$n_0 = z^2 \alpha/_2 * p * q/e^2$

Where z = value for selected alpha level of 0.025 in each tail (for 95% degree of confidence) =1.96, (p). (q) = estimate of variance = 0.25, e = the desired level of precision (i.e., the margin of error), p is the estimated proportion of the population which has the attribute in question, q=1-p.

$$n_0 = \frac{(1.96)^2 * 0.5 * 0.5}{0.05^2} = 106$$

The final sample size was calculated using Cochran's (1977) adjustment procedure because the initial sample size (106) is more than 5% of the entire population (5 percent * 2130 =106). This calculation was made in the following manner:

$n = n_0/1 + (n_0 - 1/N)$

=106/1+106/2130

=87

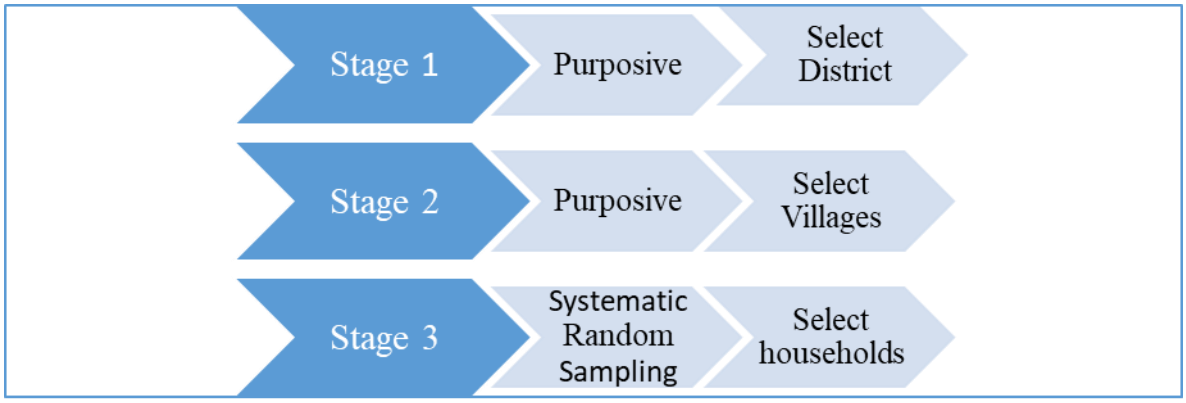

Figure 3.2: Flow Diagram Showing Multi-Stage Sampling for the Study

3.6 Data Collection

The research used both qualitative and quantitative approach through desk research to obtain secondary data and field research through the use of semi structured interviews. A structured questionnaire was used to generate quantitative data. Face to face interviews using guiding open ended questions to guide the discussion was used. 87 questionnaires were administered amongst the 3 wards with each ward having 2 villages each purposively selected. Each ward had an equal number of respondents selected for the study (29 per each ward). Data collection was done over 6 days by 3 hired enumerators supervised by the Researcher. The administration of household questionnaires was done concurrently with KII. In line with WHO standards guidelines to minimise COVID 19 disease transmission, respondents were sanitised and managed to avoid contacts. Throughout the evaluation, the team constantly referred to secondary sources to relate the findings of the survey. Data was collected from the households on demographics, household food access, availability, diversity, factors affecting food house hold food security, uses of backyard gardens, crops planted, socio-economic contributions of backyard gardens, factors affecting sustainability throughout the year.

Covid-19 Considerations

Due to the Covid-19 pandemic, the following precautions were taken to reduce risk of person-to-person transmission of Covid-19 during data collection:

- The research assistants were recruited from the wards where the data will be collected to avoid cross movement of personnel from one community to the other
- The research assistants were trained with strict adherence to Covid-19 regulations and safety guidelines as per the MOHCC protocol
- The Researcher carried out the key informant's interviews via telephone as this was key in the finalisation of the data collection tool.
- The research assistants were provided with necessary personal protective equipment (PPE) such as face masks as well as personal hygiene material such as alcohol based hand sanitizers
- Emphasis on social distancing etiquette was made

3.7 Data Handling, Management and Analysis

Data entry

Data was entered into SPSS software by the researcher. Before entry, the data was checked for errors, inconsistencies in data filling, inconsistencies in data entry and completeness of the data entered.

Data analysis.

All statistical analyses were performed using SPSS 23 for Windows, statistical package. Qualitative data was analysed and summarized using descriptive statistics including frequencies, tables, charts and graphs. Quantitative data was analysed using binary logistic regression. The table below shows how each objective was analysed in the study.

Objective	Data Type	Statistical Analysis
To identify the socio-economic characteristics of home garden owners and non-garden owners	Qualitative	The data on socio-economic variables such as age, education, marital status, sex, and income and employment source were analysed using descriptive statistics. To determine mean statistical differences, comparisons and mean comparisons were done.
To compare the Household Dietary Diversity status of the garden owners and non-garden owners in Tsholotsho	Quantitative	Household Dietary Diversity Scale (HDDS): Dietary diversity refers to the number (how many) of food groups consumed in the household. According to the FAO classification of food categories in Africa, the maximum number is 12.

		The number of different food groups consumed provides a quantifiable measure of improved household food availability and access. The increase in household dietary diversity score reflects improvement in the family diet. Therefore, a lower score is indicative of a poor dietary diversity, access or food unavailability. Mean Comparisons was done using SPSS to find out if there is a difference in HDD between the garden owners and the non-garden owners. This would also be able to show us if there is statistical significant contribution by the gardens to food security. A total of 12 questions with various food groups were used as per HDDS guidelines and then the totals per each respondent in the 2 groups were used for mean comparisons
To compare food access and availability status of the garden owners and non-garden owners in Tsholotsho	Quantitative	The HFIAS (Household Food Insecurity Access Scale) was employed. The method is based on the premise that food insecurity

		(access) may be measured and summarized using a scale. The HFIAS can be used to determine the prevalence of household food insecurity (access) (for example, for geographic targeting) and to track changes in a population's home food insecurity (access) condition over time. For all circumstances where the response to the associated occurrence is 0, the frequency-of-occurrence questions will be coded as 0. A household's maximum score is 27.
To identify the factors affecting garden establishment in Tsholotsho	Quantitative	Binary logistic was used to analyse the factors affecting garden establishment. Garden ownership used as the independent variable whilst socio economic factors such as age, education, income, employment used as independent variable. The reason for the choice of this model is that it suits well dichotomous dependent variable with **(1 for garden**

		ownership and 0 for non-garden owners).

3.8 Ethical Considerations

Throughout the data collection ethical principles were put to practices to ensure that they are adhered to by all parties that were involved in the research process especially in the field where interaction with the community was more. Confidentiality was maintained for all people interviewed and consent forms signed before the interviews. Curtsey visits to ward councillors, chiefs, headmen, and village heads were made when possible to show respect to local leadership. To avoid an inferiority mentality among the interviewees, the usage of the local language was preserved at all costs. Identification details of study participants will be kept anonymous. Completed questionnaires, notes and diaries will be kept under lock and key at the researcher's office up to 5 years beyond study period.

3.9 Summary

This chapter indicated how the research was done and all the procedures carried out. It indicated the study area and the sample households incorporated. It brings out that the study was done using questionnaires. Data collection was successfully done over a week in the three wards of Tsholotsho following the training of 3 enumerators. The enumerators were trained in efficient data collection, probing and ethical consideration for successful obtaining of data in the field. An equal number of respondents were selected to interviews with the enumerators observing the COVID 19 guideline in light of the pandemic spreading across the country. The collected data was cleaned, coded then entered into SPSS for analysis. ANOVA and significant testing was done to evaluate the data collected from the field.

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CHAPTER 4

SOCIO-ECONOMIC CHARACTERISTICS OF HOME GARDEN OWNERS AND NON-GARDEN OWNERS.

Abstract

The study investigated socio-economic characteristic of home garden owners and no-garden owners in Tsholotsho district in Matabeleland North. In selecting study households, systematic random sampling was used, and in this regard 87 households were selected for the study. Data with regards to socio-economic characteristics was collected using questionnaires. Data analysis was done using SPSS version 20, to process data. The results showed that most household heads were males, unemployed and had attained secondary education. The average household size according to the results of the study was 5, 3 with a maximum size of 12 and minimum of 2. The mean age of the head of the family was 32 the median age 28 with maximum age being 78. In addition, out of the 87 households involved, 71.3% had a functional garden. With regards to sources of food, crop production, purchase, barter, were found to be the most important sources. Households also indicated that their important source of income included returns from the sale of agricultural output, salary and remittances. The survey concluded that most households' heads are not employed and depend on agricultural output for food and income. In this regard, the study recommends the intensification of agricultural activities including home gardens and more assistance from the Government and Development Partners.

Keywords: Socio-economic, Development Partners, Backyard gardens, HOUSEHOLD, Income

4.0 Introduction

The outcomes of data acquired in the field are presented in this chapter. The findings will be provided in this chapter in accordance with the study's objectives. To give a clear picture of the findings, data will be presented in graphs, tables, and charts.

Age, gender, marital status, relationship with household head, degree of education, occupation, and contribution to the household of both garden practising and non-garden practising families were explored in this study. The major goal was to obtain information on the sample population's socioeconomic situation.

4.2 Materials and methods

4.2.1 Description of study area

The study was carried out in Tsholotsho district in Matabeleland North province which is under ecological region 5. The region was chosen because it is prone to shocks and hazards such as drought and flooding as a result of its location which is in the low veld. It is characterised by high temperatures and low rainfall. For a more detailed description of the area refer to **Section 3.2.**

4.2.2 Research Design

The research adopted a multi-stakeholder participatory approach to gather both quantitative and qualitative data, primary and secondary data. The use of multiple methods facilitated the validation of data through cross verification from the wide range of available sources (triangulation).

4.2.3 Sampling Procedure

The research study targeted 89 households in the district as well as interviews with respondents from organisations that assist farmers. For a detailed description on the sample size and sampling procedure and technique, refer to **Section 3.4.**

4.2.4 Data collection procedure

Questionnaires and key informant interviews were used to collect qualitative and quantitative data from respondents. Quantitative data was collected using a standardized questionnaire. Face-to-face interviews were utilized to direct the topic using guiding open-ended questions. Data on HHD and HFIAS, as well as demographic characteristics of households, were obtained. For more details, refer to **Section 3.6**.

4.2.5 Data analysis procedure

Data was entered into SPSS software by the researcher. Before entry, the data was checked for errors, inconsistencies in data filling, inconsistencies in data entry and completeness of the data entered. More details on this are outlined in **Section 3.7**.

4.2.6 Challenges encountered during data collect.

Due to covid 19 regulations, the research found it difficult to move from one place to another. More so, some interviews had to be done over the phone which made the process difficult as there was little room for probing.

4.3 Results

Gender distribution

The sample of the population comprised of 87 households with a total of 461 individuals. Out of these people, 46% were males whilst 54% were females. Out of the 87 households interviewed, 81, 6% (n=71) had a male household head and the remaining 16 had a female household head as shown in Table 4.1 below.

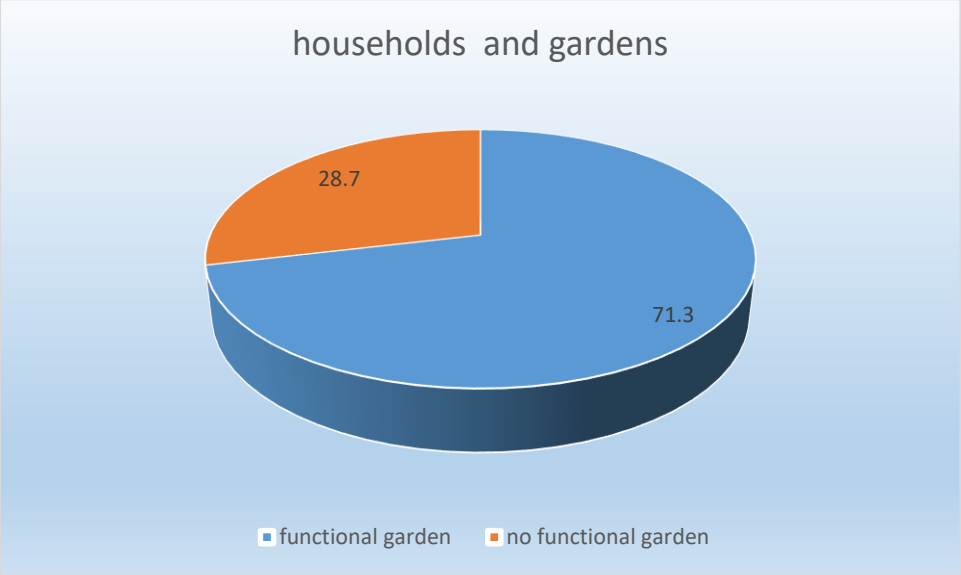
Table 4 1: Household head gender

		Frequency	**Percent**	**Cumulative Percent**
Valid	**Male**	71	81.6	81.6
	Female	16	18.4	100.0
	Total	87	100.0	

Source: Survey 2021

Amongst these households, 71,3% (n=62) had backyard gardens (Fig 1) and 25 households (29.7%) did not have a functional backyard garden. All households that were female headed (n=16) had functional gardens whilst 64,8% of households that had a male head had functional gardens (n=46).

Figure 4:1 Households and gardening



The average household size according to the results of the study was 5,3 with a maximum size of 12 and minimum of 2. The mean age of the head of the family was 32 the median age 28 with maximum age being 78.

Table 4 2: Average household size

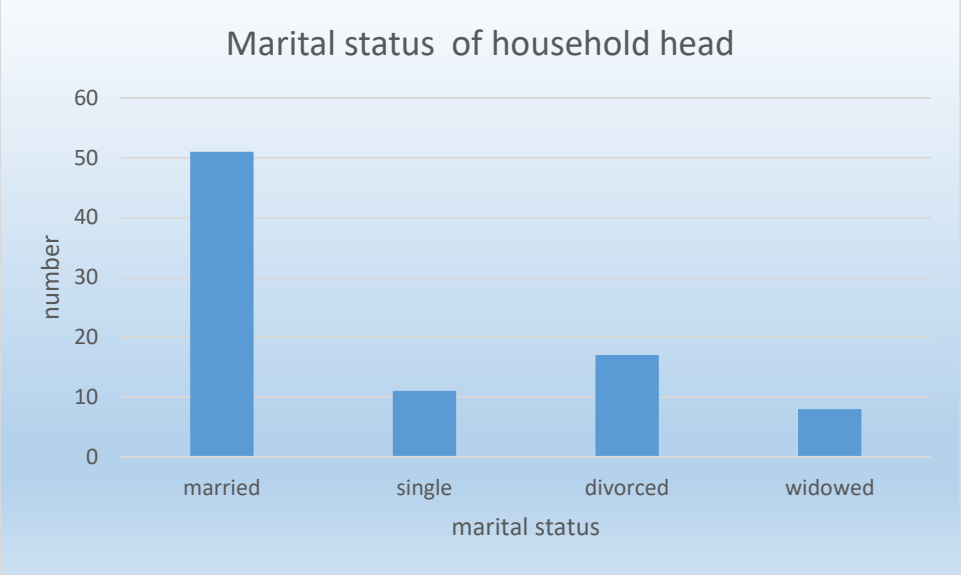
Number of households	Total number of members within households	Average household size
87	461	5.3

Source: Survey 2021

Marital status

Out of the 87 households considered, 58.6% (n=51) household heads were married, 12,6% (n=11) were single, 19,5 % (n=17) were divorced whilst 9,2% (n=8) of household heads were widowed. Amongst households that were headed by females (n=16), 62.5% (n=10) of them were divorced, 25% (n=4) were widowed and only 12,5% (n=2) indicated that they were single. Fig 4.1 below shows the marital status of the household heads.

Figure 4.2: Marital status of household heads



Source: Survey 2021

Education status

About 11,5% (n=10) of household heads had no formal education of which 8 out of these 10 were female. The majority, 47,1 % (n=41) indicated that they had formal secondary education whilst 24.1% (n=21) and 17.2% (n=15) had primary and tertiary education, respectively.

Table 4 3: Education Level of Household Heads

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	**No formal**	10	11.5	11.5	11.5
	Primary	21	24.1	24.1	35.6
	Secondary	41	47.1	47.1	82.8
	Tertiary	15	17.2	17.2	100.0
	Total	87	100.0	100.0	

Source: Survey 2021

In most households, the highest level of education of any member of the household was secondary education (71,3%) followed by 23% (n=20) who possessed a household member who had attained tertiary education. The remaining households (n=5) indicated that highest level of education among household members was primary education.

Occupation

Respondents were also inquired to indicate their principal occupation. In this regard, the majority of households indicated that they were into agriculture (80,5%) and practices

horticulture, crop cultivation, animal rearing and poultry amongst other agricultural activities. However, a few indicated that they were formally employed (teaching, shop workers, security workers etc.) and this proportion constituted only 6.8% of the respondents. In addition, the remaining minority household heads were into craftwork and vending. The high rate of unemployment in this region is attributed to the harsh economic conditions prevalent in the country. In Zimbabwe, it is estimated that over 90% of the total population is formally unemployed (Sentamu, 2020 and Towedzera et al., 2016)

Source of income

Respondents were asked to rank their most important source of income in the last four weeks. In this regard, the majority of respondents indicated that they were not formally employed hence did not have any monthly salary or wage that they were getting except for a few (n=6) household heads who indicated that salaries were their main source of income. However, the majority of household heads (n=70) indicated that their main source of income was selling the excess produce from crop production and this variable ranked the least amongst all households (Total score 113, Mean score 1,3). The second ranking source of income according to respondents was vegetable production (Total rank score 114, Mean score 1,31) even though some households did not have functional gardens. In addition, 6.9 % (n=6) of the respondent of the respondents indicated that they were into poultry production and out of this proportion, 66,7% (n=4) had a functional garden. In conclusion, most respondents indicated that indicated that they were into crop production and vegetable production which is the main source of income as these were ranked highest.

Table 4 4: Main sources of income

Source of income	**Total rank**	**Mean**
Crop production	113	1,3
Vegetable production	114	1.31
Poultry	210	2.4
Salary	354	4.1
Remittances	495	6,7

Source: Survey 2021

Support from the Government/NGOs

Respondent were inquired on the type of support that they obtained from the government or any organization in terms of capacity building, food, training or any form of assistance. In this regard, the majority of respondents indicated that they receive training during seasonal workshops in which government representatives come to train and educate them in field of agriculture. This was also confirmed by responses from the KII in which respondents from the CTDO and AGRITEX organizations also confirmed that they offered support in the form of seeds and training and other forms of supplements. The following table summarises responses from the questionnaires in terms of support obtained by households.

Table 4 5: Source of extension services

Organisation	**(Frequency)**	**Percent**	**Form of assistance**
Government	80	91.95	Training, seeds, fertilizers, inputs, food
AGRITEX	78	89.65	Training, seeds, fertilizers
CTDO	50	57.74	Training and seeds
Plan International	42	48.28	Training, inputs

Source: Survey 2021

From the table above, it can be noted that over 90% of respondents were obtaining assistance from the government in terms of training, seeds and fertilizers as well as food. In addition, other organisations such as AGRITEX. PLAN INTERNATIONAL and CTDO also offered support to households. Support offered by these organisations included training, seeds and fertilizers. Most respondents confirmed that they obtained assistance from more than one organization with the Ministry of agriculture being the main source of external source of external services.

Household food security status

Respondents were inquired on their sources of food and asked to rank them according to importance and contribution to their diet. In response, the majority (89.6%) indicated that own crop production was the main and most important source of food in their households with having the lowest total rank of 92 and a mean score of 1,06. This was followed by purchase (Total score=160, Mean score=1.84) and barter (Total score=401, Mean score=4.61). Some

households indicated that they also obtain food from stocks, livestock products as well as friends and relatives however these were not indicated to be the most important as they had huge rank scores.

Table 4 6: Source of food

Source of food	Total rank	Mean
Crop production	92	1.06
Purchase	160	1.84
Barter	401	4.61
Stocks	671	7.71
Livestock products	830	9.54
Friends and relatives	1003	11.53

Source: Survey 2021

4.4 Discussion

4.4.1 Discussion on the demographic Characteristics of household heads

More than 70% of the homes who took part in the study had food gardens, according to the findings. This figure is more in line with a research conducted by the African Food Security Urban Network AFSUN (2012) series 13, which found that 60 percent of the families studied in Harare's outskirts were active in growing vegetable crops.

From the findings of the study, it can be noted that the most households are headed by males. It can also be noted that households that female household heads are either divorced or widowed. The information presented indicate that all female headed households have gardens and most of these women are unemployed. This represents a 100% garden establishment rate in female headed households as compared 64.79 to in male headed households. This is consistent with the findings of Samantaray et al (2009), who found that vegetable agriculture is dominated by women, and that they oversee the vegetable production system from harvesting to sale.

The establishment of a backyard garden in this regard, is to reduce the burden associated with income and food shortages that these women face. The fact that they do not have a partner to assist them forces them to establish backyard gardens to supplement the little income that they obtain from other sources.

In addition, most household heads were not formally employed. This explains why most households had functional gardens in their backyards. Findings of the study in this regard are similar to those by Mapuranga et al. (2015) who postulated that low-income groups are more inclined to established backyard nutritional gardens to mitigate the impacts of incessant droughts and chronic illnesses such as HIV/AIDS as well as rampant poverty. It can therefore be concluded that garden establishment in the district is mainly due to the high rate of unemployment within the region.

Even though most households indicated that they have attained secondary and tertiary education, most of them are still unemployed. This could be attributed to the high levels of unemployment within the region and across the country as a result of the deteriorating economic conditions. Studies conducted African Food Security Urban Network AFSUN in 2012, series 13 published that the past ten years, the residents of urban and rural Zimbabwe have lived in extremely difficult environments. In addition to increasingly turbulent political climate, they have to endure the actual collapse of the country's economy, record unemployment, increasing poverty and rampant inflation. In 2005, the government cracked down on informality across the country, which had a major negative impact on the urban and rural poor in the country, who lost their homes, livelihoods, or both. The Country's collapse destroyed the livelihoods and savings of most families in the country and increased their vulnerability to poor health and food insecurity (Tawodzera et al ,2012).

4.4.2 Discussion on household source of income, source of food

Most people in rural areas produce their own food which is their main source of food as established by the study. Crops grown include both field and garden crops and these contribute the most to food consumed by households (Galhena, 2012). In addition to own crop production, households also purchase food items that they cannot grow on their own as also postulated by Chikoto (2016). Besides purchasing, households also trade food products and other items in return for food. The results obtained support those obtained by Galhena, Freed and Maredia (2013) who reported that vegetable and tree crops and livestock produced in home gardens accounted for more than 70 % of household income and more than 80% to the amount of food consumed. As established by results obtained from the study, remittances and close family members and friends also contribute to food consumed by households within the Tsholotsho region. This is also supported by Chikoto (2016) who also discovered that some households depend on food obtained from other households that they are socially related to.

With regards to household main source of income, the obtained results are similar to those postulated by Chibatamoto (2017), who echoed that most households in rural areas in Zimbabwe depend on the sale of agricultural products as their main source of income as most of them are not formally employed. Home gardens, according to Calvet-Mir et al (2012) and Trinh et al (2003), contribute to income creation, improved livelihoods, and household economic welfare, as well as supporting entrepreneurship and rural development. In addition, Galhena, Freed, and Maredia (2013) found that in most rural African homes, vegetables and crops grown in home gardens, as well as animals, account for more than 70% of household income. In many circumstances, selling products from home gardens helps a family's financial situation by giving additional revenue while also contributing to social and cultural improvement (Preston et al., 2014).

4.5 Conclusion

The chapter concludes that most people in the region are unemployed and relatively poor. The majority of households in the region are into crop and vegetable production and these are their main sources of food and income. There is therefore the need to assist them so as to broaden, diversify and enhance their source income and food (livelihoods).

4.6 Recommendation

Based on the study findings, the research recommends that the government needs to address issues to do with the rate of unemployment within the region. In addition, since most people depend on agriculture for food and income, more emphasis should be placed on the intensification of agricultural activities so as to maximise and produce more. There is need for women empowerment in agricultural activities as they play a major role in food production and their worthy somewhat not recognised. The government and other organisations such as Plan International, CTDO, USAID –Amalima project are also recommended to intervene and assist households with more inputs, capital, training, food and the construction of water bodies amongst other interventions.

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CHAPTER 5

HOUSEHOLD DIETARY DIVERSITY STATUS OF THE GARDEN OWNERS AND NON-GARDEN OWNERS IN TSHOLOTSHO.

Abstract

The goal of the study was to look at the Household Dietary Diversity status of gardeners and non-gardeners in Tsholotsho. The study also aimed to compare garden owners' and non-garden owners' food access and availability. The respondents' dietary diversity scores were calculated using information from their 24-hour dietary recall. To compare the mean HDD of garden and non-garden owners, an ANOVA test was used. The findings show that there is a substantial difference in HDD between households with gardens and those without. The Household Food Insecurity Access Scale was used to compare the food access and availability status of garden and non-garden owners (HFIAS). The researcher asked 9 questions about food access and availability in order to quantify respondents' meal experiences. To examine the mean differences in HFIAS between garden owners and non-garden owners, an ANOVA test was used. The findings show that there is a significant mean difference in HFIAS between garden and non-garden users. The researcher therefore concludes that households with garden have a much better diet and are more food secure as compared to those without functional gardens. The researcher therefore recommend that households should establish gardens and enough support should be availed in terms of inputs, capital, water sources, training amongst other interventions.

Keywords: Household Dietary Diversity, Household Food Insecurity Access Scale, 24-hour dietary recall, dietary diversity score

5.1 Introduction

This chapter presents findings with regards to the HDD and HFIAS of household involved in the study. Mean differences of garden and non-garden owners are compared with regards to the two measures to ascertain whether there is any advantage or contribution of establishing a garden to dietary diversity and food security of households included in the study. The study also goes on to further discuss the findings and give recommendations basing of the findings of the study.

5.2 Materials and methods

5.2.1 Description of study area

The study was carried out in Tsholotsho district in Matabeleland North province which is under ecological region 5. The region was chosen because it is prone to shocks and hazards such as drought and flooding as a result of its location which is in the low veld. It is characterised by high temperatures and low rainfall. For a more detailed description of the area refer to **Section 3.2.**

5.2.2 Research Design

The research adopted a multi-stakeholder participatory approach to gather both quantitative and qualitative data, primary and secondary data. The use of multiple methods facilitated the validation of data through cross verification from the wide range of available sources (triangulation).

5.2.3 Sampling Procedure

The research study targeted 89 households in the district as well as interviews with respondents from organisations that assist farmers. For a detailed description on the sample size and sampling procedure and technique, refer to **Section 3.4.**

5.2.4 Data collection procedure

Questionnaires and key informant interviews were used to collect qualitative and quantitative data from respondents. Quantitative data was collected using a standardized questionnaire. Face-to-face interviews were utilized to direct the topic using guiding open-ended questions. Data on HHD and HFIAS, as well as demographic characteristics of homes, were obtained. For more details, refer to **Section 3.6**.

5.2.5 Data analysis procedure

Data was entered into SPSS software by the researcher. Before entry, the data was checked for errors, inconsistencies in data filling, inconsistencies in data entry and completeness of the data entered. More details on this are outlined in **Section 3.7**.

5.2.6 Challenges encountered during data collect.

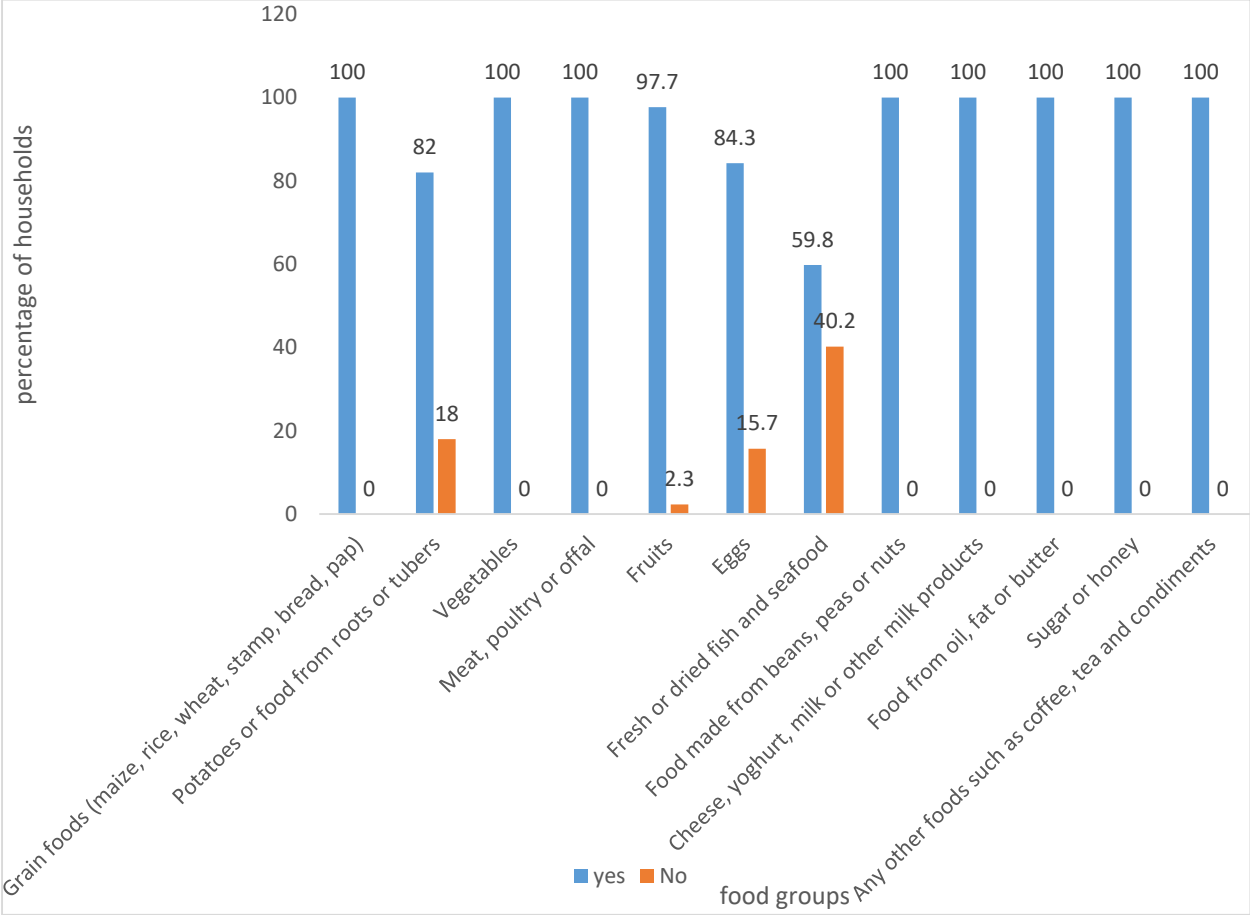
Due to covid 19 regulations, the research found it difficult to move from one place to another. More so, some interviews had to be done over the phone which made the process difficult as there was little room for probing.

5.3 Results

Respondents were inquired on the types of food that their household members had consumed the previous day and night as well as the number of times such food had been consumed in the past seven days prior to the interview. The table below shows a summary of the foods and the number of times these foods had been consumed by the household members.

A 24-hour dietary recall was undertaken to acquire food category information from respondents' food intake by addressing their dietary history. The participants were asked to recall all foods and beverages consumed in the twenty-four hours leading up to the interview. The dietary diversity of the respondents was assessed using a scale of twelve food groups, as shown in the graph below.

Figure 5:1 24-hour dietary Recall



Source: Survey 2021

As a result, the interviewees' dietary diversity scores were calculated using data from the 24-hour dietary recall (FAO, 2007). Each of the food groups consumed during the time frame was given one point, resulting in a maximum total dietary variety score of 12 points for each individual if all of their replies were affirmative. The table below compares the total score and mean of people with and without home gardens on the HDD.

Table 5 1: Statistics of HDD of garden owners

N Valid	62
N Missing	0
Mean	10.0645
Minimum	6.00
Maximum	12.00
Sum	624.00

Source: Survey 2021

Table 5 2 :HDD Descriptive of garden owners

		Frequency	**Percent**	**Cumulative Percent**
Valid	6	1	1.6	1.6
	7	3	4.8	6.5
	8	6	9.7	16.1
	9	9	14.5	30.6
	10	16	25.8	56.5
	11	16	25.8	82.3
	12	11	17.7	100.0
	Total	62	100.0	

Source: Survey 2021

Table 5 3 :HDD statistics on non-garden owners

N Valid	25
N Missing	37
Mean	7.6800
Minimum	4.00
Maximum	10.00
Sum	192.00

Source: Survey 2021

Table 5 4 :HHD Descriptive of non-garden owners

		Frequency	Percent	Cumulative Percent
Valid	4	1	1.6	4.0
	5	2	3.2	12.0
	6	5	8.1	32.0
	7	3	4.8	44.0
	8	2	3.2	52.0
	9	9	14.5	88.0
	10	3	4.8	100.0
	Total	25	40.3	

Source: Survey 2021

The HDDS shows that dietary diversity was more poor for the surveyed households without home gardens compared to those with home gardens as the minimum consumed food groups was 4 for non-garden owners and 6 for garden owners.32% of the non-garden owner's households had eaten from 6 or fewer of the twelve different FAO food groups in the 24 hours prior to the survey and maximum number consumed being 10 food groups by 4.8% of the respondents. On the other hand, garden owners had had a minimum of 6 food groups and majority 69% having consumed 10 or more food groups and maximum of 12 food groups. In contrast the dietary diversity score for food secure households is eight. Frayne (2010).

It can be noted that within the 62 households that have gardens, the mean HHD score is 10. 0645 compared to 7.68 obtained from the one of households without a backyard garden. On overage, the mean HDD out of 12 is 9.3793 in all households include.

To compare mean differences between the HDD scores of those with backyard gardens and those without backyard garden, the researcher conducted an ANOVA test to compare the mean difference between the two groups under consideration in order to ascertain whether there is a statistical difference in the means of the two groups. The table below shows the results obtained from the One-way ANOVA test between garden ownership and household diet diversification score. The ANOVA test results are shown in **Table 5 5.**

Table 5 5: ANOVA Test results of HDD

ANOVA

Total score

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	101.301	1	101.301	40.773	.000
Within Groups	211.182	85	2.484		
Total	312.483	86			

Source: Survey 2021

In the ANOVA test, the HDD was treated as the dependent variable. The null hypothesis was "there is no difference between the means of the two groups. From the table above, a p-value of 0.00 is less than 0.05. this prompts the researcher to reject the null hypothesis in favour of the alternative hypothesis and conclude that there is a significant difference between the mean HDD of households with backyard gardens and those without backyard gardens. In this regard, it is therefore safe to conclude that households with a functional garden have more options of food varieties from which to choose from as compared to those without household gardens. These results are in line with Taboka (2016) and Carney (2013) who discovered and concluded that gardening reduces food insecurity, improves dietary intake and strengthen family relations. In addition, Landon-Lane (2011) also supports by postulating that home gardening improves food security, increases the availability of food and better nutrition through food diversity, enhances income and provides employment and decreases the risk poverty through diversification. Gelhena (2013) emphasises on home garden's most fundamental social benefits being their direct contribution to the family by increasing availability, accessibility, and utilization of food products. Home gardens maintenance are to facilitate easy access to fresh plants and animals' food sources in rural and urban areas. Food Items from the home garden greatly increase the family continuous energy and nutritional needs.

Table 5 6: Frequency of consumption in last 7 days

Type of food	**Frequency of consumption (last 7 days)**			
	Never	**Between 1 - 3**	**Between 3 - 6**	**Above 6**
Grain foods (maize, rice, wheat, stamp, bread, pap)	0	0	42	45
Potatoes or food from roots or tubers	5	20	50	12
Vegetables	0	2	6	79
Meat, poultry or offal	0	54	26	5
Fruits	2	5	12	70
Eggs	12	45	17	13
Fresh or dried fish and seafood	35	22	30	0
Food made from beans, peas or nuts	0	44	42	1
Cheese, yoghurt, milk or other milk products	0	49	33	7
Food from oil, fat or butter	0	0	24	63
Sugar or honey	0	0	68	29
Any other foods such as coffee, tea, and condiments	0	0	70	27

Source: Survey 2021

In the four weeks leading up to the interview, all households consumed cereals, milk, sugar, oil, beans, peas, almonds, and meat and meat products. As can be seen in Figure 5.6, vegetable

and fruit intake was also high, with over 97 percent of households confirming they had eaten dark green leafy vegetables, other vegetables, and fruits in the four weeks before to the interview. Fish was the least frequently consumed food, with only 60% of participants (n = 52) saying that their household had eaten fish in the four weeks before to the interview. Tubers, roots, and eggs were consumed by around 85% of the population. Results of these study are supported by Chikoto (2016) who also discovered that in rural areas, products made from grains, sugar, oil products beans, vegetables are consumed by households on a regular basis. Chikoto (2016) also established that due to scarcity, products such as fish and meat products in rural areas are consumed once in a while. The respondents reported that their main food sources included agriculture production (fields, community and home gardens), trade, purchases and remittances. The main source of the green leafy vegetables and other vegetables consumed by respondents were mainly from home gardens. Gelhena said that the home garden provides a simple easy day to day access to a variety of fresh and nutritious food every day house hold food. Households obtain more than 50% of vegetables, fruits, tubers and yam in their garden. To support this premise, different studies have concluded that while increasing caloric quantity, home gardens supplements the staple based diets with significant portions of protein, vitamins and minerals, leading to a rich and balanced diet particularly for growing children and mothers. Gelhena (2013).

Average number of meals per day.

On inquiring the average number of meals that each household has a day, most households according to the results shown in table below have an average of 2 meals a day (n=49). A total of 31 households indicated that on average they eat 3 times a day and only 2 households have more than three meals a day on average whilst 5 households indicated that they normally eat only once a day.

Table 5 7: Average number of meals per day

	Meals	**Frequency**	**Percent**	**Cumulative Percent**
Valid	1 meal	5	5.7	5.7
	2 meals	49	56.3	62.1
	3 meals	32	36.8	98.9
	above 4	1	1.1	100.0
	Total	87	100.0	

Source: Survey 2021

Results obtained with regards to the number of meals a day indicate that most households consume 2 to 3 times as day which is normal in a rural set up as argued by Taboka (2016). Respondents were also inquired on whether they considered themselves to have access to enough food for household consumption. In response, most households (58,6%) indicated that they had access to enough for themselves and had no excess food whilst only 36 households indicated that they felt that there possessed more than enough food for consumption.

To compare food access and availability status of the garden owners and non-garden owners in Tsholotsho.

The Household Food Insecurity Access Scale was used to compare the food access and availability status of garden and non-garden owners (HFIAS). The table below show the total scores, maximum, minimum and mean HFIAS for the two groups under comparison. The results of the statistics and descriptive are show in the tables below.

Tables 5 8: HFIAS characteristic

HFIAS with garden

		Frequency	**Percent**	**Cumulative Percent**
Valid	1	3	3.4	4.8
	2	6	6.9	14.5
	3	6	6.9	24.2
	4	16	18.4	50.0
	5	14	16.1	72.6
	6	17	19.5	100.0
	Total	62	71.3	

Source: Survey 2021

HFIAS without garden

		Frequency	**Percent**	**Cumulative Percent**
Valid	1	1	1.1	4.0
	2	1	1.1	8.0
	3	2	2.3	16.0
	4	5	5.7	36.0
	5	6	6.9	60.0
	6	6	6.9	84.0
	7	4	4.6	100.0
	Total	25	28.7	

Source: Survey 2021

HFIAS with garden			
	HFIAS with garden	**HFIAS without garden**	**Total HFIAS**
N Valid	62	25	87
N Missing	25	62	0
Mean	4.3387	4.9200	4.5057
Std. Error of Mean	.18674	.31581	.16257
Median	4.5000	5.0000	5.0000
Mode	6.00	5.00[a]	6.00
Std. Deviation	1.47040	1.57903	1.51637
Variance	2.162	2.493	2.299
Skewness	-.647	-.686	-.585
Std. Error of Skewness	.304	.464	.258
Kurtosis	-.430	.224	-.293
Std. Error of Kurtosis	.599	.902	.511
Range	5.00	6.00	6.00
Minimum	1.00	1.00	1.00
Maximum	6.00	7.00	7.00
Sum	269.00	123.00	392.00

a. Multiple modes exist. The smallest value is shown

Source: Survey 2021

From the table above, On the 0-27 HFIAS scale, the average household score is 4.5 and 5 for garden and non-garden owners respectively. It can be noted that the combined mean HFIAS is 4.51 which is relatively lower indicating that on average, all households are relatively food secure and have relatively adequate access to food. The mean score of households with a functional garden on comparison is relatively higher than that of households without a functional backyard garden (4.34 vs 4.92).

In comparing whether there is a statistical difference between the two groups, the researcher conducted an ANOVA. **Table 5.9** below shows the results of the ANOVA test that was conducted.

Table 5 9: ANOVA Test results for HFIAS

ANOVA

Total_HFIAS					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	23.549	1	23.549	11.186	.001
Within Groups	178.934	85	2.105		
Total	202.483	86			

Source: Survey 2021

The null hypothesis stated that there is no statistical difference between the mean of households with gardens and those without gardens. In this regard, a p-value of 0.001 was obtained. This again prompts the researcher to reject the null hypothesis in favour of the alternative which states otherwise. The p-value obtained indicates that there is a significant difference between the mean HFIAS of households with a functional garden and that of those without on. It can be concluded that households with gardens are more food secure and have a greater access to food than those without household gardens. These results are in sync with findings by Landon-Lane (2011) who echoed that home gardening improves food security, increases the availability of food and better nutrition through food diversity, enhances oncome and provides employment and decreases the risk poverty through diversification. Home gardens provide economical, nutritious, and diverse local food that can improve food intake, smooth consumption, and save money by allowing households to buy items they do not produce as well as other home necessities. After reviewing a large number of case studies,

Mitchell and Hanstad (2004) assert that the home garden can contribute to the economic well-being of the family in several ways: sell of garden products to earn additional income; horticultural activities can be developed into small cottage industry; and earnings from the sale of home gardening products and consumption savings made from the consumption of homemade food products will lead to more disposable income that can be used for other household food purchases and other purposes and thus improving household food availability and access.

Gardening

According to the findings, the majority of houses (71.3 percent, n=62) had a functional backyard garden, whereas 29.7% of households did not have one. As indicated in, the most common motivations for having a food garden were to have easier access to veggies and to

save money that might be put to better use. Some households stated that having a family food garden allows them to have easier access to veggies as well as save money from their own food production. Households had food gardens for a variety of reasons, including the desire to be self-sufficient in food, the belief that food grown at home is more nutritious than food purchased at a store, the use of their food garden as a source of income, the use of extra land as a garden seemed more effective than leaving it idle, and finally, the desire to have a recreational activity. These findings of the study are more similar to Chikoto (2016) who discovered that over 60% percent of households had gardens and the main reasons for establishing a garden were to supplement diet, generate income and save money for other uses instead of buying vegetables and other fruits which they can just simply produce on their own because they had the land and all the necessary requirements such as water and labour as well as inputs.

In terms of gardening, 56.5 percent of households (n = 35) had only one type of crop in their garden (types of crops included green leafy vegetables, other vegetables such as onions, beans, or tomatoes, and in some cases fruits such as guavas or bananas), with 95 percent having only leafy green vegetables. This revealed households' preference for planting green leafy vegetables in their food gardens. Only 7.8% of households (n = 7) had four or five different types of crops in their garden. In their gardens, households reported having more than five different types of crops.

Table 5 10:Main crops grown

Main crop grown	**N**	**%**
Onions	4	6.5
Tomatoes	5	8.1
Leaf vegetables	59	95.1
Beans	4	6.5
Other (potatoes ,carrots , butternut , sweet potatoes, beetroot)	12	20.3

Source: Survey 2021

The most common reason for growing crops in home gardens was for personal use (88.7%; n = 55), whereas the rest of the households used their crops for both personal consumption and profit, as well as barter and seed storage. These results are also supported by Chikoto (2016) and Galhena, Freed and Maredia (2013) who discovered that in most rural areas and even urban areas, mostly green leafy vegetables are produced. They also found out that in some instances,

other vegetables such as onions, tomatoes and fruits are also grown alongside green leafy vegetables which are mostly grown for consumption and in some cases for sale.

Table 5 11: Uses of produce from gardens

Use of Produce from gardens	N	%
Sale	53	85.5
Consumption	55	88.7
Barter trade	31	50
Retain Seed	43	69.4

Source: Survey 2021

Only 15 of the 62 homes with food gardens were also raising cattle. Eighty percent (12/15) of livestock rearing households had only one type of livestock (chickens, rabbits, quail, and turkeys), whereas only 20% (3/15) had between two and three species of livestock. Household livestock rearing was discovered to be skewed toward chickens. 60 percent (9/15) of the households raised cattle for their own consumption as well as to sell or generate cash. Only one household raised cattle solely for the aim of selling it for profit. The remainder were rearing livestock for own household consumption. Galhena, Freed and Maredia (2013) also postulated similar results in their study which disclosed that households in rural areas also rear livestock and mostly chickens are kept since they are cheap and easy to rear in most poor households. According to their study, most households kept livestock especially chicken for consumption and in some instances for sale.

Households were inquired on how often they accessed produce from their household food gardens. Results obtained in this regard are shown in **Table 5 12** below.

Table 5 12: frequency of consumption of garden produce

Consumption	Frequency	Percent	Cumulative Percent
Never	2	3.2	3.2
between 1 and 10	2	3.2	6.5
between 11 and 20	8	12.9	19.4
above 20	50	80.6	100.0
Total	62	100.0	

Source: Survey 2021

Eighty percent (n = 50) that they had used their garden crops more than 20 times in the 28 days leading up to the interview. Only 3.2 percent (n = 2) of households had not eaten any garden produce in the 28 days leading up to the interview. The results obtained indicate that most households who had garden produced enough to access produce almost daily. Chokoto (2016) also postulated similar results in a study which revealed that most households that had garden did not have problem in accessing produce from their gardens and they frequently consume vegetables and fruits from their garden and some even produce more than enough to sale for extra income which can be used to acquire other food items. Households should be encouraged to increase home garden produce, so that there is enough to consume, preserve for future use and sell surpluses for income. This is needful for food security and good nutrition. Musoti at el, (2008).

Food obtained from the sale of garden produce.

Table 5 13 below shows the number of households who reported that they had managed to sell products from their garden and used the money to buy other food items.

Table 5 13: Food from sale of garden produce

		Frequency	**Percent**	**Cumulative Percent**
Valid	No	50	80.6	80.6
	Yes	12	19.4	100.0
	Total	62	100.0	

Source: Survey 2021

In addition, only 12 households reported to have accessed food obtained from the sale of garden produce in the 4 weeks before the interview was conducted. These foods purchased included sugar, salt, meat, bread amongst other basic foods. Foods recorded to have been obtained from the garden included green vegetables, tomatoes, onions amongst other types of vegetables.

Table 5 14 :Use of money from gardens

Use of money from Gardens	**N**	**%**
Food purchase	55	93.2
Children school fees	49	83.1
Reinvestment	16	27.1
Healthcare services	37	62.7

Other	10	16.9

Source: Survey 2021

With regards to the use of money obtained by those who sold garden produce, most used households indicated that they use the money to buy other food stuffs, pay for school fees and health care services. Taboka (2016), Landon-Lane (2011) and Arias et al. (2013) also support the findings of the study. Their findings point out that some household and community gardens produce more than enough for consumption and households sell the access to the market or households without functional gardens. They also postulated that the money obtained from the sale of garden produce is used for other purposes such as buying other food items that households cannot produce as well as paying for other essential services such as health, rent, school fees amongst other goods and services. Taboka (2016).

Challenges in vegetable production

When inquired about the problems faced in vegetable production. The majority (n=45), amongst those who had functional gardens, ranked "lack of capital" (total score 65, mean score of 1.05) as the main hindrance. This was followed by the prevalence of pests (total score 70, Mean score 1.13), lack of water sources (Total score 72, Mean score 1.16) and lack of inputs (total score 80, Mean score 1.29). Some of the problems that were indicated by households that had functional gardens included high cost of inputs, low rainfall and labour shortages for those who had small families. Among households that did not have functional gardens, the main reasons put across were the lack of water sources (Total score 31, mean score 1.24) and land shortage (score 45, mean score 1.8). other reasons also included labour and lack of capital. Table 5 15 below shows the main challenges faced by garden and non-garden owners, respectively.

Table 5 15: Challenges face by garden owners

Variable	**Total score**	**Mean score**
Lack of capital	65	1.05
Pests and diseases	70	1.13
Water sources	72	1.16

Lack of inputs	80	1.29
Labour	407	6.56

Challenges faced by households without a functional garden.

Lack of water sources	**32**	**1.24**
Land shortage	45	1.8
Labour	66	2.64
Lack of capital	89	3.56

Source: survey 2021

From the results above, it can be deduced that the main problems that garden owners face are the lack of capital, pests and diseases, water challenges and lack of inputs. Most of the households in this region are poor, which makes it difficult for them to obtain capital to expand their operations and acquire the necessary inputs required to efficiently produce vegetables. According to Chikoto (2016) and Taboka (2016), most households in rural areas are poor and unemployed, this makes it very difficult for them to acquire bank loans and Taboka (2016) also goes on further to say that even though the government and other NGOs intervene, their contribution is insignificant and only a few households benefit from their initiatives. In addition, Tsholotsho is in region 5 which is a dry region and water shortages are very prominent in this area of the country. This makes it exceedingly difficult for households to efficiently operate.

Out of the 62 households that had gardens, 83.9% (n=52), as shown in **Table 5 16** below, confirmed that they can produce vegetables all year round whilst the remainder indicated that they had seasons in which they utilized their backyard gardens for vegetable production. The main reason for seasonal vegetable production can be attributed to water shortages as the region is associated with low rainfall. In some instances, household members travel long distances to fetch water as most water sources dry up during the winter and summer. Landon -Lane (2011) cited in Matei (2018) and Chikoto (2016) also discovered that water shortages are the main reason that prohibit households to grow vegetables all year round especially in regions that receive low amounts of rainfall. This is the case in Tsholotsho as many households do not have water sources that can sustain them from one rainy season to another.

Table 5 16 :Vegetable production

Vegetable production	N	%
All year	52	83.9
Seasonal	10	16.1

Source: Survey 2021

Households that indicated that they could not produce vegetables all year round (n=10) indicated that the main reason behind this was the lack of water sources (score 10). In addition to water shortages, the prevalence of pests and diseases was also highlighted to a contributing factor with a rank of 15.

Results obtained also indicate that pests and diseases are also a hindrance. According to Dissanayake at al. (2017), challenges faced by garden owners include the availability of water, financing in order to foster sustainability, destruction of crops by wild animals, pest and diseases and lack of knowledge on basic agricultural practices. Since there are also family managed and run gardens, financing is a huge blockade to facilitate the smooth running of the gardens, according to Mitchell and Hanstad (2004). Results obtained from the survey are summarised in **Table 5 17.**

Table 5 17: Reasons for not producing all year round.

Reason	Total Rank	Mean Score
Lack of water sources	10	1
Pests and diseases	15	1.5

Source: Survey 2021

Responses from the interview guide also support these claims. According to one respondent, the main reason for seasonal instead of all year vegetable production is the lack of water sources. It was noted that gardening is mostly practiced during the rainy season when there is enough water. It was also noted that most households do not have boreholes and at times travel long distances to get water. Respondents also highlighted that during the dry season, there is high competition for water sources as animals will be also using the same sources of water thus making it scare and inadequate for gardening.

5.4 Conclusion

The chapter compared the mean HDD and HFIAS of garden owners and non-garden owners as well as the establishment of challenges faced by garden owners. In this regard, it was concluded that households with backyard gardens have a wide range of food to choose from and are more food secure than those without gardens. In addition, it was also established that households face challenges to do with capital, inputs, water sources and pests and diseases. The study therefore recommends households to establish gardens and government to intervene to assist both garden and non-garden owners in mitigating challenges that these households are facing.

5.5 Recommendations

Households are encouraged to establish household garden in order to improve their dietary diversity and food security. In addition, support should be given to households in the region to mitigate obstacles that they face in vegetable production. Support should be in the form of capital, inputs, training, pesticides and most importantly water sources. To deal with challenges associated with water availability, the government and other development partners should assist with water harvesting, construction of dams, irrigation systems and boreholes. These interventions will ensure that those without gardens are able to establish them and promote diversified vegetable production and small livestock rearing to diversify their diets and improve food security as well as increase access to food and income. In addition, such interventions will also permit households to produce vegetables all year round since there will be enough water.

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CHAPTER 6

SOCIO-ECONOMIC FACTORS THAT AFFECT GARDEN ESTABLISHMENT IN TSHOLOTSHO.

Abstract

The chapter sought to investigate socio economic factors that influence garden establishment. Qualitative and quantitative data on these factors was collected from 87 households using questionnaires. In identifying factors affecting the establishment of a garden, a binary logistic regression model was developed. In this model, the garden ownership was used as the independent variable whilst socioeconomic factors such as age, education, income, employment and gender were considered as independent variable. Results of the study indicated that household size and employment status are significant in influencing garden establishment. The research therefore recommends that these households should be assisted and be given priority as they have a greater need of food and income.

Keywords: socio-economic, binary logistic regression, independent, dependent, p-value

6.1 Introduction

This chapter intends to bring out factors that affect and influence the establishment of a household garden in Tsholotsho district. The chapter will give an outline of the methodology, the model used in data analysis as well as the presentation and discussion of the results obtained. The chapter will also go further to give a conclusion as well as recommendation in line with study findings.

6.2 Materials and methods

6.2.1 Description of study area

The study was carried out in Tsholotsho district in Matabeleland North province which is under ecological region 5. The region was chosen because it is prone to shocks and hazards such as drought and flooding as a result of its location which is in the low veld. It is characterised by high temperatures and low rainfall. For a more detailed description of the area refer to **Section 3.2.**

6.2.2 Research Design

The research adopted a multi-stakeholder participatory approach to gather both quantitative and qualitative data, primary and secondary data. The use of multiple methods facilitated the validation of data through cross verification from the wide range of available sources (triangulation).

6.2.3 Sampling Procedure

The study targeted 89 households in the district as well as interviews with respondents from organisations that assist farmers. For a detailed description on the sample size and sampling procedure and technique, refer to **Section 3.4.**

6.2.4 Data collection procedure

Questionnaires and key informant interviews were used to collect qualitative and quantitative data from respondents. Quantitative data was collected using a standardized questionnaire. Face-to-face interviews were utilized to direct the topic using guiding open-ended questions. Household demographics and data on garden ownership were among the information gathered. For more details, refer to **Section 3.6**.

6.2.5 Data analysis procedure

A logistic regression model was established to determine demographic factors that influence the establishment of a backyard garden within households. For more details, refer to in **Section 6.3** below.

6.2.6 Challenges encountered during data collect.

Due to covid 19 regulations, the research found it difficult to move from one place to another. More so, some interviews had to be done over the phone which made the process difficult as there was little room for probing.

6.3 Logistic regression model

In identifying factors affecting the establishment of a garden, a binary logistic regression model was developed. In this model, the Garden ownership was used as the independent variable whilst socioeconomic factors such as age, education, income, employment, member of organisation, farm size and gender were considered as independent variable. The table below shows the results that were obtained. The following binary logistic regression equation was estimated.

$$P(g) = \beta_0 + \beta_1 Gndr + \beta_2 Age + \beta_3 Ms + \beta_4 Edu + \beta_5 Sz + \beta_6 Empl + \beta^7 LS + \beta_8 Mo + \varepsilon$$

Where:

- P(g) is the probability of having a functional garden
- Gndr is the gender of the household head
- Age is the age of the household head;
- Ms is the marital status of the Household head.
- Edu is the education level of the household head.
- Sz is the family size associated with the household
- Empl is the employment status of the household head/income
- LS is farm size
- Mo is member of organisation
- E is the stochastic error term

Table 6 1: Binary logistic regression output for factors affecting garden establishment

	B	S.E.	Wald	df	Sig.	Exp(B)
Gender(1)	2.374	1.446	2.698	1	.100	10.744
Age	.058	.043	1.848	1	.174	1.060
Income	3.267	.003	.015	1	**.002***	2.365
Marital status			6.157	3	.104	
Marital status(single)	-25.243	4.262	.956	1	.254	1.254
Marital status(married)	-20.632	5.365	.326	1	.367	2.325
Marital status(divorced)	-18.887	3.654	2.333	1	.865	3.254
Education level			3.430	3	.330	
Education level(none)	-4.179	4.398	.903	1	.342	.015
Education level(primary)	-.425	2.023	.044	1	.834	.654
Education level(secondary)	2.259	2.182	1.072	1	.301	9.571
Household size	1.389	.501	7.682	1	**.006***	4.012
Farm size	.452	.379	1.423	1	**.033***	1.572
Membership of organisation	2.365	.002	3.665	1	.635	3.658
Constant	9.355	19337.633	.000	1	.253	4.365

Source: Survey 2012

6.4 Discussion

Table 4.8 below shows the binary logistic output for the analysis of factors affecting garden production. From the results, income, household size and farm size were found to be statistically significant at 5% significant level. Both had a positive effect to the likelihood of garden production. Income had a B value of 3.26 (p=0.002) highlighting that holding all other factors constant, adding 1USD of income will increase 3.267 binary log odds of one getting into garden production and the likelihood by 2.365 odds of garden ownership. An increase in 1 member of the household (p=0.004) increases the chances of one owning a garden by 1.389 binary log odds and the likelihood of garden ownership by 4.012. Farm size was also found to be significant at 5% significance level (0.033) and an increase in 1 acre of land increases the binary log odds of garden production by 0.452 and the probability by 1.572.

In summary, it can be noted that bigger families are more inclined to establish backyard gardens as opposed to smaller families as there is more demand for food and more people to work in the garden in bigger families than those that are small. More so, those who are unemployed are also more likely to establish backyard garden to supplement their income and diet as compared to those who are formally employed as these are more capable of purchasing more food than the unemployed. Land ownership and land size contribute greatly to home garden establishment. Results obtained are more similar to those obtained by Gbedomon et al. (2015) who postulated that garden ownership is influenced by the land ownership, size of the household, age of the household owner and the employment status of the household head. Mudiwa (2011) also established that land size, farming experience of the household head, number of extension visits, education level of the household head, household size and family labour availability as well as access to output markets are some of the demographic and economic factors affecting garden ownership.

In this regard, it can be concluded that garden ownership is mainly affected by the size of the land, Gbedomon et al. (2015) points at access to suitable and sufficient land to establish a home garden and land to which family has ownership or rights as the most important limiting factor to garden establishment. Maroyi, (2009) highlights that farm size is very significant to home garden establishment. The smaller the size of land owned the less reluctant a household to establish a garden. Land distribution of main fields, homesteads and gardens are community's decision, but once after the allocation, the activities on these plots are no longer controlled by the community, but by individual families. On Main fields, households grow cereals and legumes. Around homes, they grow fruit trees, medicinal plants, shade trees, hedges and ornamental plants. In some example, the family has a small garden dedicated to vegetable production near the homestead. These vegetable gardens are irrigated with kitchen wastewater or water used for domestic supply. Traditionally, families get land for fields and homestead from the kraal heads, family size determining the land size. Later at a stage, they were allocated a garden plot, garden plots can be assigned to individual households or may communally owned.

House hold size is another contributing factor, those with bigger families have more family labour availability hence more inclined to establish a functional garden. Galhena at el (2013) states home garden often uses family labour. Women, children, and elders are of particular importance in their management. In addition to the availability of labour, bigger families

require more food and income to sustain themselves. In this regard, the establishment of a household garden helps them with more food and income to support themselves.

Mudiwa (2011) articulated, household heads who are unemployed find solace in working in backyard gardens. This provides them with food, diversity and most importantly income to meet other expenses as they do not have other stable and reliant sources of income compared to their employed counterparts. Many families rely on food sales, especially home garden produce to meet other basic needs, such as clothing, healthcare, and tuition. In addition, data from key informants elicited a positive answer from 75% of people on the sale of farm agricultural products. Gelhena (2013) articulates the economic benefits of a home garden go beyond food and nutritional safety and survival, especially for resource-poor families. Bibliographic evidence shows home gardens help to generate income, improve livelihoods and family economic welfare and promote entrepreneurship and rural development. Although home gardens can generate income, this should only be done if the food needs of the family are met. Families should be encouraged to increase home gardening products in order to have enough to consume, save for future use and sell the remaining income. This is necessary for food security and good nutrition.

Gender also plays a role in garden establishment, in communal areas, home gardens are usually run by women, as are garden-related activities, such as the sale of vegetables and fruits. Joint activities do exist, such as compost collection, livestock manure collection and weeding. However, manual tasks such as fencing, termite digging, livestock manure, and cultivating home gardens are usually performed by men. Maroyi, (2009). Galhena at el (2013) articulates that in many cultures, women play an important role in food production and are active participants in home gardening activities. Home gardens they are instrumental in improving the women's income and social status. While women's contribution to household food production is greater, it is incorrect to conclude that home gardening is mainly a female activity.

6.5 Conclusion

The study analysed socio-economic factors affecting the establishment of a household garden. It was discovered that household heads with access to land, bigger families, unemployed and female headed families have a higher probability of establishing a garden as compared to those who are employed and with smaller families and limited land access. In this regard, government and NGO policies and intervention initiatives should target these the most as they are the ones

who are in most need of support in order to improve their HDD and HFIAS as well as income generation.

6.6 Recommendations

The study recommends that more support should be given to households with bigger families as these are the ones that are more likely to establish household garden and more prone to poverty risks as they need more food to support themselves. Women empowerment in garden activates and food production is key. In addition, priority should also be shifted towards those that are unemployed and have access to land. Assisting these and encouraging them to establish household gardens will go a long way in improving their HDD and HFIAS as well as income.

Farm size is very significant to home garden establishment. The smaller the size of land owned the less reluctant a household to establish a garden. Land distribution of main fields, homesteads and gardens are community's decision, but once after the allocation, the activities on these plots are no longer controlled by the community, but by individual families. On Main fields, households grow cereals and legumes. Around homes, they grow fruit trees, medicinal plants, shade trees, hedges and ornamental plants. In some example, the family has a small garden dedicated to vegetable production near the homestead. These vegetable gardens are irrigated with kitchen wastewater or water used for domestic supply. Traditionally, families get land for fields and homestead from the kraal heads, family size determining the land size. Later at a stage, they were allocated a garden plot, garden plots can be assigned to individual households or may communally owned.

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CHAPTER 7
SUMMARY CONCLUSION AND RECOMMENDATIONS

7.1 Introduction

This chapter provides a condensed review of the research study, including a summary of the research, methods, and findings. This chapter contains the summary results and suggestions, policy implications and recommendations based on the research findings, areas for further research based on the identified gaps, and appendices. The information collected from the findings led the research.

7.2 Research summary

The study has shown that most households involved within the region are relatively poor, unemployed and depend on agriculture as their main source of income and food. It was also established that most households have backyard gardens and the main reasons for the establishment of these backyard gardens are to diversify household diets, save money, more food security as well as to generate income. Households with food garden were found to be better off in terms of dietary diversity and food security as compared to those without functional gardens. In addition, it was also noted that households face a myriad of challenges in gardening. These challenges included water shortages, lack of inputs and capital, pests and diseases amongst others. These challenges hindered those without gardens from establishing them and prevented some with gardens from producing vegetables all year round. These challenges also affected dietary diversity and food securing amongst households within the region. In determining factors affecting garden establishment, it was noted that land availability, unemployed household heads and larger families have a higher probability of establishing household gardens as compared to their employed counterparts and those with relatively smaller families.

7.3 Conclusion

In line with the study findings, the researcher concludes that the establishment of backyard gardens plays a very crucial role in improving dietary diversification as well as food security in households within the region. Households with gardens are more food secure and obtain more income and manage to cope with the harsh conditions of the economy in which there is a high rate of unemployment. Even though household gardens play a crucial role in dietary diversification and food security within the region, households still face challenges associate with funding, inputs and water shortages. This hinders them from effectively and efficiently

utilizing these gardens to the maximum. There is therefore the need to implement intervention earmarked at addressing such challenges in order to enhance the livelihoods of households within the Tsholotsho region.

7. 4 Policy implication and recommendations

7.4.1 Government and NGOs

Food insecurity and poor dietary diversification is a problem that is faced by many poor households in rural areas. In this regard, there is need for policy interventions to chip in and address such issues amongst poor and unemployed rural households. As established by the study, households with backyard gardens are better off in terms of dietary diversification and are relatively more food secure as compared to those without gardens.

In relation with this, there is need for raising awareness on the importance of backyard gardens and diversified planting, promotion of home gardening programs. This will encourage more households to establish these in order to be more food and income secure. In addition, the study recommends that support should be given to all households in terms of inputs, training, capital, establishment of reliable markets as well as other resources so as to encourage garden establishment and to allow households to manage problems associated with gardening.

In addition, the study also recommends that more sources of water be established to ensure that shortages are eradicated, and vegetable production is done all year round.

7.4.2 Research

There is a need for research on the cost-benefit analysis of home gardening to determine the economic value and to derive viable models that hold the most promise in diverse circumstances. The areas of access to new technologies, extension and advisory services, economic and non-economic benefits, women empowerment, and long-term sustainability of home gardens in rural vulnerable regions need further research.

7.4.3 Extension services

As indicated in the study households are more inclined in the production of one or two crops (green vegetables), there is need to promote diversified seed planting to promote dietary diversity. There is also need to educate household on farming as a business and creation of market linkages to promote more sustainable livelihoods and incomes from home gardening.

7.4.4 Community

There is need to invest more and acquire knowledge about sustainable, diversified home gardening in semi-arid region like Tsholotsho faced with low rainfall. Shifting the mind set from the traditional way of home gardening, while indigenous Knowledge is vital for adaptation, there is need to harness other useful knowledge for continuous improvement in a sustainable way. Such knowledge includes rain water harvesting technology, forming groups in order to access financing for drilling boreholes because irrigation is an alternative sustainable way for food production, farming(gardening) as a business, small livestock rearing, diversified seed planting, pest control and conservation agriculture. These promote sustainable livelihoods, incomes, food security and dietary

7.5 Areas for further research

The research managed to establish the importance and contribution of household gardens by comparing the HDD and HFIAS of households with and without gardens as well as to establish the socio-economic aspects that encourage the establishment of household gardens in Tsholotsho which is a rural setup located in a dry region. Therefore, the study recommends further studies be done in other natural regions including urban setups. Further studies should also go beyond socio-economic determinants of garden establishment and capture other aspects such as the availability of markets, price of garden output, availability of land and long-term sustainability of home gardens in rural vulnerable regions amongst other factors.

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7.7 Appendices

QUESTIONNAIRE ON THE ASSESSMENT OF THE CONTRIBUTION OF HOUSEHOLD GARDENS TO HOUSEHOLD FOOD INSECURITY AND DIETARY DIVERSITY

My name is Nomsa Lee Tauya. I am a student at Bindura University of Science Education studying for a Master of Science Degree in Food Security and sustainable Agriculture. I am doing a study into the role of household gardens in alleviating household food insecurity and dietary diversity in Tsholotsho District. May you provide me with the relevant information to the questions below. The interview may take a maximum of 45 minutes. The recommendations of the study are going to be shared with interveners, policy makers and nutrition expects.

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

Enumerator name……..…… Name of respondent……
District name…….... Village name…….....
Ward……..... Date...…….....

A. HOUSEHOLD DEMOGRAPHIC AND SOCIO ECONOMC INFORMATION					
1. Head of household					
a. Gender	Male			Female	
b. Age					
c. Marital status	Married	Single		Divorced	Widowed
d. Highest level of education of household head					
	No formal or informal education	Informal education	Primary	Secondary	Tertiary education
e. Highest level of education of any household member					
	No formal or informal education	Informal education	Primary	Secondary	Tertiary education
2. What is your principal occupation?					
3. What is the size of your household?		Adults (≥18)	Children (<18)		
	Male				
	Female				
4 Do you have a functional household garden		**Yes**	**No**		
5. What are your sources of income? (Rank 1 as the most important source of income)					
	Source	**Amount in the last 4 weeks**	**Rank**		
	Crops production / sale				
	Vegetables production / sale				
	Livestock production/ sale				

	Poultry production / sale		
	Salary/wages		
	Pension/grants		
	Trade (transport, resale of goods)		
	Sale of wild foods		
	Craftwork (mats, baskets, pots)		
	Community projects		
	Remittances		
	Other (specify)		

6. Are you receiving any support from the Government /NGOs in form of input food assistance, training?

Organization	Input		Market value

B. HOUSEHOLD FOOD SECURITY STATUS

1. What are your sources of food? (Rank 1 as the most important source of food)

Own crop production	Purchase	Wild food collection		Food aid
Own livestock products	Barter	Food for work		Steal
Food at work	Gifts of food	Loans		Stocks
Food at school	Fishing	Hunting		Friends/relatives

Other sources of food(Specify):

2. What types of foods did you or anyone else in your household ate yesterday during the day and night at your home. (didn't eat=N and ate=Y) **and number eaten in the last 7 days. What are the food sources??**

	N/Y	**Last 7 days (1-7)**	**If yes Source**
Any foods made from maize, wheat, rice or any other locally available grain e.g stamp, pap, bread			
Any potatoes or any other food made from roots or tubers,			
Any vegetables			
Any fruits			
Any meat, poultry or offal			
Any eggs			
Any fresh or dried fish and seafood			
Any foods made from beans, peas or nuts			
Any cheese, yogurt, milk or other milk products			
Any food made from oil, fat or butter			
Any sugar or honey			
Any other foods such as coffee, tea and condiments			

3. On average, how many meals do you have per day?				
4. Do you think you have access to enough food?	Yes		No	

5. How do you rate your level of access to food nowadays as compared to last year?

No change	Better	Fair		Worse off

Please note:
Question 6 is about food accessibility from your garden in the past 4 weeks (1 month

6. If yes to the following questions, how often did this happen?
0= Never**; 1** = Rarely (once or twice in the past four weeks); **2** = Sometimes (three to ten times in the past four weeks); **3**= Often (more than ten times in the past four weeks)

a. Did you worry that your household would not have enough food?		
b. Were you or any household member not able to eat the kinds of foods you preferred because of a lack of resources?		
c. Did you or any household member have to eat a limited variety of foods due to a lack of resources?		
d. Did you or any household member have to eat some foods that you really did not want because of a lack of resources to obtain other types of food?		
e. Did you or any household member have to eat a smaller meal than you felt you needed because there was not enough food?		
F . Did you or any household member have to eat fewer meals in a day because there was not enough food?		
g. Was there ever no food to eat of any kind in your household because of lack of resources to get food?		
h. Did you or any household member go to sleep at night hungry because there was not enough food?		
i. Did you or any household member go a whole day and night without eating anything because there was not enough food?		

7. When do you usually encounter food shortages?(you may tick more than once)

Any time of the month	Just before month end	Before harvesting			**Other times:**

8. What is causing food shortages in your household? (Rank)

Income not increasing at the rate of inflation		
Poor harvest due to drought		
Poor harvest due to high temperatures		
Poor harvest due to pests and diseases		
Poor harvest due to hail storm		
Poor harvest due to late rainfall		
Lack of agricultural inputs		
Poor salaries		
Retirement		
Retrenchment		
Increase in household size		
Death of the main food provider		
Other (specify)		

C. GARDENING			
1. What agricultural activities do you practice other than gardens?			
Livestock	Crops	Gardening	None

2.(For those with gardens only) Which vegetables/fruit do you currently grow? (Rank 1 as the most commonly grown vegetable)

			Purpose of production		
Vegetable/fruit	Rank	Area (L x W)	Consumption	Sale	Other specify

2b.How do you use the money obtained from selling garden produce?

Food	Health	Education	Livestock	Others specify

Food accessed from the garden or purchased through garden produce in the past 4 weeks

Garden produce	**Food purchased through garden produce sales**

3. What do you consider to be the main problem in vegetable production? (Rank 1 as the most important problem)

Problem	**Rank**	**Problem**	**Rank**
Labour		Low temperature	
Input supply		Low rainfall	
High costs of inputs		Hail storm	
Lack of equipment		Lack of water sources	
High temperatures		Theft	
Low temperatures		Lack of Capital	
Land shortage		No proper structures (no fence)	
Late planting		Lack of skills	
No markets		Pests	
Other (specify):			

4. Can you produce vegetables all year round	**YES**	**NO**

Rank the reasons why you cannot grow the vegetables all year round

Reason	**Rank**	**Reason**	**Rank**
Laborious		Low temperature	
Lack of Input supply		Low rainfall	
High costs of inputs		Hail storm	

Lack of equipment		Lack of water sources	
High temperatures		Theft	
wild life / domestic animals		Lack of Capital	
Land shortage		No proper structures (no fence)	
Late planting		Lack of skills	
No markets		Pests	
Other (specify):			

THANK YOU