THE CONTRIBUTION OF NUTRITIONAL GARDENS TO FOOD SECURITY AND DIETARY DIVERSITY: THE CASE OF BINDURA DISTRICT IN ZIMBABWE

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

Bindura University of Science Education

Faculty of Agriculture and Environmental Science

Department of Agricultural Economics, Education and Extension

Ratidzai Mufari

(B1749547)

Name of Supervisor:

Ms D Manyumwa, Bindura University of Science Education

June 2019

RELEASE FORM

Name of Candidate: **Ratidzai Mufari**

Reg Number: **B1749547**

Degree: Master of Science Degree in Food Security and Sustainable Agriculture

Project Title: THE CONTRIBUTION OF NUTRITIONAL GARDENS TO FOOD SECURITY AND DIETARY DIVERSITY: THE CASE OF BINDURA DISTRICT IN ZIMBABWE

Permission is hereby granted to **Bindura University of Science Education Library** to produce a single copy of this dissertation and lend such copy for private, scholarly or scientific research only.

Signed 

Permanent Address: Dindinyongwe Secondary School P Bag 605 East Harare, Zimbabwe

THE CONTRIBUTION OF NUTRITIONAL GARDENS TO FOOD SECURITY AND DIETARY DIVERSITY: THE CASE OF BINDURA DISTRICT IN ZIMBABWE

APPROVAL FORM

The undersigned certified that they have supervised and recommended to Bindura University of Science Education for acceptance of dissertation entitled THE CONTRIBUTION OF NUTRITIONAL GARDENS TO FOOD SECURITY AND DIETARY DIVERSITY: THE CASE OF BINDURA DISTRICT IN ZIMBABWE

Submitted in partial fulfillment of a Master of Science Degree in Food Security and Sustainable Agriculture (Production).

Ms Manyumwa ……..

Signature: ……...

Date: **……..**

DECLARATION

I hereby declare that the research project entitled THE CONTRIBUTION OF NUTRITIONAL GARDENS TO FOOD SECURITY AND DIETARY DIVERSITY: THE CASE OF BINDURA DISTRICT IN 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 Ms D Manyumwa (BUSE) 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.

Author: Ratidzai Mufri

Reg Number: B1749547

Signature: 

Date: 30 June 2019

DEDICATION

This project is dedicated to my husband Demojena Marvelous Chikowe for his unwavering support and to my children Panashe Chipo, Marvelous and Carla Ruvarashe Chikowe for understanding me during this very busy period.

ACKNOWLEDGEMENTS

My heart is indebted to my supervisor Ms D Manyumwa for her rich guidance through the entire project. I acknowledge the work of Professor Nyamadzawo, Dr B Masamha, Dr L Musemwa, Dr Gadzirayi and Dr Chivheya for their help in imparting skills that helped me complete my research project. I cannot forget to thank my supervisor at workplace Mr Paul Njowa and former colleague Mrs Vimbai Marvellous Chirochierwa for their moral support during the course work. Mother Chima, Dela-ElsieTapera Chabata, Stephen Masango, Mukutiri Faith, Progress Daka and Daniel Siya, and the entire Bindura District Team that facilitated my data collection for this research. Special thanks to all my research assistants for the special role they played as participant observers during the fielding of questionnaires and to Ward 11and 12 councillors and headmen at different areas who joined the various focused groups and offered vital information during the sessions. I would like to extend my extraordinary thanks to the **Almighty God** for his kindness. Last but not least, I am grateful to my family, especially my husband Demojena Marvelous Chikowe, for his endless support and encouragement up to the end of this project.

ABSTRACT

Nutritional gardens are an effective strategy for decreasing micronutrient deficiencies to population down to household level. Food security and nutritional diversity are one of the key areas that a low income country should address. With varying local opportunities and challenges, the nutritional garden forms a panacea to food insecurity and bring in self-reliance, sovereignty and dignity. Households have labour power– the physical ability of household members to generate income (Christopher, 2006). When this labour power is used in the nutritional garden it has the ability to improve food security and nutritional diversity of the household. This research was undertaken on ward 11 and12 households in Bindura South to examine the role of nutritional gardens in addressing food security and nutritional diversity. The research used both qualitative and quantitative approach to collect data from households and stakeholders. Stratified sample was used to pick household respondents. The findings show that the nutritional gardens in Bindura District are small organic gardens which were started about ten years ago. The majority of them are about 600 m^2 Almost 48% of the respondents do not buy vegetables after establishing nutritional gardens as compared to 4.2% who were not buying vegetables before the gardens were formalised. About 99% of the respondents think that the nutritional gardens have improved their nutritional diversity. Compared to the monoculture of the few gardens that existed before the formal gardens, more than 18 different varieties of vegetable and fruits were recorded in different households during the study indicating that a wide diversity has been achieved. 85 % have replicated the garden in their urban homes, and 98% have learnt a new skill indicating that the kitchen garden seems to be positively addressing food security and nutritional diversity and further demonstrating the central role of agriculture in meeting household needs. Bindura District Agriculture Research and Extension Officers (AREX) should continue popularising the nutritional garden to bring more household to self-sufficiency in vegetable supply.

Keywords: Food Security, Nutritional Diversity, micronutrient deficiencies

Contents

LIST OF ACRONYMS AND ABBREVIATIONS

AIDS	Acquired Immune- Deficiency Syndrome
HIV	Human Immune – Virus
DFID	Department Of Interrelation Development
FAO	Food and Agricultural Organization of the United Nations
WHO	World Health Organization
FGD	Focused Group Discussion
AVLs	African Leafy Vegetables
UN	United Nations
AREX	Agriculture Research and Extension
CSO	Control Statistics Office
HFS	Household Food Security
SPSS	Statistical Package for Social Sciences
UN	United Nations
UNDP	United Nations Development Programme
ZimVac	Zimbabwe Vulnerability Assessment Committee

LIST OF TABLES

LIST OF FIGURES

CHAPTER ONE: INTRODUCTION AND BACKGROUND TO STUDY

1.0 Introduction

Effective agricultural production plays an essential role in the attainment of food security globally. Most developing countries, including Zimbabwe, have low food security indices and as such have been relying on humanitarian responses by the United Nation agencies and other non-governmental institutions to ensuring food security in situations of dire need such as severe drought due to insufficient or incessant rainfall. The World Bank (2007) pointed out that agriculture accounts for about 30% of sub-Saharan countries' GDP and almost 75% employment. The scarcity of food is usually attributed by a number of factors that included impact of climate change, high population growth, competition of food and cash crops production, and impact of the HIV and AIDS pandemic and non-communicable diseases on agricultural production and cost of available food products on the market. Erratic rainfall in these regions presents challenges to food production (Fisher, 2004). The situation is also a big challenge in Zimbabwe where food shortages and malnutrition present serious problems to households. Rising poverty levels undermine good nutrition. The provision of adequate food is a basic human right which fulfils the Sustainable development goals (ZimVAC 2010). However, several mitigation measures have been tried such as command agriculture, irrigation, cloud seeding, dam construction and water harvesting, farm mechanisation and adoption of nutritional gardens. This study examined the role of nutrition gardens as a localized strategy in contributing to food security and dietary diversity using the case of Bindura District in Mashonaland Central Province of Zimbabwe. Most farmers in Zimbabwe focus on staple food crops such as maize, millet and sorghum forgetting the small micronutrient crops as well as vegetable gardens (Mutambara et al 2013). This study focused on nutritional sensitive agriculture which addresses the four pillars of food security that are availability, accessibility, utilization and sustainability.

1.1 Background to the study

Zimbabwe has been for past several decades regarded as the bread basket of Southern African as a result of high and excess food production. However, due to high population growth, rural-urban migration and the impacts of climate change there is increased the cost of food (Silvia, 2012) in

Zimbabwe and the world over. Food production is gradually dwindling in Zimbabwe. Furthermore the increased competition between food and cash crops as well as biodiesel production and food consumption have put further imbalance to food supply which affects the demand /supply relationship. Humanitarian assistance has proved to be unsustainable in Zimbabwe and it needs to be reinforced with long-term interventions such as nutritional gardens (Concern, 2009). Non communicable diseases are further worsening the situation especially among the low income groups. This will result in more people becoming food insecure. The food insecure groups need to devise ways which better align aesthetics, ecology and health (Denver Urban Gardens, 2012) such as nutritional gardens. According to Food and Nutritional Council (2010), there is need for governments to promote the introduction and expansion of nutritional gardens to improve food availability and dietary diversity. Maximum co-operation among households leads to increased adoption of nutritional gardens (Soroti, 2007).

Nutritional gardens have the potential to contribute to improved food security in Zimbabwe if production is scaled up. The nutritional gardens can be viewed as an adaptive strategy of communities as an entry point for development. Short term humanitarian responses need to be reinforced with longer term programmes to meet the needs of the most vulnerable subsistence farmers especially in areas of high HIV prevalence. Increasing male farmers have migrated to work in commercial farms, mines or they have relocated to South Africa and Mozambique. This has left many female headed households with little support to work on land. This is increased by lack of water resources, fertilisers and different varieties of seeds and other agricultural extension services. Most are struggling with HIV either because they are sick or they are affected and looking after children of relatives who have passed away.

In Bindura District Ward11 and 12, there is a high prevalence of HIV which stands at about 25% of the population being infected with the virus. Two hundred and fifty-five people are on ART from the statistics obtained from the local health centre. Thirty percent (30%) of the children under five are also malnourished. Nutritional gardens tend to benefit everyone in society. The elderly, the sick the bed-ridden and the young children in society benefit from nutritional vegetable gardens. Women and children also benefit from increased dietary diversity. It also improves the safety nets of households especially during lean periods like prior to harvesting periods from

January to March. Bonnard (2010) noted that nutritional gardens tend to provide a nutritional supplement and they are a source of income.

The key questions the researcher asked are what is the impact of introducing and adopting nutritional gardens with Bindura District population? How can the production from the nutritional gardens be optimized to enhance food security in terms of availability, utilisation, accessibility and sustainability in a high HIV prevalent community? What benefits are derived from adopting the nutritional gardens practice of food production in Bindura District Ward 11 and 12 where the majority of the population living with the HIV needed improved immune systems, better resistance to opportunistic infections and more disposable incomes through the sale of surplus produce. The beneficiaries of nutrition gardens are many and varied as they range from infants to the eldest members of society. Everyone stands to benefit from these gardens. The young children will resist malnutrition through the availing of a balanced diet. There is also improved resistance to diseases among the young and the elderly.

A Nutritional garden is an integrated system which comprises the family house a recreational area and a garden producing a variety of foods including vegetables, fruits and medicinal plants for home consumption or sale The kitchen gardens have been found to play an important role in improving food security for the resource poor households in developing countries like Bangladesh (Asaduzzan, 2011) and can do the same in Zimbabwe. A nutritional garden is different from an ordinary vegetable garden in that it comprises of high nutrition value vegetables such as carrots, sugar beans, squash or butternuts, herbs, peas, garlic and pumpkin. Proper care is taken to ensure that sustainability is maintained. The researcher noted that many research studies have been conducted on ordinary vegetable gardens but, the role of nutrition in contribution to food security in terms of its four pillars namely accessibility, availability, utilisation and sustainability has been overlooked by most of these research studies(Mutambara etal,2013).Hence the researcher identified this research gap and decided to carry out a research on the contribution of nutritional gardens to food security and nutritional diversity.

Nutritional gardens also help in biodiversity conservation and create a platform of socializing the younger generation into the communities ‘norms as they interact with older people while tending

gardens. The higher demand for food should be met by practical innovations like nutritional gardening which improves availability and diversity required for a healthy community. Whether they are known as home, mixed, backyard, nutritional or homestead gardens family food production systems are found in most regions of most countries the world over. They may be the oldest production system and their persistence is proof of their intrinsic economic ad nutritional merit. Traditional nutritional gardens typically exhibit a wide diversity of perennial and semi-perennial crops, trees and shrubs which are well adapted to local microclimates and maintained with minimum purchased inputs. Some traditional nutritional gardens have proved to have ecologically sound regenerative properties by which the "recreate natural forest conditions" and minimise the need for crop management. Usually the output of home gardening complement field agriculture. Whereas the bulk of field crops provide energy needed by the household, the garden supplements the diet by providing vitamin-rich vegetables and fruits, energy rich vegetable staples and minerals.

1.2 Statement of the Problem

Rural households lack sufficient capital to meet their food and nutritional demands adequately. An alternative way of improving their food supply is practicing vegetable garden farming. African countries contribute the highest human development index in terms of GDP but this has not been translated into food security (Goswan, 2012). In the developing countries food production has gone down as a result of poor governance, poor land management, and marginalization of the peasant production and rural -urban migration which has deprived the food production areas of the much needed workforce. Staple crops are the dominant crops grown at the expense of other crops which make a balanced diet. These crops include vegetables such as carrots, spinach, lettuce, cucumbers, and sugar beans. Nutritional sensitive agriculture should be promoted through nutritional gardens to address health issues.

1.3 Aim of the study

Based on the statement of the problem above, the research study set out to examine the role or contribution of nutritional gardens to household and national food and nutritional security and nutritional diversity in terms of accessibility, availability utilization and sustainability among the population in a selected local community. The researcher also wanted to find out whether women and children benefit from being involved in running nutritional gardens. Finally the researcher

sought to find out the extent to which nutritional gardens significantly contribute to household food security? Besides household food security, what other benefits are brought about by nutritional gardens?

1.3.1 Main objective

To examine the contribution of nutritional gardens to food security and dietary diversity at household level among the population in Bindura District wards 11and 12 of Mashonaland Central Province.

1.3.2 Specific objectives

(i) To identify crops grown in nutritional gardens.

(ii) To assess how nutritional gardens have influenced food security and dietary diversity.

(iii) Establish the challenges associated with nutritional gardens and identify strategies employed by members of nutritional gardens in mitigating the challenges.

1.4 Research Questions

The research questions that the study set out to answer are;

1. Which crops are grown in nutritional gardens?

2. To what extent have nutritional gardens impacted on food security and dietary diversity of Bindura District households?

3. What challenges do nutritional gardens face and how can they be overcome?

1.5 Significance of the study /Justification

Nutritional gardens are important in the domestic economy of the marginalized although their contribution is often underrated. The multiple potential benefits of nutritional gardens, of which the most important is increased direct access to nutritious foods by the food insecure have prompted the researcher to carry out a research on the role of nutritional gardens in improving food security in Bindura District of Mashonaland Central Province of Zimbabwe.

Nutritional gardens contribute to household food security by providing direct access to food that can be harvested, prepared and fed to family members, usually on a daily basis. Even the very poor, landless or near landless people practice gardening on small patches along water bodies, on roadsides or edges of a field. Minimum resources are required to kick-start a home garden using

locally available planting materials, green manures, “live” fencing and indigenous methods of pest control. Thus, home gardening at some level is a production system that the poor can easily carry out. Mashonaland Central lies in natural farming region 2 where the total rainfall received exceeds 800mm per annum and it is endowed with fertile soils. The majority of households in this province have access to pieces of land where they can access water with much ease. Some areas are geographically positioned in such a way that they are easy to irrigate using gravitational force to draw water from highlands to lowland areas.

The availability of vegetables and fruits in a nutrition garden would increase consumption and hence fight malnutrition. Quality of life would also be greatly improved through the sale of surplus vegetables. Among the barriers that deter consumption of fruits and vegetables are costs, availability and acceptance. Nutritional gardens have been found to lower these barriers as the cost of production is low as the participants invest in their own labour and other production functions like land and organic fertilizer (Dibsdal, 2011).The individual production will certainly grow varieties that one would like thus increase access and acceptance of fruits and vegetables. Herbs and condiments improve the taste of food and thereby encourage consumption.

Poor people usually pay a higher price for food as they buy in expensive small quantities and they travel far to buy where the food is relatively cheaper. Therefore, nutritional gardens can be argued to improve access to food to the vulnerable groups. They also provide and supplement subsistence requirements and generate secondary direct or indirect income (Ninez, 1984). Direct income is realised from sales of surplus produce, while the indirect income is from the savings achieved by not buying the same products from the market and also from butter trade when produce is exchanged with other items from the neighbours. Gardening provides an aesthetic and therapeutic exercise that helps in relieving stress which further improves the wellbeing of the participants.
Africa Leafy Vegetables (ALVs) form part of the richest sources of vitamins for human consumption. African Spinach happens to be the most common in African diets (Oiye, 2009). Micronutrient deficiencies in iron, selenium, copper, zinc and iodine affects many people In Africa. The nutritional Garden through the advent of bio-fortification and adoption of ALVs will certainly address the much needed nutritional diversity.

1.6 Scope/Delimitations and Limitation of the study

The study covered the ward 11 and 12 households of Bindura South District in Mashonaland Central province. The target households were those that practice nutritional gardening. It also focused on the impact of vegetable gardens on food security and household nutritional diversity. The area is a rural one which is mainly agro-based. The people are dominantly women and children and they are not gainfully employed, they rely on income generating projects like nutritional gardens to economically sustain themselves. Considering that cash is hard to get in most rural areas, the researcher found it noble to study how these rural dwellers find their means of livelihood through nutritional gardens and to what extent they benefit from the ventures.

The researcher targeted this area because of the need to find out how rural people utilise resources available to them like land and water for their own benefit especially in formal nutritional gardens. The farmers have no other source of livelihood and they can make nutrition more diverse through abundant outputs produced in nutritional gardens.Ward 11and12 have twenty -three villages namely Jingo, Chawonza, Chitauro,Chiriseri, Chigiji ,Besa, Mukwesha,Masembura ,Chima,Mapfudzanwa,Chitunhu, Mushore, Masembura, Tsunda, Zhenje, Shamba, Chikupo, Timuri, Ngoshi,Mashayamvura,Mhunza and Gombamwa. The total number of households at the time of the study was 1300.Since the study was conducted in a peri-urban environment, the results may not be applicable to urban areas. However, they may be true for other parts of Zimbabwe that have similar characteristics.

REFERENCES

Bonard D., (2010). Identifying The Drivers Of Sustainable Rural Growth And Poverty Education In Zimbabwe. DSDG Discussion Paper 19.

Carrey D. (1998) Sustainable Rural Livelihood – What Contribution Can We Make? Department For International Development, London.

Central Statistical Office, (2002) Income And Expenditure Survey Report July 2002, Government Of Zimbabwe, Harare.

CFTRI., (2006) Developing Policy Orientation Monitoring And Analysis Of Human Development In Indonesia. Innocent Working, Paper No.83. Unicef.

Concern Worldwide Zimbabwe , (2009). Growth Options And Poverty Reduction In Zimbabwe. A Spatial Economy Wide Model Analysis For 2004 – 2005.

Concern; (2009). Review Of Garden Based Learning . School Gardens, Agricultural Education , Nutrition Education, Junior Farmer Field And Life Schools, Harare.

Fisher M., (2004). Global Agricultural Statistics For Agriculture, World Health Organisation, Geneva.

Food And Agriculture Organisation (FAO): (2010) Nutrition And Consumer Protection. Household Food Security And Community Improving Nutrition Through Home Gardening.

ICRISAT. (2010). Having Hunger Through Nutritional Interventions.

Soroti C, (2007). A Capital Assets Framework For Household Livelihood Strategies Development Policy Review 17 (3) 315-42. UNDP , (2003), Zimbabwe Human Development Report 2003, Poverty Reduction Forum, University Of Zimbabwe Harare.

Waterfields., (2007). Growing Urban Health : Community Gardening In South East Toronto.

ZimVac (2010) Strengthening Food Security Analysis In Zimbabwe, Institutional Framework For Moving Forward, Harare May 2010.

CHAPTER TWO: LITERATURE REVIEW

2.0 Introduction

Nutritional gardens have been given various names and different definitions have been used to describe them. For this research paper nutritional gardens entails scale enterprise relatively confined units located close to the family homestead. Nutritional gardens have evolved with man over a long period of time but they still remain ancient and the most persevering form of cultivation (Kimber, 2004). Nutritional gardens fall within the definition of urban agriculture. This is the practice of cultivation processing and distribution of food in, and around a village, town or city. It may include the keeping of small livestock such as rabbits, chickens and bees.

The discourse of achieving food security should not be left to the arenas of national discussion but should start at the lowest levels through communal interventions that feed into the national whole. Nutritional gardens come in handy to fil this gap and they help to ensure food self-sufficiency and avoid reliance on donor aid which is not sustainable. Nutritional gardens have multiple benefits for communal households such as optimised health, reduced risk of diet-related chronic diseases and increased enjoyment of food among community members. Nutritional gardens also offer a balanced diet through dietary change that compliments the seasonal availability of foods produced and processed by the local food and agricultural system they also help to improve access to an adequate and nutritious diet for the entire household.

In the USA nutritional gardens came into the limelight during the second world war due to food shortages, labour and transport the government urged people to grow their own fruits and vegetables I what were called “victory gardens”. It encouraged patriotism as people felt duty-bound when they contributed to food security through these victory gardens the production of vegetables and fruits in gardens was economically and nutritionally valuable for the poor (Kemp ,1977).

In Germany there are German garden ghettos which are found on the outskirts of cities. Families rent these plots and they spend their weekends there teaching their young ones how to grow vegetables(German Survival Bible, 2006).These gardens have enabled man produce relatively large amounts of food from relatively small extensions of land, provide fresh produce and supply adequate nutrition not obtained solely from field agriculture, for example spices.

Nutritional gardens provide fodder for household animals like rabbits and chicken, accrue in kind or cash benefits when they are exchanged with money or other needs with the neighbours, and they obtain secure production though their close proximity to the dwellings in terms of time and space. They are a source of clean supplies of vegetables as they are less contaminated due to a reduced number of people handling them. They guarantee women a regular ad secure supply of food, petty cash or goods for trade. Nutritional gardens also for an important role in in-situ biodiversity (Eyzaguire, 2001).they provide aesthetic value which in turn provides therapeutic healing to the community. The garden offers physical exercises to the family members which guards against obesity. Availability of fruits and vegetables induces their consumption.(Oniang'o,2009) pointed out that African Leafy Vegetables ALVs form part of the richest sources of vitamin for human consumption about 45000 species are found in Africa of which1000 are edible the African Spinach is very popular in Africa diets.

According to WHO/FAO vegetable consumption is 147kgs per person per annum. ALVS have been found to be to be more important than the brassicas in Yaoundé Cameroon for household consumption and income generation for poor households (Shiudu, 2007).Iron deficiency affects over 50% of the world's population mostly in the developing countries (WHO, 2004). This results in in about 30% impairment in physical capacity and performance (WHO, 2001). The ALVs that are products of nutritional gardens provides a stable supply of this essential iron. The traditional vegetables meet the main protein calorie nutritional needs for children, the sick, elderly, expectant and lactating mothers (FAO, 2005).

2.1 Nutritional Gardens and Food Security

In 1974 at the World Food Summit in Rome, FAO defined food security as "availability at all times, of adequate world food supplies of basic foodstuffs to sustain a steady expansion of food consumption and to offset fluctuation in production and prices" (FAO, 2003) .The most widely accepted definition of food security is that of the World Bank (1986)which asserts that food security exists when "all people, at all times have physical and economic access to sufficient, safe and nutritious food for an active and healthy life" (FAO,2003) The definition dwells on four aspects that is availability, accessibility, utilization and sustainability. Many famines In the world occur not due to lack of food, but due to its poor distribution caused by government

policies, perishability of the food and also due to geographical challenges.in Bengal in 1943, there was a bumper rice harvest but hundreds of labourers starved to death due to their vulnerability and lack of security of livelihood that will secure food (Department for International Development (DFID), 2004).

The nutritional garden is the principal source of household food and income during periods of stress, for example, the pre-harvest lean season, harvest failure, prolonged unemployment, health or other disabilities suffered by family members or civil wars. E.g. the post-election violence in Kenya in 2008. Nutritional gardens provide household food security by providing direct access to food that can be harvested, prepared and fed to family members .local resources and minimum capital may be used to kick-start these gardens. Small pieces of land are also ideal for the practice of nutritional gardening. Marsh (1998) pointed out that nutritional gardening provides a diversity of fresh foods that improve the quality and quantity of food rich in nutrients available to the family.

2.2.1 Food Accessibility and Vulnerability

There are various factors that hinder people's access to food and render them more vulnerable to food insecurity. Globalization, geo-politics, geographical barriers, level of economic development, gender, income, religion, weather hazards and culture are among the wide range of factors that impact greatly in access to food. Ironically the world has sufficient food to feed the current population, but the food happens to be in the wrong hands, at the wrong place and at the wrong time or I a form that is not palatable to people.

Challenges to food access include low economic growth resulting in lac of opportunities to become active members in the economy (USAID, 1992).

Globalization has broken down both the physical and mental barriers and this has brought unrealistic perceptions of access to food. The adverts in the media and in market places of food from afar tend to make food look cheaper than what is really prevailing on the ground. We are like people in an ocean of food which is visible to us through a thick glass which can only be broken by monetary exchange.

Vulnerability is a dynamic concept which looks at the situation before and the outcomes or results. It is more of the perception of the people involved rather than the physical availability

of food or the ability to acquire it. Different people will return different levels of satisfaction when they are given the same physical conditions and endowments.

2.2.2 Food availability

Globalization has helped man to access foods from faraway places due to improved transport, processing, cooling and communication networks. This has improved food availability more in developed countries than I developing countries. In developing nations, there is poor infrastructure. Food production has intensified I developed countries as a result of the green revolution but in developing countries, production has remained stagnant or actually declined (Asiema, 1994).

The people living below the poverty datum line are mainly the net buyers of food. Besides cereals, man also needs other types of food. Fruits and vegetables are perishable and they have a short lifespan than cereals. Meats and animal products are also highly perishable and the will require expensive processing and refrigeration for them to be transported over long distances. This will result in their prices shooting up thus making them less accessible to the majority poor. This will in turn compromise the availability of a balanced diet to the majority of citizens of developing countries.

The household 'ownership of assets also determines its ability to have access to food. A household without assets to liquidate and buy food will go hungry(Maxwel,1992).most of the imported food in developing countries are found in supermarkets located far away from the poor and marginalised people. Richman (1995) asserts that the nutritional garden uses part of domestic water thereby improving growing conditions for plants.

2.3 Theoretical framework

The researcher used two theories in this research. These are the Techno-Ecological theory and the Adoption theory. These are explained below.

2.3.1Techno-Ecological Theory

The Techno-ecological theory designed by Berry and Cline (Scanlan, 2003) best describe the Nutrition Garden innovation.

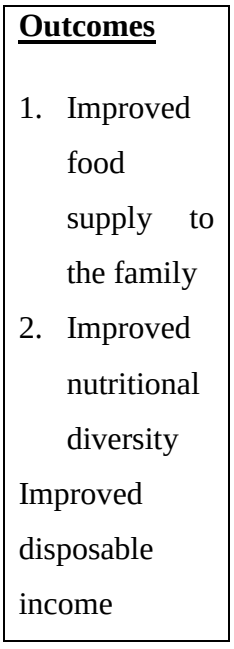
The theory suggests that technology and human ingenuity are the greatest resources available and they are not threatened by scarcity.it also points out that future challenges facing the

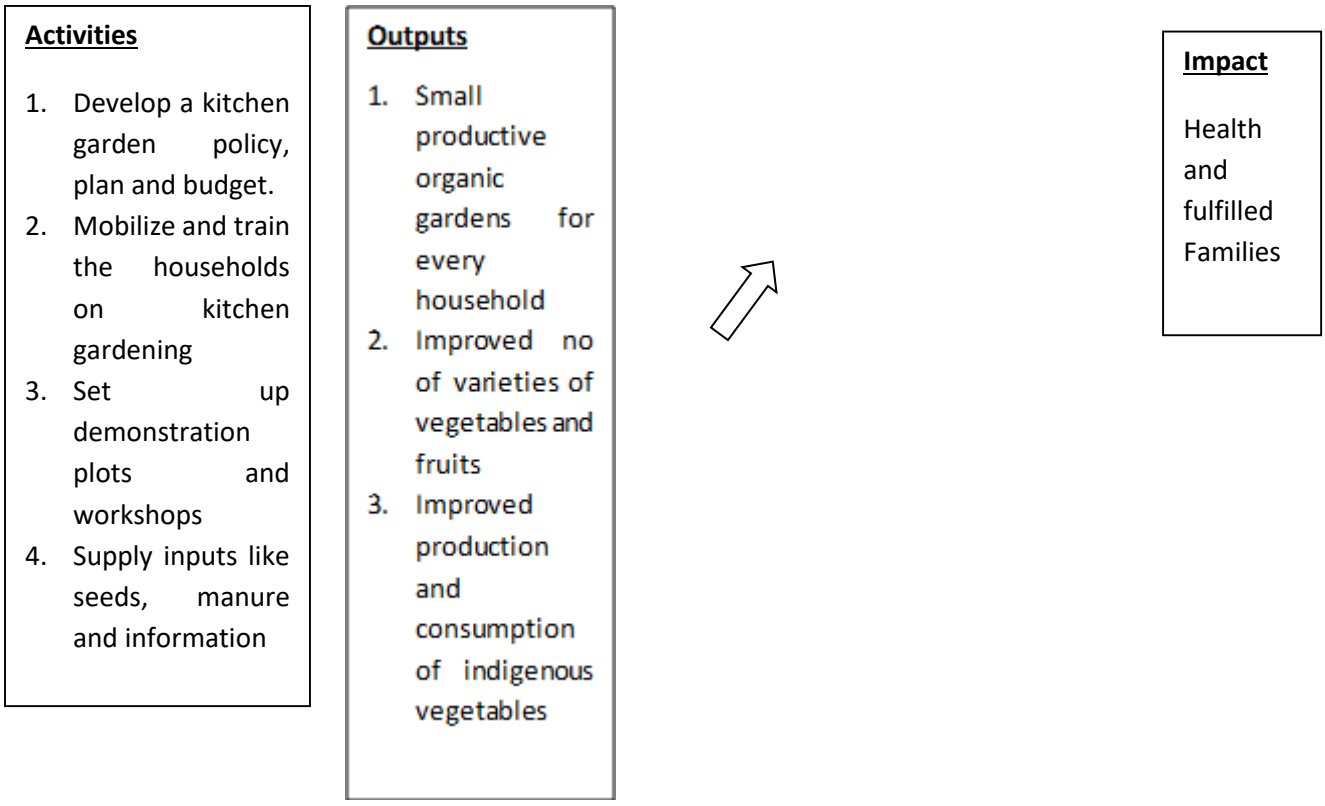
world's carrying capacity will be met. Nutritional gardens are a result of human ingenuity and they were instrumental in the shift of humankind from the hunters and gatherers stage to domesticated agriculture where seeds collected from the forest were planted near the homestead. The success of these nutritional gardens can be used to address food and nutritional diversity. If this is combined with organic farming, the nutritional garden can produce sufficient food for years from a small area.

2.3.2 The Adoption of Innovation Theory

Rodgers (1995) came up with the theory which gives light to how innovations are adopted or not. Diffusion plays an important role in respect to the type of innovation, the communication channels, the timing and the social system that would determine the success of adoption. This will answer evaluation questions lie who was involved in decision making, how the decisions were made, whether new networks have been made and who benefits from the innovation. Usually top-down innovations are short lived since the participants do not own the process. There is need to use a bottom –up approach when participants co-design, co-implement and co-evaluate so that the projects become more sustainable.in this project, the researcher intend to use village elders as village champions (communication channels) for opinions.

Figure 2.2 Conceptual Framework





2.3.3 Conceptual Model

The nutritional garden was set up using the result chain logical framework typical of result based management as highlighted above. This provided a way of identifying measurable indicators which helps to recognise changes attributable to the innovation. The activities were well defined and form a basis of expectations in terms of short term outputs like seeing the actual physical garden and villagers supplying the household labour. The outcomes desired are improved food supply and nutritional diversity. Replication of these gardens outside Bindura district would be a good indicator of the uptake of the innovation. Happy and heathy families are the major reasons why the nutritional garden was started.

If a farming family produces these food items at its own field, it can save $2560/- annually besides improving the health status of their family members. Adoption of this model not only improves the health status of the family but also improves the health of non-farming families. Because, the surplus production of vegetables and fruits is distributed to the non-farming families (Kaur and Gill 2005).

Health is directly related to the food consumed. To maintain good health, ingesting a diet containing the nutrients in correct amount is essential. A balanced diet is one which contains different types of food in such quantities and proportions so that the need for calories, proteins, fats, minerals and vitamins is adequately met and a small provision is made for extra nutrients to withstand short duration of leanness. Deficiency of any nutrient affects health of an individual. For a healthy and balanced diet, consumption of five portions of fruits and vegetables a day is recommended. Research shows that eating at least 400 gm of fruits and vegetables a day can lower your risk of serious health problems such as heart disease,

Midmore et al. (1991) mentioned that lack of long-term commitment by development agencies and funding organizations is the single most important reason why some garden projects fail. Household garden projects do have the potential to have a sustained impact, if managed well. Kumar and Quisumbing (2011) evaluated the impact of an intervention supplying women with improved varieties (from the World Vegetable Centre) for small-scale vegetable production in Saturia district (near Dhaka, Bangladesh). Ten years after adoption, they found significant improvements in the nutritional status of women and children for early adopters of the varieties. Zimpita et al (2015) also found sustained improvements in vegetable production and consumption 10 years after the completion of a home garden project in a rural village in South Africa.

REFERENCES

Asiema. (1994). Africa's Green Revolution. *Biotechnology and Development Monitor* (No. 19, p. 17-18.), No. 19, p. 17-18.

Department for International Development (DFID) . (2004). *Agriculture, hunger and food security.* London: DFID.

DFID(2014)Can Agriculture interentions promote nutrition: AgricultureandNutrtion evidence paper"Department of Internatoal Development ,London.

Dibsdall, L. B. (2011). Low-income consumers' attitudes and behavior towards access availability and motivation to eat fruit and vegetables. *American Journal of PublicHealth: August 2011, Vol. 101* , 159-168 .

Eyzaguire, W. a. (2001). *Homegardens and In situ Conservation of Plant Geneticmaterial.* ipgri.

FAO. (2003). Trade Reforms. Rome: FAO.

Journal of Food, Agriculture, Nutrition and Development, vol 9 no 6.

Kumar N, Quisumbing A R (2011) Access, adoption, and diffusion: understanding the long term impacts of improved vegetable and fish technologies I Bangladesh. Journal of Develpmenteffectiveness3 (2), 193-219.

Midmore DJ, Ninez V, Venkataraman R (1991) Household Gardening projects in Asia: past experience and future directions Asian vegetable Research and Development Center (AVRDC), Taipei

Ninez. (1984). Household Gardens. *Potatoes in food systems* , 15.

Oniang'o, O. S. (2009). The Contribution of African Leafy Vegetables (ALVs). *Africa*

Rogers. (1995). *Diffusion of innovations.* Frederick: Free Press.

Scanlan. (2003). *Food Availability and Access in Lesser-Industrialized Societies: A Test and Interpretation of Neo-Malthusian and Technoecological Theories.*

Shiundu, O. (2007). Marketing African Leafy Vegetables: Challenges and Opportunities in the Kenyan Context. *Afrin Journal of Food, Agriculture,Nutrition and Development* , Vol 7 No 4.

Silvia, N. a. (2012). *International Food Prices*. ROME: FAO, IFAD,WFP.

USAID. (1992, April 13). *Defination of Food Security.* Retrieved April 5th, 2013, from www.usaid.gov: http://pdf.usaid.gov/pdf_docs/PNAAV468.pdf

WHO. (2004). *Comaparative Quantification of Health Risks.* Geneva: WHO.

Zimpita I, Biggs C, Faber M(2015) *Gardening Practices in a rural village in South Africa 10 years after completion of a home garden project*. Food and Nutrition Bulletin 36, 33-42

CHAPTER 3 RESEARCH METHODOLOGY

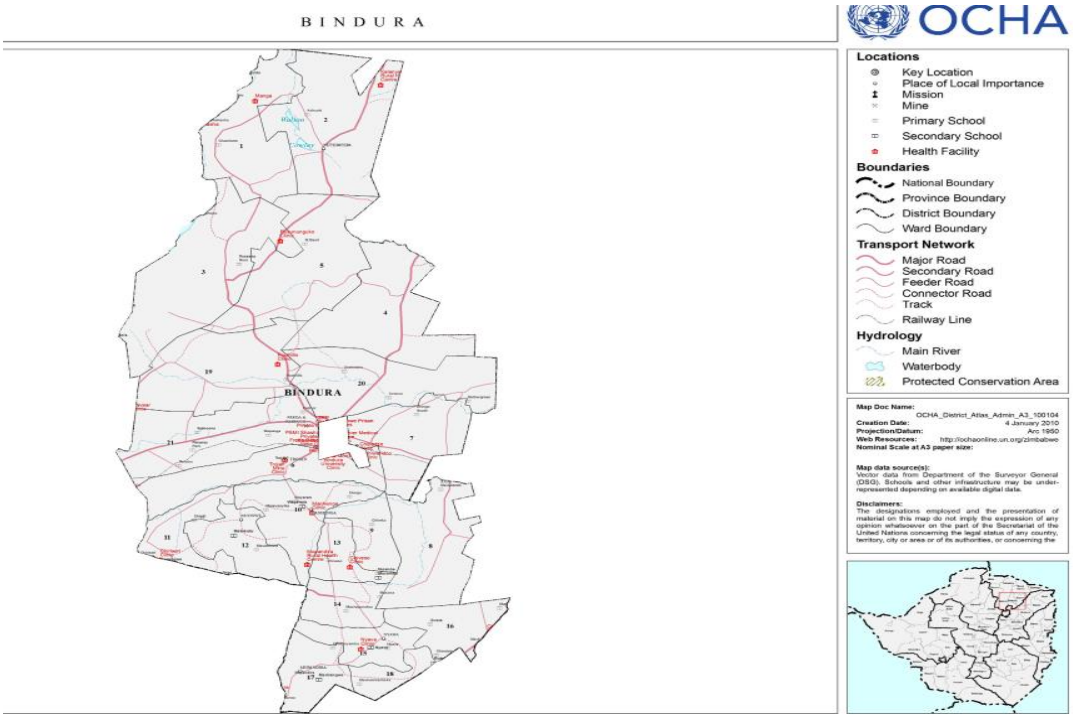
3.0 Introduction

The chapter presents the research design and methodologies that were employed in this study. The areas that were reviewed in the chapter are the research design, site description, unit of observation, sample size, data collection techniques and data analysis were discussed in this chapter.

3.1 Research Design

The study was a case study which followed a sequential mixed method approach in which both quantitative methodology and qualitative methodology were employed in order to understand the role of nutritional gardens to the ward 11 and 12 households by interviewing the participants who include community leaders and AREX Officers in the area. The researcher administered a structured questionnaire to the villagers and used three focus group discussions in three villages, observations, key informant interviews as well as desk review of information from AREX Officers.

3.2 Site description



Bindura District Map: Source Central Statistical Office

The study was carried out in ward 11 and 12 of Bindura District of Mashonaland Central Province. The area is a rural one which is mainly agro-based. The people are dominantly women and children and they are not gainfully employed, they rely on income generating projects like nutritional gardens to economically sustain themselves. The researcher targeted this area because of the need to find out how rural people utilise resources available to them like land and water for their own benefit especially in formal nutritional gardens. The farmers have no other source of livelihood and they can make nutrition more diverse through abundant outputs produced in nutritional gardens. Food availability, accessibility, utilization and sustainability would be greatly enhanced on a local scale. The surplus produce obtained can also be sold to neighbours or to the nearest markets for that extra profit.

Yount, (2006) pointed out that when studying a population, it may not be logistically or economically possible to study the full population. When one studies representative of the population he or she may make inferences and extrapolations to the whole population. Sampling is the process of collecting relevant information from the sample. The study population is about 1300 households who live in the ward. Morgan (1980) pointed out that a 280 sample would be most ideal for such a population at 95 level of confidence. However, the cost implications were too high for the researcher. The researcher sampled one hundred and fifty households for the study in order to minimise bias, a stratified random sample was used. The population was divided into fifteen sub –groups where representative samples were taken. This was done so as to help cover the stratified nature of the households and also to capture all the possible perceptions across the various groups. High, middle and low social classes have different perceptions about food and this can only be captured by a random stratified sample. This probability element allowed the findings of this study to be used for inferring on the Bindura District population.

Fifteen households with a breadwinner in formal employment were sampled, eighty-three with female breadwinners, twenty-five with male breadwinners and nineteen relying on gardening only were sampled. Among the sample the researcher ensured that people living with H.I.V were also strategically and purposefully included because they significantly benefit from nutritional gardens. The researcher wanted to note whether there were differences in their lifestyles.

3.4 Types of Data

The study used both primary and secondary data. The primary data were collected from the respondents on their perceptions of the state of food security and their dietary diversity. The researcher recruited three research assistants, trained them and helped them on how the questionnaires are supposed to be filled. They administered the filling of the questionnaires to the households under supervision. Secondary data were sourced from the AREX Officers for ward 11 and 12, food prices trends from the Ministry of Agriculture and time lined from the elderly in Bindura South.

3.5.1 Data collection

Household interviews, key informant interviews, focus group discussions, desk review, photography as well as observations and questionnaires were used to carry out this study.

3.5.1.1 Household interview

The household is central to the development process, from production to consumption and also as a social and demographic unit. This is so because the household is the basic unit of influence to the member's wellbeing. The Malawian definition of a household is "consisting of one or more persons related or unrelated who make common provision for food and who regularly take their food from the same pot and or share the same grain store, or pool their incomes for the purpose of purchasing food", Malawi 1987, 1988",(Coast,2008). A structured questionnaire was used to get the respondent household's perception about various issues regarding nutrition gardens.

3.5.1.2 Key informants

Key informants refer to individuals with knowledge of the community under review in terms of their needs. They provide key information on the subject matter and the community. The key informant needs to be well versed with information about the community. The researcher prepared a key informant interview guide structured in a way to shed more light on ward 11and 12 nutritional gardens. The researcher interviewed two (2) ward councillors, four (4) AREX Officers, the project consultant, thirteen(13) village heads, eight(8) headmasters and the local clinic Nurses in Charge

3.5.1.3 Focus Group Discussions

Focus group discussions (FGDs) are groups of individuals selected and assembled by researchers to discuss and comment on, from personal experience, the topic that is the subject of the research

(Gibbs, 1997). They entail organised discussions aimed at gaining information from the individuals about the topic at hand and organised in such a way that all the perspectives of the subject was covered. This is important in qualitative research where the indicators in review are perceptions difficult to quantify and can only be captured in emotions and where visual and body language and weight to spoken or written words. FGDs help to gain insight into people's shared understandings of everyday life and the ways in which individuals are influenced by others in a group situation. A moderator was required to control and guide the discussions and was employed for this study. An FGD guide was used to prevent digression of the discussions. In this study, 4 focus group discussions were conducted at Jingo, Chima, Besa and Masembura. The discussions included councillors, village heads, school heads, medical personnel, and welfare representatives.

3.5.1.4 Desk Review

Desk review also known as secondary research is done by collecting information from existing data from other researchers and government departments as well as stakeholders in the area. In this study, the stakeholders were nutritional officers, AREX Officers and farmers and NGOs. A check list was used to ensure that all possible data were collected.

3.5.1.5 Observation

Observation helps in gathering information primarily through close visual inspection of the natural setting. The research tried to be unobtrusive and detached from the setting. Participant observation where the researcher and the assistants observed and experienced the world as the participant, while retaining the observers, eye for understanding, analysis and explanation was applied in this study (Smith, 1997). Field notes were taken and maintained throughout the research. Observations were done in an open mind to avoid bias interpretations of the situation. A structured checklist was used to guide the observation.

3.6 Data analysis

The study employed both qualitative and quantitative method but with a bias on the former. Quantitative data were coded and summarized in tables and analysed in frequencies and percentages. Descriptive Statistics of the Statistical Package for Social Scientists (SPSS) was used to analyse some of the data. The findings were presented in tables, narratives and bar charts. Qualitative data were analysed by screening all the notes taken and presented in narratives where necessary.

3.7 Ethical Considerations

The researcher took into consideration the use of non-GMO seeds for health reasons. Instead, hybrid seeds were incorporated into the study whose source was known and tracked. The researcher also advocated for the use of organic manure rather than artificial fertilizers since they are more ecosystem-friendly. The use of pesticides and herbicides was greatly minimised since they have a residual effect on ecosystems. Conservation agriculture has also been incorporated as an environmentally-friendly agricultural practice. The use of forced or child labour has also be discouraged where it results in violation of children's rights and women's rights. Confidentiality was of paramount importance and the researcher ensured that individual information was kept privately

REFERENCES

Coast, R. A. (2008). *The Concept of the Household: From Survey Design to Policy Planning.* London: ESRC.

Department for International Development (DFID) . (2004). *Agriculture, hunger and food security.* London: DFID.

Hallman K, Lewis D, Begum S(2003)An Integrated Economic and Social Analysis to Assess the Impact of Vegetable and Fishpond Technologies on Poverty in Rural Bangladesh, InternationalFoodPolicyResearchInstitute(IPRI).Retrieved from http/ebrary.ifpriorg/cdm/ref/collection/p15738ol2/id/79202(8July2015).Washington,DC

Journal of Food, Agriculture, Nutrition and Development, vol 9 no 6.

Kabeer N(2005) Gender equality and women'sempoerment:Acriticalanalysis of the third millenium development goal 1.Gender and Development13(1),13-24.

Kumar N, Quisumbing A R (2011) Access, adoption, and diffusion: understanding the long term impacts of improved vegetable and fish technologies I Bangladesh. Journal of Develpmenteffectiveness3 (2), 193-219.

CHAPTER 4 RESULTS

4.0 Introduction

This chapter presents the research findings obtained from the 150 respondents selected from the Bindura District ward 11 and 12 households, observations seen in the gardens, information from focus group discussions and Key informant interviews as well as secondary data from stake holders. The data generated contained enough information to effectively answer the research questions. The survey focused on assessing whether the nutritional gardens have influenced food security and nutritional diversity of the practising households.

4.1 Demographic Characteristics

4.1.1 Respondents Household Distribution

The structured questionnaire was administered to 150 households in seven villages in ward 11 as shown in the table 4.1 below.

Table 4.1: Village Distribution of the Respondents

Village	Frequency	Percent
Jingo	18	12
Besa	11	7
Chiriseri	35	23
Mukwesha	28	19
Chaonza	13	9
Kagande	10	9
Chima	15	7
Masembura	15	7
Mazhenje	10	7
Total	**150**	**100**

The researcher had more tomato farmers available and hence a slightly higher percentage sampled than it would normally be in a purely stratified sense.

4.1.2. Distribution of Respondents by Sex

From the 150 respondents seventy percent (70%) of the respondents were females while the rest were men. No data was available to compare with the households gender data and hence this is not a reflection of the district but for those who were available in their homes at the time of survey. The higher female percentage was perhaps due to the different stereotyped tasks done by both women and men (Gender roles in this community). Many women are rural based hence they engage more in providing food for the households than their male counterparts who work in other kinds of industry or migrate to towns for employment. Potato growers were predominantly men who worked early in the morning and are back in their homes by mid-morning.

Table 4.2 Gender

Gender	Frequency	Percent (%)
Female	105	70
Male	45	30
Total	150	100

4.1.3 Marital Status

Majority of the respondents (59%) were married which would point to some level of seriousness in handling household needs. About 35% of the respondents were single as shown in **Table 4.3**

Table 4.3

Marital Status	Frequency	Percent (%)
Married	88	59
Separated	4	3
Single	53	35
Widowed	5	3
Total	**150**	**100**

The higher percentage of married gives the research more insights that married people are normally directly involved in food provision to their households.

4.1.4 Distribution of Respondents by Age

A third of the households fall in the so called youth group with respondents aged between 21 and 40 years making a total of 33% of the respondents.

The high percentage of the youthful gardeners agrees with the national outlook where the youth forms the majority of the nation (United Nations Development Programme, 2013). The youthful range could also be a result of high unemployment rates which forces the youth to take any available form of employment who could be going for greener pastures away from the low paying agricultural sector.

Table 4.4 Age Group Distribution

Age group	Frequency	Percent (%)
21-30yrs	38	25
31-40yrs	68	45
41-50yrs	39	26
51-60yrs	4	3
Above 61yrs	1	1
Total	**150**	**100**

4.1.5 Education level

Majority of the respondents had the primary level of education (58%) with almost an equivalent number with secondary (39%). 2% have tertiary courses while 1 % had only pre-primary education. The high level of secondary school graduates in Bindura agrees with the availability of skilled manpower in Zimbabwe which places the country at a comparative advantage over its neighbours. This could also be an indicator of high level of un-employment in Zimbabwe forcing educated people to take the only available slots in the agricultural sector

Table 4.5 Education level

Education level	Frequency	Percent (%)
Pre-primary	2	1
Primary	58	39
Secondary	87	58
Tertiary	3	2
Total	**150**	**100**

4.2 Main Findings

4.2.0 Introduction

The research was able to answer all the questions that it sought to answer in the objectives as detailed below.

4.2.1 The effectiveness of nutritional gardens in achieving food security

The first objective sought to assess the effectiveness of nutritional gardens in attaining food security. To do this a reflection of the food security status was sought from the Bindura District AREX Officer (DAO) as well as the households involved in the survey. Bindura district is a high productive area in terms of agricultural productivity, the district is relatively food secure. The district was 60 % food secure in 2012 according to the DAO. As observed by many stake holders during the FGDs, the villages before the onset of the programme were untidy and messy with free for all outlook with only the very industrious people who had resemblance of gardens and which were mainly with one crop (rape) on the periphery of the villages. The same gardens were poorly cultivated and as result soil erosion had taken its toll.

4.2.2 Size of gardens

The newer villages have houses which have more families together. As a result their gardens are smaller but still within the 10 square metres. In Villages where the area is really limiting households are given equivalents plots within the periphery of the village. 76.67% of the gardens were between 11 and 50 square metres as shown in Table 4:6

Table4.6: Size of the Gardens

	Size	Frequency	Percent
	<10m	20	13.33
	11-50m	115	76.67
	51-100m	15	10
	Total	**150**	**100.0**

4.2.3 Source of Help and Organization

The project used a top-down approach with the AREX Officers being in charge of the programme. To improve on positive uptake by the households a village committee headed by village champion oversees the implementation.

4.3 Nutritional Garden Food Security Effect

Both the recipients and the village headmen agree that the program has improved the food security of the households. *"Before the gardens were introduced, only a few households had nutritional gardens", said village head Chima.* From the 150 household respondents 47.9 % do not buy vegetables today as compared to 4.2% who were not buying vegetables before. This shows that more households are now relying on their gardens for vegetables supply as table 4:7 below suggest. Before the gardens many workers had to buy the most inexpensive vegetable and one that was readily available. This is the same in many communities where this resilient vegetable has been widely accepted. The mixed vegetables was second in demand perhaps from the predominant Chiriseri and Mukwesha communities in the rural sector who traditionally love vegetables in their meals.

Table4.6: Size of the Gardens

	Vegetables	**Frequency**	**Percent (%)**
	Viscose	45	30
	Indigenous vegetables	36	24
	Mixture	60	40
	None	9	6
	Total	**150**	**100.0**

Out of the 150 respondents only one who did not think that the garden helped at all in food supply with 99.3% saying that the garden has improved their food supply. As the vegetables became available through the nutritionl garden garden workers had to alter their behaviour pattern and buy less vegetables from the market. The smarter or cleverer households sell or exchange their excess

vegetable products with cash or use it to build their social capital explaining the outward movement of vegetables as observed by the AREX Officers. Food availablity,accessibility,sustainability and utilization have greatly improved in the two wards as highlighted above.

People do not buy what they have but rather what they do not have. Many households produced their own vegetables making many households attain self-sufficiency explaining the high number of households not buying vegetables today (44.67%). Apparently a higher percentage of households now buy indigenous vegetables (16.52% compared to 11.3%) than before. This indicates that the awareness workshops and the knowledge attained from them may have altered the attitudes of the households towards indigenous vegetables. Additionally more disposable income from the savings of not buying the vegetables is now available to buying non-available indigenous vegetables.

4.3.1 Value of Food Supply

Majority of the respondents think that the gardens have helped with the highest scale of "extremely a lot response" (44.67%) as table 4:9 below shows. As pointed out by many during te FGDs the gardens have become a major source of food to the households.

Table 4.9 Value of Food Supply to the Respondents

Response	**Frequency**	**Percent (%)**
A lot	38	25.33
Extremely a lot	67	44.67
Fairly	26	17.33
Not at all	1	.67
Sparingly	15	10
Total	**150**	**100.0**

Table 4:9 shows that all except one put some value to the vegetable garden in regard to food supply. The garden quickily gave the households a new form of self-reliance. This was perhaps enhanced by the short growing periods of the vegetables which brings results quick enough to be repeated.

Watching neighbours harvesting vegetables from their own gardens presents favourable vicariuos experiences which further enhances self-reliance. The verbal pursuasion in workshops and the choice of using an external consultant may have done the trick.

4.3.2 Nutritional Garden Effect on Nutritional Diversity

From the first respondent the nutritional diversity was quite apparent. She had just picked some vegetables for lunch from the garden and there were more than three varieties in her basket. Through the help of the consultant and the medical team the households have embraced the garden as a source of diversity.

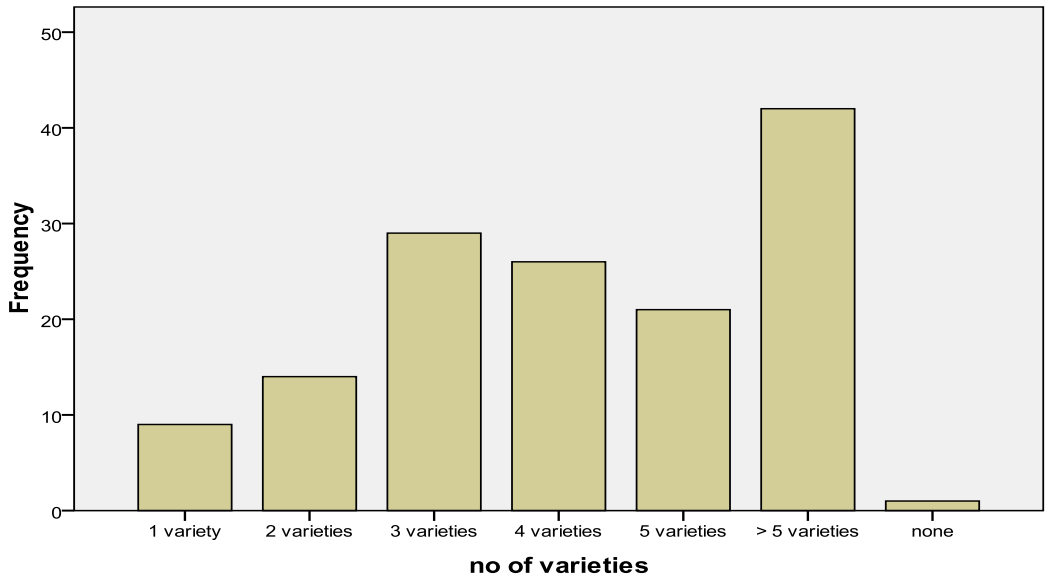


Figure 4.2 Number of Varieties grown in Households

Variety inventory had over 17 names from the sampled villages which indirectly suggest that the households have a great value for the nutritional diversity. They have attributed good health to the eating of mixed vegetables. Majority of the respondents have more than four varieties growing in their gardens as shown in figure 4.2 above. This implies that the households are no getting the vitamins, proteins, fats and carbohydrates that constitute a balanced diet.This agrees with Miller and Donald principles of fundamental to learning; drive, cue, response and reward (Encyclopedia.com articles, 2011). The need for vegetables food could have been the drive. Religious values play a big role in self-identity and could also have played a big role as members

made efforts to conform to their beliefs as explained by the shop steward. The SDA teachings instil strong cognitive components on its followers which greatly influences their attitudes to nutrition gardens.

4.4.2 Nutritional Diversity from ward 11 and 12

From ward 11 and 12 of Bindura district vegetable inventory the nutrition gardens seem to have brought in all the diversity of the community in terms of the number of varieties(Figure 4:10 below) compared to 17 varieties found in the nutrition gardens sampled.

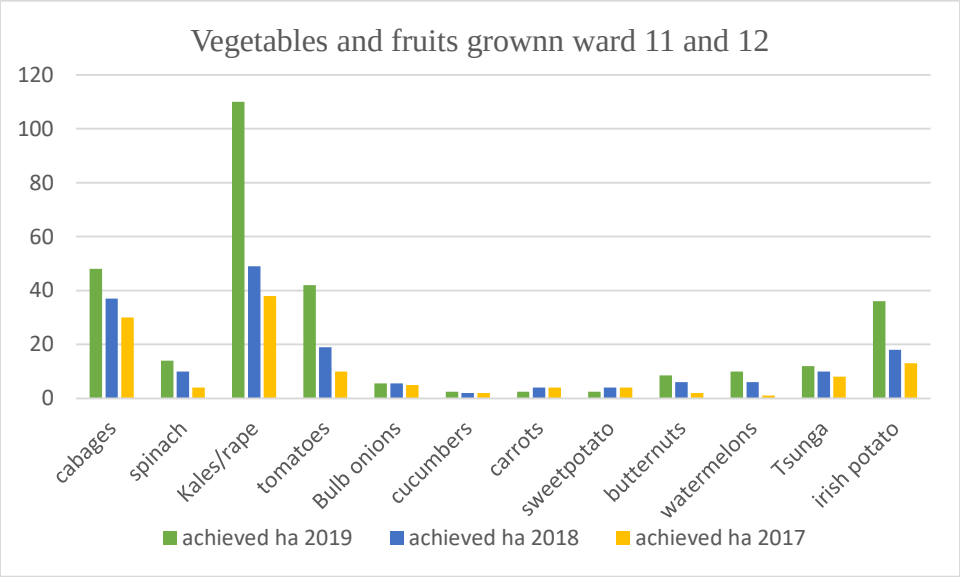


Figure 4.10 Vegetables/Fruits Grown in ward 11 and 12
[Source: *Bindura District AGRITEX Office***]**

Vegetables and fruits found in the market place forms the cognitive aspects as far as diversity component is concerned. This formed the target that the participants would be trying to achieve. Other sources of diversity were the homes where they came from as well as the information received from the project consultant explaining why they achieved a higher diversity. The social capital in the form of knowledge gained from decades of traditional farming in different cultural set-ups was put to use resulting in the amazing diversity.

4.4.3 Value of Nutritional Diversity

When asked about the value of the garden to their nutritional diversity, 76.67% of the respondents think that the gardens have given them great value as the bar chart shows in figure 4:3.below.

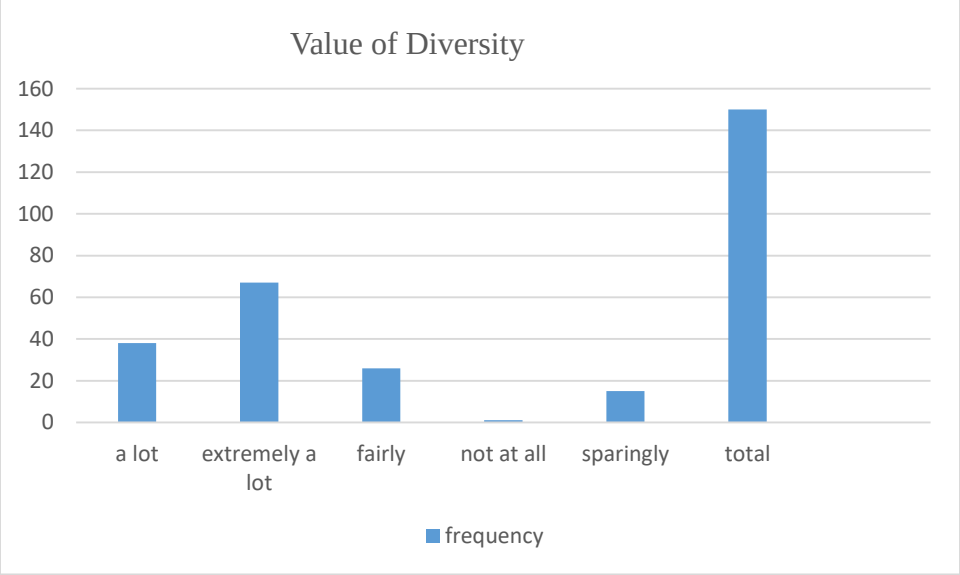


Figure 4.3 Respondents Value of Diversity

Plate 4.8 Pumpkin leaves in One of the Nutrition Garden (Part of the fruits introduced in the villages both for food and income generation)

One bunch of banana fetches as much as $15". The extra income from the sale of the garden produce forms part of the reward system critical in repeating the response in this continued attachment to the nutritional garden.

Before the gardens were implemented respondents used to answer the diversity elements with buying expensive meat and usually on credit which was not sustainable as revealed during focused group discussions?

4.4.4 Vegetables as a Source of Protein

Although there is no baseline to compare with, the respondents are not buying as much meat today (Figure 4.4 below).

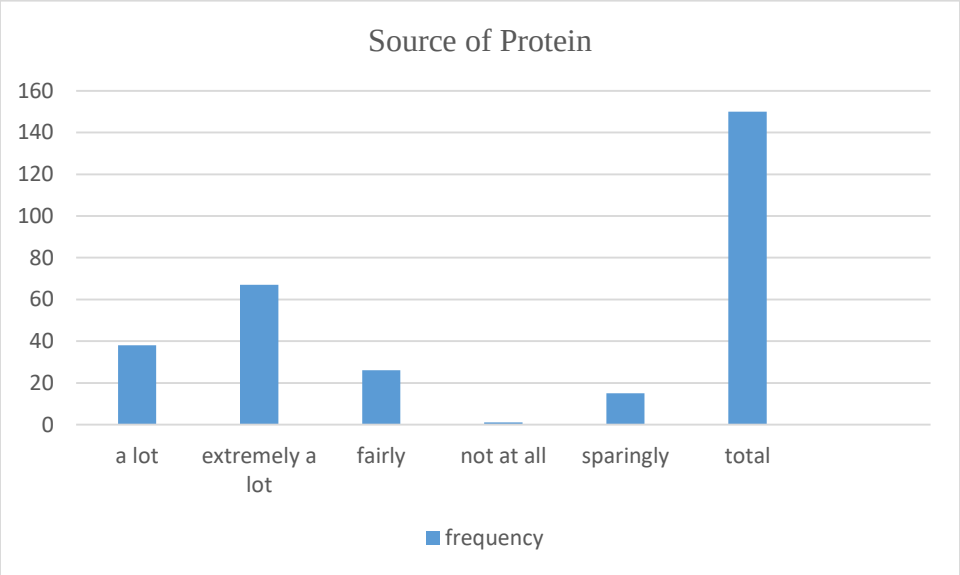


Figure 4.4 Frequency of Buying Meat

Besides the vegetables the inclusion of fruit trees improved the nutritional diversity. The recent inclusions of chicken will also enhance this diversity through the eggs and occasionally when they slaughter the chickens for meat. Almost every household has a banana plant which has high potassium content.

A survey of the grocery shops in the villages showed an almost complete absence of common vegetables on the shelves. The predominant vegetable on display was the english potatoes. The shops in the villages stocked value added grocries like bread, sodas, sweats , soaps, detergens and

toiletries like tooth paste.The donkeys that seems to be the main means of transport of food items to the villages could be seen carrying only maize bags.

5.3.1 Vegetable production in Containers

Containers come in handy where space for a vegetable garden is too small for reasonable production (plate 4.1 to plate 4.13). A patio, doorstep, a balcony or even a window seals can provide sufficient space for producing sufficient vegetables and fruits for the family

Plate 5.1.2 vegetables growing in upright sack containers ***(AGFAX, 2010) (the vertical/upright sack containers are the most common plant pots in urban agriculture where they improve production area as well as where the soil media is absent like in paved backyards and rooftops).***

As one moves close to shade it's important to use plants that are shade tolerant. Container vegetable production can improve the aesthetics of the surrounding by brightening dull areas just by placing beautiful growing vegetables like the curly kales.

Plate 5.1.3 Vertical Multi-storey Garden **(Youth Agro-Environment Initiative, 2011) (The vertical multistory garden improves the production area such that well planned three sacks can supply the needs of a small household.The multistory garden can be made from variuos kind of bags that can hold the planting media and the plants in place)**

Plastic gunny bags like in plate 4.12 and plate 4.13 are in use in many parts of the world especially in slums. They offer excellent drainage but they are made to be used for a short time and disintegrate quickly under ultra-violet light. Light weight welded wire shaped into cylinders and lined with moss can make excellent gardens (University of Arizona, 1998). Most plants require containers 6 to 8 inches deep for adequate rooting. With imagination and innovation there are a myriad of locally available material and can make good containers. With low volume of soil watering is more important than in dealing with soil.

Many possible containers can be used for gardening like clay pots, plastic, metal and even wood like in plate 4.10 and plate 4.11 containers. The key is that the container must be big enough to support plants when they are fully grown, hold the growing media without spilling, have adequate drainage and should not have been used for products that are harmful to people or the environment. Locally available material like wood and banana stems can be used in an innovative way to generate space. Baskets lined with plastic with drainage holes punched in it, pieces of drainage pipes and even sacs form good containers as in plate 4.13. Treated wood is not good for food production and should be avoided.

REFERENCES

Kabeer N(2005) Gender equality and women'sempoerment:Acriticalanalysis of the third millenium development goal 1.Gender and Development13(1),13-24.

Kumar N, Quisumbing A R (2011) Access, adoption, and diffusion: understanding the long term impacts of improved vegetable and fish technologies I Bangladesh. Journal of Develpmenteffectiveness3 (2), 193-219.

Midmore DJ, Ninez V, Venkataraman R (1991) Household Gardening projects in Asia: past experience and future directions Asian vegetable Research and Development Center (AVRDC), Taipei

World Vegetable Center.2016.*The World Vegetable Center's Approach to Household gardening for nutrition.* World Vegetable Center, Sanhua, Taiwan.PublicationNo.16-803.35p.

Zimpita I, Biggs C, Faber M(2015) *Gardening Practices in a rural village in South Africa 10 years after completion of a home garden project*. Food and Nutrition Bulletin 36, 33-42

CHAPTER FIVE RESULTS AND DISCUSSION

5.0 Introduction

This section illustrates the results obtained from both primary and secondary data collected and analysed. The subheadings description of study area, research design sampling procedure, data analysis procedures during data collection, results and discussion, conclusion and recommendations were followed in presenting the findings.

5.1 Challenges Faced by the nutritionl Gardens and possible solutions.

Table 5.1.1 Challenges faced by the Nutrition Garden

Challenges	Frequency	Percent
Wild animals	23	15.33
Pests/Diseases	43	28.67
Water supply	10	6.67
Poor lifespan of indigenous vegetables	10	6.67
Loss of soil fertility with time	13	8.67
None	39	26
Supply of quality seeds	1	.67
Small Size of Garden	2	1.33
Theft	1	.67
Shortage of capital	8	5.33
Total	150	100.0

From Table 5.1.1 Pest and diseases were cited as the biggest problem facing the gardens. Poor lifespan of the indigenous vegetables was also cited as a major setback to the project in terms of diversity. The seeds they get from the market are of poor quality. The high moisture of the region hampers the harvesting of seeds from their own gardens. The annual nature of majority of the indigenous vegetables against the resilient perennial rape (kales) makes a few households to stick

to Kales. Various types of monkeys and baboons are found across the villages and limit the diversity of some gardens as they feast on certain preferred plants like onions making them conspicuously absent from some villages.

One of the challenges that elicited some of emotions is the stealing of vegetables from the gardens by some households. This is common with all many parts of the country where food has become a major source of conflict. Many youths have been accused in this country of shying away from farming considered as dirty and only thriving in errant behaviour of acquiring other hard earned proceeds. The moral breakdown of the social fabric could be responsible for this evil. Twenty seven point 5 % reported no challenges at all. This is a lower figure than those who are self-sufficient in vegetables indicating more is required in improving the gardens. Success brings with it satisfaction and along with it a strengthening of the relation of the experience. The project should build on this success depicted by the number of people who think that the garden has no challenge.

5.2 Correlation between Attendance and Food Supply Value

While collecting the data a trend appeared where respondents who put their own labour and other resources in the garden were attributing a higher food supply value to the garden. The project consultant cites laziness as the main hindrance to success as people have to dig and work their own gardens on top of supplying their own seeds. This prompted the researcher to correlate attendance and food supply scores by the respondents. Pearson product moment correlatnwas used

$$r = \frac{N\sum xy - \sum x \sum y}{\sqrt{[N\sum x^2 - (x)^2][N\sum Y^2 - (\sum (Y)^2}}$$

Where

∑=sum of

X=scores of one set

Y =scores in another set

Table 5.1.2 Correlation between attendance and food supply value

			attendance	Value of food supply
Attendance		Pearson Correlation	1	.145
		Sig. (2-tailed)		.085
		N	150	150
Value of food supply		Pearson Correlation	.145	1
		Sig. (2-tailed)	.085	
		N	150	150

When attendance and food supply value to the respondents were correlated a positive relationship was established although it failed the significance test at 95% confidence (Table 4:12). Those who do not work on the garden have low emotional attachment and could score the gardens poorly. Figure 5.5 Solution to the challenges

5.2.3 Solution to the challenges

Various efforts have been put to address the challenges facing the Kitchen garden. As shown in figure 4:5, over 60% of the respondents are satisfied with the project as it is. Loss of soil fertility overtime is mitigated by supply of manure and mulch as a number of respondents suggested.

The gardens with high levels of mulching had low levels of complains whether its water stress, or pests menace as they tend to have more health plants which can withstand a myriad of problems. As the consultant explained the project was founded on organic concept where fertilizers and pesticides were to be avoided. Crop rotation even in a small area has been started to help mitigate against soil pests and diseases. The incorporation of pests' repellent plants like marigold has helped to address the pest problems.

A number of respondents still do not understand the organic concept and as such they suggested to be supplied with pesticides and fertilizers to improve their gardens.

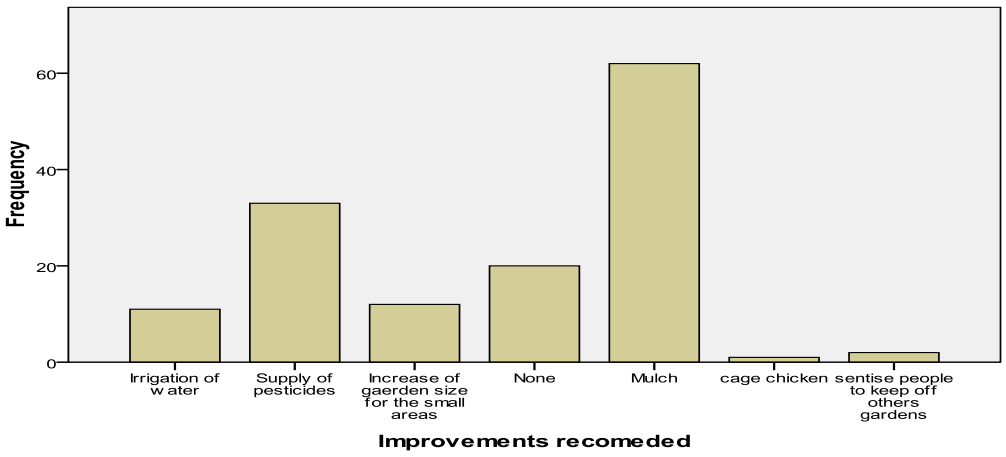
Regular workshops helps to continually keep the workers informed on the importance of the gardens. Demonstration plots located near every dispensary help to reinforce the importance of the nutrition garden.

5.3 Improvement recommended by respondents

Health personnel have been trained to preach the gospel of nutritional diversity and to demonstrate the possibility of achieving this from one own garden. These trainings are targeted not only to the health of the family but their entire wellbeing

The cultural disposition that *Covo* and *Rape* (Kales) is the only life supporting dish need to be demystified as identified by the consultant through continuous awareness campaigns.

Figure 5.6 Improvement Recommended



Improved container technology can help alleviate this problem. Containers made from plastic but conical in shape would improve the surface area available for putting sufficient no of plants to sustain productivity in relatively very small ground area like shown the improvised containers in the strawberry greenhouse in the picture. Many models as shown in the pictures below of sacks and banana stems (Plate 4:9-4:13 below) can be used to improvise and increase surface area for

crop production. The challenge here will be in the need to water the plants regularly and losing the rain fed benefit.

REFERENCES

Kabeer N(2005) Gender equality and women'sempoerment:Acriticalanalysis of the third millenium development goal 1.Gender and Development13(1),13-24.

Kumar N, Quisumbing A R (2011) Access, adoption, and diffusion: understanding the long term impacts of improved vegetable and fish technologies I Bangladesh. Journal of Develpmenteffectiveness3 (2), 193-219.

Midmore DJ, Ninez V, Venkataraman R(1991)Household Gardening projects in Asia: past experience and future directions Asian vegetable Research and Development Center(AVRDC),Taipei

World Vegetable Center.2016.*The World Vegetable Center's Approach to Household gardening for nutrition.* World Vegetable Center, Sanhua, Taiwan.PublicationNo.16-803.35p.

Zimpita I, Biggs C, Faber M(2015) *Gardening Practices in a rural village in South Africa 10 years after completion of a home garden project*. Food and Nutrition Bulletin 36, 33-42

CHAPTER SIX: SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

6.0 Introduction

The findings from the research indicate that the nutritional gardens in Bindura District ward 11and 12 have had a positive effect in food security and nutritional diversity to the households. Clearly many people have reduced the buying of vegetables since the introduction of the programme. As an organic project which is normally slow in uptake as results have to go through full natural cycles, the results obtained are appreciable. The measure to role of the kitchen gardens were indirectly measured in the comparing the sourcing patterns of the vegetables not only in the in the ward 11 and 12 households but also the relationship with the rural homes in terms of replication.

6.1 Summary of Findings

The nutrition gardens have helped to lower vegetables bought by the ward 11 and 12 households. Today 47.9 % of the households do not buy vegetables compared to 4.2% before the program was initiated. With 99.3 % of the respondents saying that the garden helps them in food security the gardens have an effect in food security. Although 71.1% of the respondents had gardens before the fact that 84.5% have replicated the gardens in their rural homes from their own free will further suggests that they have attached appreciable value to the nutritional garden.

The replication also shows that the programme has weathered the typical top-down resistance to innovation uptake. 97.9% of the respondents have learnt a new gardening skill which perhaps explains the high level of replication even with a people who are not new to gardening.

The predominant ordinary garden has been replaced with a mixed garden rich with indigenous vegetables which has helped to improve on nutritional diversity. 98.6% the respondents feel that the garden has helped them to increase their nutritional diversity.

The biggest challenge cited by the respondents was pest and diseases which is much related to the soil fertility. The respondents wanted pesticides, fertilizers and mulch supplied to them to improve productivity. This response from workers who work in agriculture production fields where such problems are tackled by provision of pesticides, fertilizers, and even high quality seeds is only natural. From the organic layout of the project the project has made tremendous gains in achieving food security and nutritional diversity.

6.2 Conclusion

The nutritional gardens in ward11 and 12 have helped to improve the food security and nutritional diversity for the households. While the local leadership would perhaps have expected a miraculous rollout of the programme and immediate uptake by the household the organic approach is normally slow and results are achieved over a long period of time as the project entails changing the perception of the recipients. The project has shown that there are yield increases in food production from the system which has lowered procurement from the open market. This is in agreement with other findings that show that organic agriculture increase productivity rather than decreasing in tropical Africa (United Nations Confrence on Trade and Development, 2008). This is in the quantity of food as food produced by households leads to members of the same household having access to food. The geographical location deprives households' ample time to go and shop for food. The fact that the garden is adjacent to house gives the owner access to food as and when required. Some vegetables like *viscose* only require a fertile open ground to supply to the mankind needs. Here the vegetable garden has acted as a trap to this natural resource for the benefit of mankind.

The organic approach of the nutrition garden innovation in ward 11and12 has increased the ability of the households to use better understanding of the holistic nature of farming that helps them to adapt and change when faced with new challenges and become more resilient in the ever changing environment. This is evident from their replication in their urban homes and the urge to set up

similar gardens wherever they will reside. The land tenure issue has been partly shown by this research not to be the main hindrance to food production. The households do not own the land they are now cultivating. You only need a people friendly policy in handling land and food production like in this case the freehold land tenure policy in Zimbabwe. The size also demonstrates how one can produce sufficient food in relatively small areas.

The nutrition gardens in Bindura District are a good example of how one can combine the natural, Social, physical and human capital to produce enough food for the households in a sustainable way. The nutritional garden is an *in situ* on site household production with the use of low cost local materials and technologies. This eventually improves self-reliance and substitute's human capital for costly external inputs which agrees with many researchers in this field ((United Nations Confrence on Trade and Development, 2008).

From the research about 71% had vegetable gardens previously which means they were privy to the traditional systems of production that have evolved through centuries and addresses local environmental and cultural conditions. It is then important to continue recognising the recipients wide cognitive abilities and pointing to them where and how their knowledge can be used to address local challenges central to human existence like food security and nutritional diversity.

6.3 Recommendations

6.4 .1 Recommendations to Bindura District

The nutrition garden project is of great value to the households and should be encouraged. De-linking the households from what they do in their daily lives and what they do after work would need a lot of sensitization and reinforcement. Higher levels of success are achievable as enough drive and cue exists within the households. The total picture of an organic nutrition garden is that, that not only grows plants beneficial to man as food but also should incorporate some animals to achieve the holistic mix required in life. At present the gardens in Bindura are predominantly having plants and efforts to include animals have not fully succeeded. The cure to this is sensitizing of the households on the benefits of having animals in the system. The key here is to encourage households to develop a new culture which takes training and reinforcement. There seems to be a

tread that households where the heads are involved in working on and maintaining the garden seem to attach a higher value to the gardens. Further research should be carried out to ascertain this phenomenon and help guide the training model for the project. In areas where space available to the households is too small, container vegetables growing can be adopted. Households have many containers which bring other household groceries which can be used in plant production. This would bring such households to par with their colleagues who have enough land space and reduce the feeling of discrimination.

The organic garden can be improved by using Integrated Pest Management and crop improvements which has inexpensive organic products which can improve the indigenous vegetable root system ability to harness water and nutrients and in turn improve both their longevity and productivity (Dudutech ltd, 2012). Incorporate bone meal in the kitchen garden to address the phosphorous supply to improve the productivity (United Nations Confrence on Trade and Development, 2008). Adopt a more participatory approach where the village team should be given a bigger role in compliance.

6.4.2 Recommendations to other investors in Agriculture

Healthy households are more productive. Improving productivity, household health can be achieved as the case of Bindura District not just by investing in health infrastructure but by adopting such innovations like nutritional gardens. Such innovations improve the households' confidence in their ability to participate in solving their own problems. Involving households in producing part of their own food helps to develop effective relationship necessary for harmonious growth. Food security and nutritional diversity is so basic and is a strong foundation for a productive society. The nutritional garden can be an effective motivation tool that would mitigate against households turnover by giving the households a sense of belonging.

6.4.3 Recommendations to Government

The nutrition gardens can be a panacea to the vulnerable households in Zimbabwe in providing a form of food security and nutritional diversity. This research showed that there is a lot of potential in the knowledge accumulated in societies over time and only require the right trigger to unlock it for the benefit of the same societies and the nation at large. Encouraging the vulnerable Zimbabweans to adopt nutritional gardens could be one way to meet the new constitution requirements of ensuring that no one suffers from hunger. Adopting the nutrition garden which identifies with many cultures would also help in achieving the first sustainable development goal

of ending poverty and hunger as envisaged in the first millennium goal. Disposal of organic waste which is a big headache to municipal authorities can also be eased as the organic waste would be used to fertilize the organic nutrition gardens. The peri- urban agriculture should be encouraged but made as simple as possible taking into consideration the available resources to the vulnerable groups

6.4.4 Recommendations to Development Agents

Most of the development agents today target capacity building without tying other productive factors like land. Building competence need to be tied to the opportunities available to the recipients. Proper strengths, weakness, opportunities and threats analysis (SWOT) need to be carried out for effective and meaningful community development. As captured in this research communities have rich knowledge derived from many decades through society values which only need a trigger to bring the intended change. All we need is to identify those strengths and encourage them to thrive in well planned programs. Reinforcement through well trained personnel is all that is required to change communities. The household labour is one of the biggest assets that the vulnerable groups have for gainful exchange. Programmes that encourage and tap this asset are bound to be successful.

6.4.5 Further Research

A quantitative research involving the weighing and costing of the vegetables harvested from the gardens would help to shed more light on the impacts of nutritional gardening in terms of the biomass and the actual cash saved by the households. Correlations between the attendance and food supply value need to be established in a further research to guide the consultants of the target groups in terms of further training.

BIBLIOGRAPHY

Asaduzzaman, N. S. (2011). *Benefit-Cost Assessment of Different Vegetable Gardening on improving Household Foood and Nutritional Security in Rural Bangladesh.* Pittsburgh, Pensylvinia: Agricultural & Applied Economics Association's 2011 AAEA & NAREA.

Asiema. (1994). Africa's Green Revolution. *Biotechnology and Development Monitor* (No. 19, p. 17-18.), No. 19, p. 17-18.

Bonard D., (2010). Identifying The Drivers Of Sustainable Rural Growth And Poverty Education In Zimbabwe. DSDG Discussion Paper 19.

Carrey D. (1998) Sustainable Rural Livelihood – What Contribution Can We Make? Department For International Development, London.

Central Statistical Office, (2002) Income And Expenditure Survey Report July 2002, Government Of Zimbabwe, Harare.

CFTRI., (2006) Developing Policy Orientation Monitoring And Analysis Of Human Development In Indonesia. Innocent Working, Paper No.83. Unicef.

Coast, R. A. (2008). *The Concept of the Household: From Survey Design to Policy Planning.* London: ESRC.

Concern Worldwide Zimbabwe , (2009). Growth Options And Poverty Reduction In Zimbabwe. A Spatial Economy Wide Model Analysis For 2004 – 2005.

Denver Urban Gardens. (2012). *Denver Urban Gardens.* Retrieved December 15th, 2018, from Denver Urban Gardens: http://dug.org/gardens/

Department for International Development (DFID) . (2004). *Agriculture, hunger and food security.* London: DFID.

DFID(2014)Can Agriculture interentions promote nutrition: AgricultureandNutrtion evidence paper"Department of Internatoal Development ,London.

Dibsdall, L. B. (2011). Low-income consumers' attitudes and behavior towards access availability and motivation to eat fruit and vegetables. *American Journal of PublicHealth: August 2011, Vol. 101* , 159-168 .

Dudutech ltd. (2012). Dudutechs Beneficial Insects and Biopesticides. , Nairobi, Kenya: Finlays Horticulture K ltd.

Eyzaguire, W. a. (2001). *Homegardens and In situ Conservation of Plant Geneticmaterial.* ipgri.

FAO (2003). Trade Reforms. Rome: FAO.

FAO (2005). *Building on Gender, Agro-biodiversity and Local Knowledge.* Rome:

Fisher M., (2004). Global Agricultural Statistics for Agriculture, World Health Organisation, Geneva.

Food and Agriculture Organisation (FAO): (2010) Nutrition and Consumer Protection. Household Food Security and Community Improving Nutrition through Home Gardening.

Hallman K, Lewis D, Begum S(2003)An Integrated Economic and Social Analysis to Assess the Impact of Vegetable and Fishpond Technologies on Poverty in Rural Bangladesh, (IPRI).Retrievedfromhttp/ebrary.ifpriorg/cdm/ref/collection/p15738ol2/id/79202(8July2015).Washington,DC

ICRISAT (2010). Having Hunger through Nutritional Interventions.

Journal of Food, Agriculture, Nutrition and Development, vol 9 no 6.

Kabeer N(2005) Gender equality and women'sempoerment:Acriticalanalysis of the third millenium development goal 1.Gender and Development13(1),13-24.

Kumar N, Quisumbing A R (2011) Access, adoption, and diffusion: understanding the long term impacts of improved vegetable and fish technologies In Bangladesh. Journal of Develpmenteffectiveness3 (2), 193-219.

Midmore DJ, Ninez V, Venkataraman R (1991) Household Gardening projects in Asia: past experience and future directions Asian vegetable Research and Development Center (AVRDC),Taipei

Ninez. (1984). Household Gardens. *Potatoes in food systems* , 15.

Oiye, S. A. (2009). The Contribution Of African Leafy Vegetables (Alvs)To Vitamin A Intake And The Influence Of Income In Rural Kenya . *African Journal of Food Agriculture Nutrition and nutrition* .

Oniang'o, O. S. (2009). The Contribution of African Leafy Vegetables (ALVs). *Africa*

Oxfam International (2013)Women' collective action unlocking the potential of agricultural markets,Oxfam GB,Oxfrd,UK.

Richman. (1995, JULY 20/07/1995). The International Population Stabilization and Reproductive Health Act. *CATO* .

Rogers. (1995). *Diffusion of innovations.* Frederick: Free Press.

Scanlan. (2003). *Food Availability and Access in Lesser-Industrialized Societies: A Test and Interpretation of Neo-Malthusian and Technoecological Theories.*

Shiundu, O. (2007). Marketing African Leafy Vegetables: Challenges and Opportunities in the Kenyan Context. *Afrin Journal of Food, Agriculture,Nutrition and Development* , Vol 7 No 4.

Silvia, N. a. (2012). International Food Prices. ROME: FAO, IFAD,WFP.

Smith. (1997). *participant observation and informal education.* Retrieved JAN 12/01/2013, 2013, from www.infed.org.

Soroti C, (2007). A Capital Assets Framework for Household Livelihood Strategies Development Policy Review 17 (3) 315-42. UNDP, (2003), Zimbabwe Human Development Report 2003, Poverty Reduction Forum, University Of Zimbabwe Harare.

Soroti C, (2007). A Capital Assets Framework for Household Livelihood Strategies Development Policy Review 17 (3) 315-42. UNDP, (2003), Zimbabwe Human Development Report 2003, Poverty Reduction Forum, University Of Zimbabwe Harare.

United Nations Confrence on Trade and Development. (2008). *Organic Agriculture and Food Security in Africa.* New York and Geneva: United Nations.

USAID. (1992, April 13). *Defination of Food Security.* Retrieved April 5th, 2013, from www.usaid.gov: http://pdf.usaid.gov/pdf_docs/PNAAV468.pdf

Waterfields, (2007). Growing Urban Health: Community Gardening In South East Toronto.

WHO. (2004). *Comaparative Quantification of Health Risks.* Geneva: WHO.

World Vegetable Center.2016.*The World Vegetable Center's Approach to Household gardening for nutrition.* World Vegetable Center, Sanhua, Taiwan.PublicationNo.16-803.35p.

Youth Agro-Environment Initiative. (2011, SEPTMBER 11TH). *Multi-story Vegetables Gardening for Food Security in Kenya.* Retrieved JULY 20TH, 2013, from Yagrein.blogspot.com: http://yagrein.blogspot.com/2011/09/multi-storey-vegetable-gardens-for-food.html

Zimpita I, Biggs C, Faber M(2015) *Gardening Practices in a rural village in South Africa 10 years after completion of a home garden project*. Food and Nutrition Bulletin 36, 33-42

ZimVac (2010) Strengthening Food Security Analysis In Zimbabwe, Institutional Framework For Moving Forward, Harare May 2010.

APPENDIX1: QUESTIONNAIRE

My name is Ratidzai Mufari. I am a student at the University of Science Education Department of Economics, Agriculture, Research and Extension. I have come to your village to ask you about the role of the nutrition gardens in your household food security and dietary diversity. The information I will collect could be used by the government to introduce more innovations that can improve your wellbeing. I would like to use the next 30 to 45 minutes in this exercise. In our discussion try to be as objective as possible and give all speakers the right to express themselves fully without fear. The information you will give will be treated in strict confidence.

1. What is your level of formal education?

    - Pre- primary
    - Primary
    - Secondary
    - Tertiary
    - Others (specify)

2. Which ward do you stay in Bindura?

    - Ward 11
    - Ward 12
    - (specify)_____

3. For how long have you stayed in Bindura?

    - 0-5 YRS
    - 5-10YRS

- 10-15YR
- 15-20YRS
- OVER 20YRS

4. Which of the following village committees/organizations have you served?
   - none
   - headman
   - Other (specify)……
5. How much do you earn or make per month in Zimbabwean dollars?
   - Below 100
   - 101- 200
   - 201- 300
   - 301 and above

6. Do you own land anywhere in Bindura?
   - Yes
   - No
7. Do you own a house or a plot?
   - Yes
   - No
8. Did you have a garden in Bindura?

- Yes
- No

9. What size is your nutritional garden?

……..

10. How did you design your nutritional garden?.....

11. Did you get external help in setting your garden

- Yes (if yes from whom?).....
- No

12. Do you still get any help in running your garden?

- Yes (if yes from whom?).....
- No

13. Did you have a garden before you came to Bindura?-

- YES, if yes where?.....
- NO

14. How many times do you get your food from the kitchen garden in a week/

- once times a week
- twice times a week
- thrice times a week

- more than three a week

15. What kind of plants do you grow in your Nutrition Garden?**.....**

16. Before you started a nutrition garden what vegetables did use to buy?.....

17. What vegetables do you still buy after the establishment of the nutrition garden?.....

18. Has the Nutrition Garden helped to improve your food supply?

- Yes
- No

If yes above by how much in a scale of 1 to 5 (1being the lowest and 5 the highest)

- 1
- 2
- 3
- 4
- 5

19. Has the nutrition gardens improved the variety of food for your household?

- Yes
- No

No

If yes above by how much in a scale of 1 to 5 (1 being the lowest and 5 the highest)

- 1
- 2
- 3
- 4
- 5

20. During the lean times did the garden supply your needs?

- Yes
- No

If yes in a scale of 1 to 5, 1 being the lowest and 5 the highest

- 1
- 2
- 3
- 4
- 5

21. During drought times did the garden supply your needs?

- Yes
- No

If yes in a scale of 1 to 5, 1 being the lowest and 5 the highest

- 1
- 2
- 3

- 4
- 5

22. Who attend the Garden?

- wife
- children
- whole family
- self
- hired labour

23. Have you learnt any new gardening skill

- yes
- no

24. Would you do a nutrition garden after you leave Bindura?

- Yes
- No

25. Have you replicated the garden in your rural home?

- Yes
- No

26. What challenges do you have in your Nutrition Garden?.....

27. How are these challenges being overcome?.....

28. What improvements do you think would improve the benefits from Kitchen garden?.....

29. How many times do you buy animal proteins other than milk in a month?

- More than 4 times
- Four times
- Two times
- Rarely(less than twice a month)

30. How much cooking fat/oil do you buy per month in kilogrammes /litres

- 6
- 4
- 2
- 1
- Less than 1

31. How many times do you eat fruits a(Avocadoes, bananas, mangoes, papaws and passion) per week

- Daily
- >three times
- Twice
- <twice

32. In the last 30 days did you or any household member eat any food that you did not want just because you did not have resources?

    - None
    - Rarely (one or twice)
    - sometimes (3-10 times)
    - Often (more than 10 times)

33. In the last 30 days did you worry that your household will not have enough food?

    - None
    - Rarely (one or twice)
    - sometimes (3-10 times)
    - Often (more than 10 times)

34. In the last 30 days did you or member of your household had to eat lesser meals in a day because there were no enough food?

    - None
    - Rarely (one or twice)
    - sometimes (3-10 times)
    - Often (more than 10 times)

35. In the last 30 days did it happen that there was no food to eat of any kind in the house because of resources

    - None

- Rarely (one or twice)
- sometimes (3-10 times)
- Often (more than 10 times)

36. In the last 30 days did it happen that you or any of the household member had to eat a smaller meal that you felt you needed just because there was no enough food?
    - None
    - Rarely (one or twice)
    - sometimes (3-10 times)
    - Often (more than 10 times)
37. In the last 30 days did it happen that you or any member of the household went to sleep at night hungry because there was no food?
    - None
    - Rarely (one or twice)
    - sometimes (3-10 times)
    - Often (more than 10 times)
38. In the last 30 days did it happen that you or any of your household members went for a whole day and night without eating anything because there was not enough food?
    - None
    - Rarely (one or twice)
    - sometimes (3-10 times)
    - Often (more than 10 times)

APPENDIX II

KEY INFORMANT INTERVIEW GUIDE

The Role of Nutritional Gardens in Food Security and Nutritional Diversity: "A Case study of Bindura District"

Name of interviewer: _____

Date of the interview: _____

Name of the community leader _____

Role in the Community; _____

1. How were the nutrition gardens set up?
2. When were the nutrition gardens set up in what were the objectives of setting up the gardens?
3. What kind of plants is found in these gardens?
4. What was the food security position (food supply) before the nutrition gardens were introduced?
5. Has the Nutrition Gardens made any change to the food supply?
6. In what ways have gardens improved the variety of food to the participants?
7. What benefits do participants get from the nutrition gardens?
8. What was the position of food varieties (Nutritional diversity) to the households before the gardens were introduced?
9. Are there any changes in variety food (nutritional diversity) to the households after gardens were introduced?
10. What kind of problems do households face in implementing the nutrition gardens?
11. In your view how can these problems be addressed?

APPENDIX III

FGD GUIDE

The Role of Nutrition Gardens in Food Security and Nutritional Diversity:

"A Case study of Bindura District"

My name is Ratidzai Mufari. I am a student at the University of Science Education Department of Economics,Agriculture,Research and Extension. I have come to your village to ask you about the role of the nutrition gardens in your household food security and dietary diversity. The information I will collect could be used by the government to introduce more innovations that can improve your wellbeing. I would like to use the next 30 to 45 minutes in this exercise. In our discussion try to be as objective as possible and give all speakers the right to express themselves fully without fear. The information you will give will be treated in strict confidence.

Ice breaker/introduction	
Which department and area of expertise do you come from?	
What is a kitchen garden to you? How is the kitchen garden designed? What inputs do you need for a nutrition garden? Which plants are grown in the nutrition garden? Where do you participants get planting materials?	
In what ways Have nutrition gardens improved food security (supply of food to households)? Have the nutrition gardens improved nutritional diversity? If yes how?	
What challenges do nutrition gardens face? How can these challenges be solved?	
What are your thoughts on the way forward	