FARMERS’ PERCEPTION ON FACTORS INFLUENCING SMALL-SCALE VEGETABLE PRODUCTION AT TSENGIWE VILLAGE, SOUTH AFRICA

By

AKHONA GQIBITYALA

Submitted in fulfilment of the requirements for the degree of Master of Technology in Agricultural Management to be awarded at Nelson Mandela Metropolitan University

April 2017

SUPERVISOR: DR TM PITTAWAY

CO-SUPERVISOR: DR LN MLISA

CO-SUPERVISOR: MR M KHAPAYI
DECLARATION

I, Akhona Gqibityala, hereby declare that the work in this dissertation is my own original work. I cede of the dissertation in favour of Nelson Mandela Metropolitan University.

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

Akhona Gqibityala

Port Elizabeth

April 2017
DEDICATION

This dissertation is dedicated to my late father, Koti Lennan Gqibityala who left the words of wisdom and to my mother, Nozuko Victoria Gqibityala who never gave up on supporting me with love and prayers throughout my studies.
ACKNOWLEDGEMENTS

I would like to show my appreciation to the Lord Almighty who is the Alpha and the Omega. I would not be able to finish my studies if it was not by Him.

I am highly appreciative to my promoter, Doctor Timothy Pittaway and co-promoters, Doctor Nomfundo Lily-Rose Mlisa and Mr Musa Khapayi for their encouragements, guidance, constructive criticism and academic support from the introductory to the final phase of my study.

My gratitude to the community of Sakhisizwe municipality (Tsengiwe village) for giving me a home to stay during the interviews and welcome me in their community and sacrificed their time to participate in my research. Gratitude to Tsengiwe One Stop Development and Research Centre for their support on this research and appreciation they have shown during the visits in the village.

I am thankful to my close friends, from my department and from the neighbouring universities who sincerely supported me in my research journey.

It is my deepest pleasure to pay acknowledgement to my mother, Nozuko Victoria Gqibityala, my three brothers and my sister-in-law: Samora Fihlani, Lungelo Gqibityala, Sakhe Gqibityala and Likhwezi Fihlani for their support and for believing in me.

I owe an appreciation to Nelson Mandela Metropolitan University Research office for the research workshops and University of Fort Hare on making this study possible.

The financial support of the National Research Foundation (NRF) is gratefully acknowledged.
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>DECLARATION</td>
<td>i</td>
</tr>
<tr>
<td>DEDICATION</td>
<td>ii</td>
</tr>
<tr>
<td>ACKNOWLEDGEMENTS</td>
<td>iii</td>
</tr>
<tr>
<td>TABLE OF CONTENTS</td>
<td>iv</td>
</tr>
<tr>
<td>SUMMARY</td>
<td>ix</td>
</tr>
<tr>
<td>LIST OF FIGURES</td>
<td>xi</td>
</tr>
<tr>
<td>LIST OF TABLES</td>
<td>xiii</td>
</tr>
<tr>
<td>APPENDICES</td>
<td>xiv</td>
</tr>
</tbody>
</table>

## CHAPTER ONE: INTRODUCTION AND ORIENTATION OF RESEARCH

1.1 INTRODUCTION TO THE RESEARCH                       | 1    |
1.2 BACKGROUND OF THE STUDY AREA                       | 2    |
1.3 PROBLEM STATEMENT                                  | 4    |
   1.3.1 Sub-Problems                                   | 5    |
1.4 OBJECTIVES OF THE STUDY                            | 5    |
1.5 DELIMITATIONS OF THE STUDY                         | 6    |
   1.5.1 Geographic demarcation                         | 6    |
   1.5.2 Participants and role-players                  | 6    |
1.6 RESEARCH DESIGN AND PROCESS                        | 7    |
1.7 RESEARCH METHODS                                   | 8    |
1.8 SIGNIFICANCE AND RATIONALE OF THE STUDY            | 9    |
1.9 DEFINITION OF MAIN CONCEPTS

1.9.1 Small landholdings and vegetable crop production 10
1.9.2 Food security 10
1.9.3 Farmers perceptions 10

1.10 STRUCTURE OF THE RESEARCH 11

CHAPTER TWO: LITERATURE REVIEW

2.1 INTRODUCTION 12

2.2 SOUTH AFRICAN AGRICULTURE

2.2.1 Introduction 13
2.2.2 History 14
2.2.3 Food security and livelihoods 17
2.2.4 Small-scale farming 18

2.3 CROP PRODUCTION IN THE FORMER “TRANSKEI” 21

2.4 AFRICAN INDIGENOUS LEAFY VEGETABLES 27

2.5 SMALL-SCALE FARMER MARKET ACCESS 30

2.6 COMMUNAL AND CULTURAL INFLUENCES ON FARMING 32

2.7 CLIMATE 33

2.8 MEASURING FARMERS PERCEPTIONS 35

2.8.1 Emotional perceptions 36
2.8.2 Expectation and motivational perceptions 37

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 INTRODUCTION 38

3.2 DESCRIPTION OF THE STUDY AREA

3.2.1 Geographic information 40
3.2.2 Socio-economic description of the study area 41
3.3 RESEARCH METHODOLOGY

3.3.1 Types of data
3.3.2 Research design
3.3.3 Research approach
3.3.4 Main data collection instruments

3.4 RESEARCH ETHICS

CHAPTER FOUR: RESEARCH FINDINGS

4.1 INTRODUCTION

4.2 SOCIO-ECONOMICAL CHARACTERISTICS

4.2.1 Gender of the respondents
4.2.2 Variation in age
4.2.3 Marital status of the respondents
4.2.4 Source of income of the respondents
4.2.5 Educational level of the respondents
4.2.6 Size of respondents’ families
4.2.7 Size of respondents’ farms
4.2.8 Farming experience of the respondents

4.3 FARMING ACTIVITIES AND PRODUCTION

4.4 LAND AND SOIL

4.4.1 Distribution according to soil preparation
4.4.2 Soil Problems

4.5 IRRIGATION INFRASTRUCTURE AND WATER SOURCES

4.5.1 Methods of irrigation used by participant farmers
4.5.2 Irrigation frequency
4.5.3 Irrigation challenges

4.6 MARKET AND PRODUCT DESTINATION

4.6.1 Trading of vegetables
4.6.2 Monthly income from vegetable production
4.6.3 Main reasons for growing vegetables
4.7 COMMUNAL AND CULTURAL INFLUENCES 75
   4.7.1 Traditional methods of vegetable production 75
   4.7.2 Vegetable farming responsibility within the family 75
   4.7.3 Irrigation responsibility 76

4.8 CLIMATE 77
   4.8.1 Perception of climate influence on vegetable production 77
   4.8.2 Change in rainfall patterns and levels 77

4.9 CROP SELECTION AND DIVERSITY 78
   4.9.1 Spinach varieties 79
   4.9.2 Selection of crops 79
   4.9.3 Crop rotation 80

4.10 PESTS, DISEASE & NUTRIENT DEFICIENCY 80
   4.10.1 Pests 80
   4.10.2 Vegetable diseases 81
   4.10.3 Pesticide application 82

4.11 PERCEIVED HEALTH BENEFITS OF INDIGENOUS LEAFY VEGETABLES 82
   4.11.1 Indigenous leafy vegetables 82
   4.11.2 Distribution according to perceived health benefits 84
   4.11.3 Responsibility for growing indigenous leafy vegetables 84
   4.11.4 Collection of indigenous leafy vegetables 85
   4.11.5 Time of harvesting of indigenous leafy vegetables 86
   4.11.6 Challenges in making use of indigenous leafy vegetable 86

4.12 PERCEIVED CHALLENGES FACED IN VEGETABLE PRODUCTION 87

CHAPTER FIVE: DISCUSSION, CONCLUSION AND RECOMMENDATIONS

5.1 INTRODUCTION 89

5.2 SOCIO-ECONOMIC FACTORS INFLUENCING SMALL-SCALE VEGETABLE PRODUCTION 90
5.2.1 Gender
5.2.2 Age
5.2.3 Marital status
5.2.4 Source of income
5.2.5 Educational level
5.2.6 Family size
5.2.7 Farm size
5.2.8 Farming practices

5.3 MAIN PERCEIVED DETERMINANTS IN VEGETABLE CROP PRODUCTION

5.3.1 Production activities and practices
5.3.2 Irrigation infrastructure and water sources
5.3.3 Market access and product destination
5.3.4 Climate

5.4 SKILLS AND PRACTICES FOR SUSTAINABLE VEGETABLE PRODUCTION

5.5 INDIGENOUS LEAFY VEGETABLES HARVESTED FOR HOUSEHOLD CONSUMPTION

5.6 CONCLUSION

5.7 RECOMMENDATIONS

REFERENCE LIST

APPENDICES
SUMMARY

Food security and self-sufficiency in the rural areas has been and remains a major concern for the South African government. The study aimed to investigate farmer’s perception of factors influencing small-scale vegetable production in Tsengiwe village in the Eastern Cape. The research focus was on the following aspects that may have an influence on small-scale vegetable production: socio-economic factors, production and resource deficiencies and the impact of indigenous leafy vegetables. The researcher conducted several demonstration workshops during the field work. The pilot studies and community engagements were essential to extract knowledge systems embedded in the cultural traditions of indigenous or local communities. The action research was part of the reflective process of broadminded problem solving led by researcher and community.

The research approach used a triangulation research method to extract information, whereby both quantitative and qualitative research was used to ensure greater accuracy. The main data collection was obtained from interviews with small-scale farming households in the Tsengiwe-area. The study revealed that households were dependent on elderly female pensioners to source food and water. These women received most of their income from social grants and were mainly responsible for all farming activities in the households. Most households attempted to produce vegetables, although food security and self-sufficiency through own production was rarely achieved.
Other perceived farming challenges included: lack of market accessibility, irrigation infrastructure, drought, financial limitations and soil degradation. Indigenous leafy vegetables were found to play a nutritional role in times of food shortage and not as much for their medicinal value. The study recommended the following interventions: Support for the elderly women in development and production practices, interventions to address factors affecting vegetable production, improving soil structure, working towards food self-sufficiency, moving away from dependence on mechanisation in rural farming.
# LIST OF FIGURES

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Figure 1:</td>
<td>Researcher’s own construction research process model</td>
<td>8</td>
</tr>
<tr>
<td>Figure 3:</td>
<td>Map indicating the research area</td>
<td>41</td>
</tr>
<tr>
<td>Figure 3.1:</td>
<td>Map of the village of Tsengiwe</td>
<td>43</td>
</tr>
<tr>
<td>Figure 3.2:</td>
<td>Comparison of quantitative and qualitative research approaches</td>
<td>49</td>
</tr>
<tr>
<td>Figure 4.1:</td>
<td>Distribution according to gender</td>
<td>59</td>
</tr>
<tr>
<td>Figure 4.2:</td>
<td>Distribution according to farmers’ age</td>
<td>60</td>
</tr>
<tr>
<td>Figure 4.3:</td>
<td>Distribution according to marital status</td>
<td>61</td>
</tr>
<tr>
<td>Figure 4.4:</td>
<td>Distribution according to source of income</td>
<td>62</td>
</tr>
<tr>
<td>Figure 4.5:</td>
<td>Distribution according to level of educational level</td>
<td>62</td>
</tr>
<tr>
<td>Figure 4.6:</td>
<td>Distribution according to size of households</td>
<td>63</td>
</tr>
<tr>
<td>Figure 4.7:</td>
<td>Distribution according to size of farm</td>
<td>63</td>
</tr>
<tr>
<td>Figure 4.8:</td>
<td>Distribution according to farming experience</td>
<td>64</td>
</tr>
<tr>
<td>Figure 4.9:</td>
<td>Network view of main perceived soil problems</td>
<td>68</td>
</tr>
<tr>
<td>Figure 4.10:</td>
<td>Distribution according to irrigation schemes</td>
<td>69</td>
</tr>
<tr>
<td>Figure 4.11:</td>
<td>Distribution according to frequency of irrigation</td>
<td>70</td>
</tr>
<tr>
<td>Figure 4.12:</td>
<td>Network view of main perceived irrigation challenges</td>
<td>72</td>
</tr>
<tr>
<td>Figure 4.13:</td>
<td>Distribution according to respondents’ vegetable trading</td>
<td>73</td>
</tr>
<tr>
<td>Figure 4.14:</td>
<td>Distribution according to income from vegetable production</td>
<td>74</td>
</tr>
</tbody>
</table>
Figure 4.15: Distribution according to reasons for growing vegetables
Figure 4.16: Application of traditional methods of vegetable production
Figure 4.17: Distribution according to respondents’ farming responsibility
Figure 4.18: Distribution according to irrigation responsibilities
Figure 4.19: Distribution according to climate influence on production
Figure 4.20: Alteration in rainfall patterns and levels in the past five years
Figure 4.21: Distribution according to selection of spinach varieties
Figure 4.22: Distribution according to selection of crops
Figure 4.23: Distribution according to crop rotation
Figure 4.24: Distribution according to application of pesticide
Figure 4.25: Health benefits of indigenous leafy vegetables
Figure 4.26: Distribution according to responsibility for growing
indigenous leafy vegetables
Figure 4.27: Distribution according to collection of indigenous
leafy vegetables
Figure 4.28: Distribution according to seasonal collection of
leafy vegetables
Figure 4.29: Distribution according challenges in using leafy vegetables
Figure 4.30: Factors presenting production challenges
**LIST OF TABLES**

<table>
<thead>
<tr>
<th>Table</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Table 1</td>
<td>Typology of smallholders</td>
<td>7</td>
</tr>
<tr>
<td>Table 3</td>
<td>Summary of research methodology</td>
<td>44</td>
</tr>
<tr>
<td>Table 4.1</td>
<td>Farming practices</td>
<td>65</td>
</tr>
<tr>
<td>Table 4.2</td>
<td>Vegetable production practices</td>
<td>67</td>
</tr>
<tr>
<td>Table 4.3</td>
<td>Distribution according to pests in vegetables</td>
<td>80</td>
</tr>
<tr>
<td>Table 4.4</td>
<td>Distribution according to diseases in vegetables</td>
<td>81</td>
</tr>
<tr>
<td>Table 4.5</td>
<td>Distribution according to indigenous leafy vegetables</td>
<td>83</td>
</tr>
</tbody>
</table>
APPENDICES

Appendix A: Obsolete water resources 127

Appendix B: Home-made watering can 128

Appendix C: Stones and gravel in growing areas 129

Appendix D: Examples of indigenous leafy vegetables 130

Appendix E: Severe soil erosion North of Tsengiwe village 131

Appendix F: Workshop on research findings feedback and recommendations 132

Appendix G: Cultivation of indigenous leafy vegetables 133
CHAPTER ONE
INTRODUCTION AND ORIENTATION OF RESEARCH

1.1 INTRODUCTION TO THE RESEARCH

The research sought to investigate the farmers’ perceptions of the main factors influencing vegetable crop production of small-scale farmers in Tsengiwe village, with a focus on the following determinants: socio-economic characteristics, production practices, land and soil rehabilitation, irrigation infrastructure, market integration, communal influences, climatic change and crop selection and diversity and the perceived health benefits of indigenous leafy vegetables. Thus, the study outcomes aimed to contribute to the body of knowledge on a better understanding of small-scale vegetable farming in the area. The study was conducted in Tsengiwe village, Cala, under Sakhisizwe municipality in Chris Hani District in the Eastern Cape Province.

Previous studies conducted in Tsengiwe village indicated that the economic activity of Tsengiwe village is little or rather low apart from few agricultural activities and few stores (Bosenburg and Hay, 2011:36). Vegetables are important for human nutrition and health practitioners recommend that people increase the consumption of vegetables (Modi, Modi and Hendriks, 2006:3). The village is exposed to a plethora of challenges such as soil erosion, seasonal droughts and limited farming resources. Drought periods and inability to access adequate water and community vulnerabilities influence the everyday living and vegetable farming as well as livestock management (Bosenburg and Hay, 2011:37). The lack of crop improvement and development in the village is exacerbated by poor infrastructure, lack of municipal services and social facilities (Town, 2013:40).
1.2 BACKGROUND OF THE STUDY AREA

The empirical component of this study was limited to farmers and role players operating in Tsengiwe village in the Sakhisizwe municipality under Christ Hani District in the Eastern Cape. The village of Tsengiwe is representative of most rural villages in the former Transkei area (former “homeland”). It is vulnerable to inconsistent rainfall patterns and seasonal drought. This erratic climate makes it difficult to plan for summer crop selection. The area receives an average annual precipitation of 581 mm and mainly occurs in the summer months. The mean annual temperature is 16.3°C (Gunya, Mlisa and Muchenje, 2014:12).

The province is applying innovative methods to draw rural people who survive mostly on subsistence agriculture, migrant labour and welfare grants into the mainstream economy. Unemployment remains a challenge, but as the economy has grown, improvements such as municipal infrastructure have been evident. The village falls under the Sakhisizwe Local Municipality, which in turn forms part of the Chris Hani District Municipality. Tsengiwe consists of two main parts: the upper village, called Emhlonyaneni, and lower village, called Emandileni. With the growth in its population, Tsengiwe was further sub-divided into six sections called: Mhlonyaneni, Ng’ala, Ntlakwesikolo, Ekuphumleni, Zabhokhwe and Strong Yard. The village is situated near the Tsomo River, which has origins in the Drakensberg Mountains. The Tsomo River separates Tsengiwe from the villages of Manzimdaka and Mbenge in the east (Department of Science and Technology, 2012).
The socio-economic environment is aggravated by poor infrastructure and a lack of municipal services (Tancott, 2014:1). According to the local municipality’s Integrated Development Plan (2014), the Sakhisizwe Municipality’s Human Development Index is at 0.41, which is lower than that of the region and of the country as a whole. The municipality’s Local Economic Development Plan (2014), acknowledges the municipality’s potential in the agricultural sector -- particularly the high-fertility lands for plant production, which lie unutilised in most parts of the municipality.

The Eastern Cape is the second-largest province, following the Northern Cape, of South Africa’s nine provinces. Situated in the south-east of the country, with its Indian Ocean coastline, the province covers 168 966km² (13.9 per cent of South Africa’s land area), with a population of an estimated 6.5 million people (LEDP, 2015). Previously, the Eastern Cape formed part of the Cape Province, along with the former “homelands” of Transkei and Ciskei. The Eastern Cape is regarded as being abundantly rich in natural resources from grazing land to forests, marine life to rich farming soils, and water to wilderness. Featuring all seven of South Africa’s ecological zones, the province’s climate allows for the production of a wide range of crops. Crops as diverse as pineapples, tea, tomatoes and chicory are successfully cultivated.
Agriculture programmes implemented to solve the problem of poverty, food security and nutrition shortages in the Eastern Cape have been problematic and have fallen short of meeting the needs of the communities (Aliber and Hall, 2010:122). From the 1950s, a policy of “betterment” was introduced, ostensibly as a means of controlling rangeland degradation in communal areas. The policy redefined land use patterns by dividing areas into residential arable and grazing land (De Wet, 1995:37).

During the preliminary visits to the research area, the researcher observed that the vegetable farmers were willing to participate in vegetable farming and were enthusiastic to make the vegetable production a success but vegetable production was problematic and not sustainable. When people in rural areas become less involved in agricultural activities, there are increasing levels of poverty (Bryceson and Van der Laan, 1994). South Africa has also seen much disempowerment of tribal authorities and deterioration of extension services (Mabhena, 2011:17). Although the draconian historical environment laid the foundation for the impoverishment of rural villages in the Eastern Cape, today there are new challenges facing rural agriculture in villages such as Tsengiwe. The main research question of the study is therefore:

What are the main perceived determinants influencing vegetable crop production of Tsengiwe village in the Eastern Cape?
1.3.1 SUB-PROBLEMS

The study aimed to identify the main farmer’s perceptions on factors influencing vegetable production of small-scale farmers in Tsengiwe village in the Eastern Cape. Investigating the following sub-problems jointly contributed to answering the main problem statement:

- What are the farmer’s perceptions of problems relating to vegetable production?
- How do indigenous leafy vegetables influence vegetable production and household consumption?
- How can this research promote increased involvement in agricultural activities?

1.4 OBJECTIVES OF THE STUDY

The study sought to:

- Identify the main perceived determinants on vegetable crop production.
- Explore the types of indigenous leafy vegetables procured and cultivated for household consumption.
- Contribute to the knowledge and skills and practices for sustainable vegetable production.
1.5 DELIMITATION OF THE RESEARCH

The purpose of delimitation is to make the research study manageable by demarcating the scope of the study. For this purpose, the following demarcations apply to this study:

1.5.1 Geographic demarcation

The research was delimited to Tsengiwe village located at 31° 33’ S and 27° 36’ E at an altitude of 1 441m above sea level in Chris Hani District in the Eastern Cape. The community centre (Tsengiwe One Stop Development and Research Centre) was the main venue used for focus groups and workshops.

1.5.2 Participants and role-players

The study focused on subsistence oriented small-holders as defined by Manderson, (2015:7) in Table 1 below. The majority of the farming community at Tsengiwe are black and isiXhosa-speaking. The participants in this study were limited to small-scale vegetable farmers from the age of 18 and above. The participants for the questionnaire were selected from and around the village. The representative sample of this study focused on those actively involved with subsistence orientated small-scale vegetable farming in the Tsengiwe area. Sixty five farmers were selected for interviews which were producing on farm sizes of less than 7 ha.
Table 1: Typology of smallholders

<table>
<thead>
<tr>
<th>Objective of production</th>
<th>Subsistence-oriented smallholders</th>
<th>Market-oriented smallholders in loose value chains</th>
<th>Market-oriented smallholders in tight value chains</th>
<th>Small-scale capitalist farmers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proportion of marketed output</td>
<td>Household consumption</td>
<td>Household consumption + cash income</td>
<td>Cash income + some home consumption</td>
<td>Profit</td>
</tr>
<tr>
<td>Contribution to household income</td>
<td>None or insignificant</td>
<td>50% or &gt;</td>
<td>75% or &gt;</td>
<td>100%</td>
</tr>
<tr>
<td>Labour</td>
<td>Family</td>
<td>Family + some hired</td>
<td>Family + significant numbers hired</td>
<td>Hired</td>
</tr>
<tr>
<td>Mechanisation</td>
<td>Very low</td>
<td>Low</td>
<td>Medium to high</td>
<td>High</td>
</tr>
<tr>
<td>Capital intensity</td>
<td>Very low</td>
<td>Low</td>
<td>Medium to high</td>
<td>High</td>
</tr>
<tr>
<td>Access to finance</td>
<td>Absent</td>
<td>Some</td>
<td>Significant</td>
<td>Very significant</td>
</tr>
<tr>
<td>Households in SA</td>
<td>2–2.5 million</td>
<td>200–250 000</td>
<td>?</td>
<td>?</td>
</tr>
</tbody>
</table>

Source: Manderson (2015:7)

1.6 RESEARCH DESIGN AND PROCESS

Research design refers to the plan or proposal for conducting research and which involves the intersection of philosophy, strategies of inquiry and specific methods (Creswell, 2008:5). The research was therefore adopted mainly from a research design using a variety of exploratory and descriptive approaches as the main components shown in Figure 1. The data collection and analysis were used as different sources of information in order to increase validity of the study. The main sources consisted of a literature study, participant engagement and community members. The data collecting process included a pilot study, focus groups and questionnaires.
1.7 RESEARCH METHODS

Research methodology is a procedure by which a researcher goes about the work of describing, explaining and predicting phenomena. This study applied a mixed-method approach of both qualitative and quantitative paradigms. The researcher aimed to “mix” the research methods to validate data through cross verification from two or more sources. This triangulation method is particularly suited to unexplored areas of information and phenomena (Hussein, 2015:8). The triangular methodological approach to research enables the researcher to fully understand and interpret the research findings and ascertain complete validity and accuracy of data (Halcomb and Andrew, 2005:72).
This research method applied different techniques and approaches in collecting samples, data and find solutions to a problem. Quantitative methods place the emphasis on the generalizable considerations of research participants and associations between variables. However, qualitative methods focus on perception, points of view, description and expansion. The strategies that were used for data collection was action research, pilot study and the questionnaire data collection. Thus, action research and explorative pilot study was used to assist in the development of the main questionnaire for the main data collection. Face to face interviews were used during data collection using the derived questionnaire. The qualitative and quantitative data was generated from the questionnaire conducted with the Tsengiwe vegetable farmers. Workshops and focus groups were conducted to acquire a contextual enquiry of the farmer’s environment.

1.8 SIGNIFICANCE AND RATIONALE OF THE STUDY

The objectives of the study strive to promote increased involvement of small-scale farmers in agricultural activities in order to improve food security, community health, local economic development and the alleviation of poverty. In sub-Saharan Africa, agriculture is mostly practiced by rural smallholder subsistence farmers and this sector contributes to feeding 2.6 billion people. The transition from subsistence to smallholder commercial farming is slow, leading to increased food insecurity and widespread poverty among rural populations (Ramaila, Mahlangu and du Toit, 2011). There are underutilized natural resources in the Eastern Cape and knowledge about the perceived determinants on small-scale vegetable production is limited. The researcher intended to provide the recommendations that could assist vegetable production and rural development.
1.9 DEFINITION OF MAIN CONCEPTS

1.9.1 Small landholdings and vegetable crop production

Smallholder food production in small home gardens and larger field plots is a mainstay of the rural economy. Hence, one of the biggest challenges confronting African development is to maintain food self-sufficiency in the face of increasing human populations, static or degenerating agricultural production and environmental degradation. Within South Africa, the prevailing perception has been one of a decline in the importance of arable agriculture as a livelihood strategy. Small landholders have limited financial resources for achieving good vegetable crop production (Binns et al. 1996).

1.9.2 Food security

Food security refers to the ability of individuals to obtain sufficient food on a day-to-day basis. Food security has been defined as the ability of people to secure adequate food and as the access by all people at all times to enough food for an active, healthy life (Anderson, 1990:1). According to the World Food Summit convened in Rome in 1996, food security is delineated as the availability of sufficient quantities of food of appropriate quality and food access by individuals to adequate resources for acquiring appropriate foods for a nutritionally adequate diet.

1.9.3 Farmers perceptions

Perception can be constructed as a means by which a person analyses, selects and amalgamate the information that has been gathered (Robbins, Judge, Millet and Boyle, 2013:201). Farmer’s perceptions are the combination of characteristics of the individual farmer and the characteristic of organization group. The perception of farmers is measured multi-dimensional.
This model integrates several family components that potentially influence each dimension of farmer’s perceptions (Dolisca, McDaniel and Teeter, 2006:706).

1.10 STRUCTURE OF THE RESEARCH

**Chapter 1:** Discusses the introduction and the background of the study area and the research at large. The chapter summarises the objectives of the study, the main research question, the problem statement, the research design and delimitations of the study, the research design and processes, significance and rationale of the study and the definitions of the concepts.

**Chapter 2:** Discusses the literature review conducted for the current research. The chapter outlines the background to South African agriculture productivity, small-scale farmers, food security in South Africa, crop production and measuring farmer’s perceptions.

**Chapter 3:** Explains the research design and methodology implemented in this study. This chapter elaborates on the chosen samples, measuring instruments and methods of data collection.

**Chapter 4:** Presents the results and findings from the data gathered by means of questionnaires and focus groups.

**Chapter 5:** Presents the discussion, conclusion and recommendations of the research.
CHAPTER TWO

LITERATURE REVIEW

2.1 INTRODUCTION

The following chapter forms the framework of concepts and variables that needed to be explored and as well as reviewing the research themes appropriate to the study. This theoretical framework serves as a backdrop to the study and explores previous research conducted in this field. This literature review was developed around the themes of rural agriculture, small-scale farming, and crop production in the ex-Transkei area, African indigenous vegetables and measuring farmer perceptions.
2.2 SOUTH AFRICAN AGRICULTURE

2.2.1 Introduction

As about 16 million South Africans are living in poverty, with numbers highest in the rural areas. Most of these small-scale farmers are dependent on agriculture for survival (Department of Agriculture Forestry and Fisheries, 2010). Agriculture has been a supplement to rural areas as it has provided an alternative source of income, and it has been the source of food and the increase of crop production results in alleviation of poverty. South Africa is defined as a middle-income country for it has a high level of infrastructure, nevertheless poverty still affects the country especially the rural areas.

According to Ravallion (2014:1803), a rise in average household income by 2 per cent can lead to a drop in the poverty rates by 4 per cent. The World Bank (2008:2) stated that economic growth originates mainly in the agriculture sector and is about four times more effective in reducing poverty as compared to the growth from other sectors.

Small-scale farming has a long history of challenges in South Africa despite the relaxation of policies and the development of new policies with the aim of developing subsistence agriculture, reducing inequalities, alleviating poverty and supporting the previously disadvantaged farmers. Crop disease, climate alteration and lack of water, lack of agricultural resources, decrease in farm sizes, insufficient government support for irrigation systems, poor health and education and insufficient knowledge are some of the reasons for crop production decline in former homelands in the Eastern Cape (Vink et al. 2008 and Van Rooyen, 2009:12, Baiphethi and Jacobs, 2009:67). The improvement of vegetable crop production could lessen the necessity to procure vegetables which is of vital importance (Manyevere et al. 2014:41).
2.2.2 History

After democratic transition in 1994, large-scale farmers occupied 87 million hectares of land mostly privately owned and farming about 95 per cent of South Africa’s total agricultural production. With 14 million small farmers residing in the former homelands were engaged in smallholder farming mainly for self-consumption with only 13 per cent of the farmers commercialising their production and about 2 per cent effectively living off the land (Visser, 2013 and Kirsten, Wiggins and Llambi, 2010).

Emancipation after transition offered new hopes of ending the duality in South African agriculture consisting of commercial farmers made up of more than 40 000 farming units, covering a production area of 82 million hectares. The large-scale modern greenhouses, innovative technology and proper resource endowments are responsible for more than 99 per cent of the countries formal marketed agricultural output (Visser, 2013 and Kirsten et al. 2010). On the other hand, subsistence farmers mainly practised by emerging farmers, the historically disadvantaged farmers who are inexperienced, have poor resources, small scales of operations and facing a number of constraints inhibiting the commercialization of their production and actively participating in supply chains (Visser, 2013). In the early 20th century, the previous South African political regime divided the land into ethnic administrative areas set aside for African occupation, under the system of indirect rule based on chiefs and headmen, and resort areas reserved for the holiday homes of whites (Kepe, 2001:10).

The Natives Land Act of 1913 segregated Africans and Europeans in South Africa by designating about 8 per cent of the country’s farm land as reserves, which then became the only areas that could legally be farmed by Africans. The aim was to create surplus labour for the mines and the white agricultural sector.
South Africa evolved into a dual agricultural economy. South Africa can be categorised as a country that belongs to the lower middle-income and the share or contribution made by the agricultural sector is minimal when contrasted to other nations in a similar category (Perret, 2001:3). Agriculture is regarded as the source of promoting the homelands in generating income and employment and agriculture is also seen as a foundation that improves the South African economy (Fenyes et al. 1988:185). Van Rooyen and Nene, (1995:44) further stated that in the mid-1980s, small-scale farmers were supported with the aim of promoting the development and improvement of agricultural production proficiency.

Since the early 1990s, it was accepted in South Africa that commercial farmers refer to white farmers only and small-scale farmers refer to black farmers residing in the former homelands. However, a few black farmers have migrated to the commercial agricultural sector. Therefore, not all commercial farmers can be regarded as white. Nonetheless, there is no evidence that the racial composition of small-scale farmers has changed since democratic transition in 1994. The majority of disadvantaged farmers attempting to become commercial farmers are black (Machete et al. 2004; Moloi, 2008:24; Baloyi, 2010).

The phenomena of small-scale black farming arose almost completely as a separate form of agriculture in South Africa, augmenting the prominent description of 'two agricultures' that progressed from various surroundings or settings of the political economy of SA (Van Rooyen and Nene, 1995:45). Contrary to the 55,000 white commercial farmers, an estimated one million small-scale farmers encounter difficulties in relation to doubtful and fragmented land rights, community-based tenure agreements, unworkable limited farm units, over stocking and the degradation of land, (Van Rooyen and Nene, 1995:45).
The state concentrated on black homelands by providing support through the relevant channels with an objective of bettering the agricultural production of small-scale farmers (Van Rooyen and Nene, 1995:45). According to Perret, (2001:3), South African population size in rural areas is approximately about 17 million, establishing approximately 1.5 million commercial farms homes and 2.3 million found in the former homelands. Of this area, the per cent age of poverty is higher in the rural areas about 71.6% and there is a danger of these areas remaining poor relative to the urban areas (May, 1998 cited in Perret, 2001:13). Forgey et al. (1999) stated that homes that are headed by women are more vulnerable to poverty than homes that are headed by men.

During the mid – 1980s, the apartheid schemes have progressively been slowly eroded and it has been stated that the new democracy of South Africa in 1994 struggled to achieve the removal of falsifications and inconsistencies (Perret, 2001:4). Rural areas of the South Africa have faced a critical short supply of infrastructure, services, human size and confidence, access to data, markets and have been deprived of access to natural resources. The South African government commenced working on the alleviation of the rural poverty by implementing the land reform programmes, innovative water regulations and developed service delivery (Kirsten et al. 2000, Brooks, 2000).
2.2.3 Food security and livelihoods

The South African main goal in the development of agriculture is food security (FAO, 1996:1). South Africa is regarded as a food secure country at national level. However, there is approximately ±35 per cent of the population that is susceptible to food insecurity. Food security refers to the ability of individuals to obtain sufficient food on a day-to-day basis. According to FAO (1996:80), food security is demarcated as the availability of sufficient quantities of food of appropriate quality and the ability to acquire appropriate foods for a nutritional diet.

Subsistence production plays very crucial role in improving access to food and food security of impoverished households from both peripheral country sides and urbanised communities. Food security is achieved by availing more food supply avenues and bringing down the rate of dependence on buying food from markets given the high interest rates and inflation.

It is generally upon that there are three sources or ways in which most households obtain food. These sources include markets, subsistence production and sharing from public programmes or other households (Ruel et al. 1998). These sources could also be termed entitlement categories: production, trading and transfers (Sen, 1982). The majority of economists had advocated for the supply-centred view and in so doing, they put more emphasis on the availability, production and accessibility of food on a national level. Contrarily, nutritional practitioners gave more scrutiny to the demand and consumption of food at family level. Nevertheless, as time went on, there emerged a general agreement that adequate agricultural production did not inevitably lead to a reduction of food insecurity, either momentary lack of food or prolonged starvation (Maxwell and Slater, 2003; Webb et al. 2006).
Subsistence production is known to be essential in terms of food security at household level. However, there has been a noticeable lack of productivity of smallholder agricultural production; it has been found that the cause for the neglect of agricultural production in both rural and urban household settings is the increasing dependence on other sources of income than farm-based sources (Olufayo 2012:30). The Rockefeller Foundation (2006) attributes this to the fact that high-yielding crop selections are not used and elsewhere in the world, such crops are extensively put to good use. It has also been noted that in order to increase harvests one ought to extend the cultivated area. There is also a belief that food scarcity and inefficiency could be considerably minimised if quality seeds and technologies could be available to farmers.

2.2.4 Small-scale farming

There is no unique definition of small-scale producers. Small-scale vegetable production provides a source of income for the rural farmers as well as an important source of food nutrition in remote areas. These influences have determined crop development, production capacity, food security and income. Land ownership and limited access to land is the main definition of the small-scale farmer.

Small-scale farmers received support from the government as the support sustained to the initiation of democracy of the country. According to Vink and Van Rooyen (2009), the South African government aided the small-scale farmers in the 1970s by land acquisition and homeland amalgamation, microeconomic deregulation procedure which improved the economic market informal products of the farm in 1968.
The government provided the assistance to small-scale farmers by creating the land reform process that had promoted the increase of land ownership for the year of 2000s production with the declaration of the new Water Act in 1998 that has assisted on the accessibility to water by farmers and rural people (Vink and Van Rooyen, 2009).

Small-scale farmers comprise unique characteristics which have an impact on both efficiency and perspective (Olufayo, 2012:12). Regardless of the challenges small scale farmers face, they fulfil numerous functions in the agricultural economy. These functions include amongst others their ability to contribute towards food security, equitable distribution of income and the linkages for economic growth (Jari, 2009:26; Van Rooyen, 2010:1-3). Small-scale farmers are often regarded as backward, non-productive, and non-commercial farmers that are found in parts of rural homelands (Kirsten and Van Zyl, 1998:552).

These producers are frequently relegated mainly because of their deficiency of access to developed outputs such as quality arable lands, developed technologies such as irrigation systems and quality of seeds and or seedlings. Furthermore, these producers are also relegated by the lack of access to capital markets and lack of information about growing conditions and market (Murphy 2012:3). These farmers are discouraged to take risks and they are demotivated to make a profit for they lack the most vital developed inputs for farming. The relegation of these farmers results in food insecurity. The challenges that the small-scale farmers face lead to a general demotivation to participate in agricultural activities (Lipton, 2005:8).
Aliber (2005:8) reported that there is a weakening in the number of households that partake in agricultural activities. Notwithstanding the general negativity towards agriculture, small-scale growers can possibly be feasible, lucrative and efficient. Kirsten and Van Zyl (1998:551) stated that small-scale producers are possibly competitive in certain activities and with practical strategy support and the strategy progress chances for a future smallholder. Smallholder production is more suitable for labour concentrated produce that requires transplanting, numerous harvest by hand and for other products that necessitate care to detail.

There has been an important growth in farm assets within the commercial agriculture division. In 1996, farming divisions were 60 000 and the number decreased to 45 000 which is 25% in the year of 2002 however, during the period of 1994/1995 to the period of 2002/2003 the arable lands decreased by 10% (Vink et al. 2008:24). The decrease of the arable lands has resulted in the merging of landholdings to large divisions of land possession and productivity.

Commercial farmers that are small and less proficient have been taken out of the division and their arable lands were required and were joined with the close farms because of their inability to improve the increased scale of economies. Hall and Aliber (2010), stated that the South African agriculture business have partaken on buying the of arable lands in the area. The difference between small-scale farming and commercial farming comes with an anticipation of resulting to a broader range of farm size of the South African agriculture.
2.3 CROP PRODUCTION IN THE FORMER ‘TRANSKEI’

According to Fox (2000:211), the former Transkei has high potential for crop production in relation to water accessibility yet the area contains erodible soils and is poor in fertility. Vegetable crop production requires a set of principles and practices for sustainable production of arable and vegetable crops for best production. Eicher and Staatz (1984), states the importance of vegetable production in regard to knowledge of production techniques on which crops to grow, which new crop technologies, which rural infrastructure investments, which farm size and which agriculture tactics in generating the efficient agricultural productivity.

According to research, the farmers of the former Transkei stated that the arable fields’ productivity has declined due to the introduction of chemical fertilizers and hybrid seeds and some vegetable farmers in the village have stopped cultivating their fields. The soil fertility is in general low prompting constraints on the production of the primary crop, maize. Many farmers lack money to obtain adequate agricultural inputs such as fertilizers, seeds and traction for ploughing and stock theft restricts the accessibility to manure and animal traction (Wood and Schoor, 1976:57).

In the former Transkei, the agricultural sector plays a very significant role and this status quo will remain unchanged in future (Wood and Schoor, 1976:57). In order for agriculture to develop there needs the social climate that favours agriculture development (Burger, 1975). Therefore, the social climate and agricultural support pillars such as credit procurement, production finances, complementary tenure systems, market availability, farming resources and other production aspects play an important role in agricultural productivity of the former Transkei area.
According to Statistics South Africa (2011) data, the villagers are mostly focused on animal farming (56.9 per cent). The data also shows that that Sakhisizwe municipality farmers focus mostly on cows, sheep, goats and chicken. Crop farming is accounts for approximation of 13.4 per cent of the area. Vegetable production in the Sakhisizwe municipality is not as important as the animal farming. Mixed farming consists of 28.9 per cent, which shows that the farmers partake on both animal and crop production. This research reveals that other farming types only account for 0.8 per cent.

The main crops that are grown in small-scale farmers in rural areas are maize, beans, pumpkins, cabbage, spinach, tomatoes, potatoes and watermelons (Aliber and Hart 2009:448). Agricultural production growth is the most important tool to fight food insecurity worldwide. Crop production is normally boarded on where soil and climate changes are favourable as household production is heavily dependent on rainfall (Olufayo, 2012:14).

Most of the crop producers associate crop farming with other income earning activities (Aliber and Hart, 2009:437). Crop production is mainly subsistence oriented and does not seem to be a generating income action due to deprived market access and low productivity (Funder et al. 2001). The topography of this area consists of both on the slope and on the flat sedimentary areas, where most fertile land found on the flat areas.
The fertility of the fields has been decreasing resulting in reduced yields and most of the fields are not fenced. The most commonly grown crops on the fields are maize, sorghum, wheat, and millet. Most of the farmers are cultivating hybrid maize or millet in a monoculture system. Some of the farmers exercise rotational and mixed farming consisting of different crops and legume crops, such as beans and peas (Funder et al. 2001:29).

Maize is considered to be a staple food crop in the areas of former Transkei and it represents a great deal of the cultivated crops in the fields. Crop residues are left on the fields for livestock forage (Funder et al. 2001:29). Most of the cultivation of the former Transkei is governed by factors such as fences for security against grazing livestock and the availability of different agricultural inputs such as seeds, fertilizers, oxen and other ploughing machinery. There is no problem in finding people to help in the fields. The home gardens are located in the village in the household’s yards (Funder et al. 2001:29).

A wide variety of vegetables are grown in these gardens and the most common are potatoes, beans, spinach, cabbage, carrots, tomatoes, pulses and turnips. In numerous cases, oxen or hoes are used for ploughing as the plots are too small for tractors to plot (Funder et al. 2001:30). Kraal manure was used as fertilizer. The home garden has become increasingly important to the villagers. The cultivation of home gardens has been intensified and the number of farmers has declined and the relative importance of home gardens in terms of food security has increased. The home gardens offer a source of food security for former farmers, pensioners and others as a supplement to buying food (Funder et al. 2001:30).
A number of factors such as labour, experience, seeds accessibility, prices, government policy and numerous other environmental concerns including climate and soil state of affairs and surface flow influence farmers decision on crop selection. Lands that are dominated by arable agriculture are constantly subject to variations subsequent from the select of crops and adoption of different harvesting land use patterns and crop rotations (Haughton et al. 2009).

It has been stated that 75 per cent of crop diversity in agriculture production show no development of improvement (Dewi and Gonzalez, 2015:1). Crop diversities are the outcome of human selection and management as well as an ordinary instrument of development. Improvement is grounded on alteration, ordinary hybridization, introgression and selection, adaption of plant populations to the agro-environment. Crop breeding by growers and experts build on these phenomena makes them more efficient and focuses them on the needs of their farmers (Dewi and Gonzalez, 2015:1). Hereditary diversity is the foundation of all crop development.

Crop diversity is the subdivision of agro-biodiversity and becoming an important part of agriculture plant production. Agro-diversity has environmental, hereditary, commercial, technical, informative and ethnic morals (Wale, 2008:603). Agro-diversity provides private benefits and communal benefits to society. Private benefits are classified as the consumption and production values that are derived by farmers. Local benefits are classified as the consumers make a choice that make the farming stronger to biotic and abiotic stress driven by agro-diversity as well as the global benefits is classified as the consumers and plant breeders that make a choice to protect against genetic erosion (Lipper and Cooper, 2009:27).
Vegetable production offers a source of income to small-scale farmers, and it is a vital source of food security in the Eastern Cape by strengthening the overall development of poverty alleviation aims (Heinemann, 2002:7). Alfaro (2004:17) reported that vegetable production is a result of a multifaceted set of relationships not merely the input from vegetable producers. There are factors that affect the vegetable crop production of small-scale farmers (Nossal and Gooday, 2009:12). These factors are under the control of vegetable producers e.g. soil nutrients, soil texture, farm skills and variability of characteristics on the farm. However; there are factors that are not under the control of farmers e.g. climate change (Olufayo, 2012:16).

The Eastern Cape region is the biggest united area in South Africa where land is held by African smallholders (Van Averbeke et al. 2008:1). The region counts 583 000 households of which 424 000 are rural households. These rural households have right of access to communal rangeland which quantities to an average of about 8.9 ha per household. They also have home gardens with an average size of 0.4 ha and 158 000 hold an arable share of 1.3 ha or larger. The agro-ecology of the former Transkei area is superior particularly in regard of rainfall comparing to other parts of the Eastern Cape and South Africa at large (Van Averbeke et al. 2008:2). In most of the regions, the annual mean of rainfall exceeds 600 mm and that is regarded as critical limit in rain-fed vegetable production (Van Averbeke and Marais, 1991:23).
Vegetable production plays an important role in the growth of human civilization (Masood et al. 2012:343). It has been stated that “agriculture production decrease due to many factors climate change, soil degradation, low soil fertility, land ownership, illiteracy, lack of good seeds and fertilizers, use of traditional farming methods, technological factors, lack of entrepreneurship in agricultural zone, weak agrarian structure, internal and external migrations and droughts” (Masood et al. 2012:343).

Crop vegetable diverges in their tolerance to pest attack liable on the type of harm and stage of growth. Most crops can endure substantial pest pressure in the vegetative stage but significantly fewer damage at critical growth. Monitoring and pest management during these high risk periods is essential to minimise economic loss. Pest and disease promote the damage and the risks to vegetable production and these pests are worsened by high levels of weather especially drought during growing seasons (Brasier and Scott, 1994:221).

It has been specified that agriculture practices are still automatically derived from the past experience however; reduction of pest problems has been realized by farmers that there should be practices that should be utilized through manipulation of vegetable production techniques to fight pests and diseases (Metcalf and Luckmann, 1994:1).
2.4 AFRICAN INDIGENOUS LEAFY VEGETABLES

African Indigenous Vegetables (AIV) have a prominent track record for their properties and uses in health protection. A numerous number of these species are put to use for prophylactic and healing intents in the rural areas. The indigenous awareness of health-promoting and protecting features of AIV’s is evidently correlated with their rich nutritional value and non-nutrient bioactive properties. The AIV’s have played and continue to play a pivotal role in contributing considerably to the dietetic vitamin and mineral ingestions of local residents. The research studies conducted in the past have revealed that traditional leafy vegetables are wealthier in vitamins, minerals, and crude fibres compared to European vegetables (Oluoch, Pichop, Siluè, Abukutsa-Onyango, Diouf and Shackleton, 2009).

It has also been widely believed that AIV’s contribute significantly to the great taste of food and its digestibility (Adebooye and Opabode, 2004). Food intake that is rich in micronutrients vegetables is believed to have a potential to augment the bioavailability of micronutrients in fundamental foods when eaten. The affordability of vegetables makes them easier to access and they are an important nutritional source. AIV’s significance in generating income and subsistence is far-reaching.

In Kenya, Abukutsa-Onyago (2003) indicated that AIV’s present ample opportunities for the deprived people in Western Kenya to make a living. This is because AIV production is cost-effective and does not require large sums of investment. Njume, Goduka and George, (2014:19-33) indicated that South Africa is skilful and cautious in choosing natural and man-made or invented processes and developments that consist of various species of indigenous leafy vegetables that play a big role in promoting health and that are major sources of nutrients for more than three million
people who are malnutrition and living in poverty. African leafy vegetables are no longer put into such good use as they are diminishing in the natural environment. This situation can be attributed to negligent and unsuitable farming practices that are meant to produce quality and adaptable vegetables. Traditional leafy vegetables are not commonly used in South Africa (Voster and Van Rensburg, 2005:669). These groups of plants are deserted and despised regardless of their rich nutrient and mineral content including proteins, carbohydrates, vitamins and dietary fibre which are helpful in the preservation of decent health and prevention of diseases (Nnamani, Oselebe and Agbatutu, 2009:2321).

Communities who settled 2000 years ago in Southern Africa also collected leafy vegetables from the wild (Bundy, 1998:12). South African people obtain leafy vegetables in different ways. The vegetables are harvested from the wild or from fallow and cultivated fields and they tend to be regarded as female’s food, but gender differences in terms of their consumption are much less worldwide than in terms of their collection (Whitbread, 1986:130, Hart and Vorster, 2006:52).

In South Africa, morogo and or imifuno are traditional terms that are utilized for a collection of various dark-green leaves that are consumed as a vegetable and these vegetables grow wild or they come from vegetables such as pumpkin, beetroot, and sweet potato (Faber et al. 2010). Rural area residents have free and unrestricted access to indigenous leafy vegetables where they can harvest them either from wild, home gardens or fields. However, urban residents do not have access to these vegetables and they have restricted space to even plant their home gardens (Faber et al. 2010).
Indigenous leafy vegetables are regarded as poor people’s food in the Eastern Cape and other parts of the country and knowledge related with these vegetables is referred as retrograde information leading to an unwillingness of youth to be partaking in these vegetables (Voster and Van Rensburg, 2005:670). It is needed to create an atmosphere of consciousness that would motivate consumption and manufacturing production of these vegetables in a suggestion to control the high level of starvation and food insecurity in South Africa.

Consequently, knowledge regarding their habitat and importance is hardly being transferred to the younger generation due to their changing social values and migration from the rural areas where these vegetables are consumed to the cities where they are ignored and neglected in favour of exotic western varieties (Van Rensburg et al. 2004:53).

Several vegetable crops grown from the wild and cultivated during specific seasons are highly unreserved. The leafy vegetable crops feature prominently in the food consumption patterns in South African homesteads and this differs from household to household. This is highly dependent on social issues such as poverty or wealth status, extent of urbanisation, how far the markets that produce fresh vegetables and the season of the year (Vorster et al. 2002). Quantitatively, the intake of leafy vegetables harvested from the wild and or grow as weeds in cultivated areas, are prone to be inversely proportional to homestead earnings (Vorster et al. 2002).
As these indigenous leafy vegetables are regarded as poor people’s vegetables, food protection and micronutrient supplementation are the approaches that assist on the hidden hunger however, dietary diversification is the approach that assists on the sustainability of agriculture. Dietary variation has widened its scope to include indigenous leafy vegetables such as wild vegetables. The consumption of cooked and pureed indigenous leafy vegetables has a benefit of improvement of vitamin A (Voster and Van Rensburg, 2005:680).

These vegetables have the potential value of food security as rural areas have access to leafy vegetables unrestrictedly (FAO 2009:92). African leafy vegetables contribute towards the dietary requirements of micronutrients other than other nutrients such as calcium, magnesium, iron, potassium, zinc and vitamin C, although the bioavailability of some of these micronutrients are affected by the oxalates, phytates and nitrates present in the leafy vegetables (Faber et al. 2010). Wild growing green leafy vegetables are richer source of various micronutrients than exotic or commercially produced leafy vegetables.

2.6 SMALL-SCALE FARMER MARKET ACCESS

Nossal and Gooday (2009:12) indicated that market conditions offer a firm encouragement for production improvement. The researchers additionally indicated that since crop production responds to altering product prices, the forces of demand and supply and competition can encourage development in performance through activities such as changes in input mix. Particularly, the agricultural nature of most economies of the African region, agricultural production remains to be a dangerous determinant of both food security and economic growth (Funk and Brown, 2009).
The integration of markets is a challenge for farmers, so some farmers try to learn techniques in their production in order to integrate well in their cooperative. They will strive for higher benefits through quality control, quantity control, inputs control and consumer control. It means that their minds will be broader when they start integrating their own production, community and markets (Berdegue et al. 2008, Kaganzi et al. 2008). The unfavourable market access is the major hindrance to the farmers. Farmers in Tsengiwe village faced with challenges when it comes to selling their produce in the market place due to infrastructural challenges as well as the competition posed by commercial farmers.

It is not possible for farmers to access markets because of the resources that are needed to make that possible. The farmers would need to be able to buy seeds and the correct amounts of fertilizers and the farmers would need transport to get their products to the market place. It is not possible for farmers to buy their goods without support. The ageing is another constraint on the future of vegetable crop production of the former Transkei.

Altshul (1998:53) and Lyster (1990:33) stated that marketing plays a serious part in meeting the overall goal of food security, poverty alleviation and sustainable agriculture mainly among small-scale farmers in emerging countries. The pressure that the small-scale farmers get from market liberalization makes it difficult for the farmers to partake in markets.
Marketing by small-scale producers is inhibited by deprived infrastructure, distance from market, deficiency of assets and transport and insufficient market material (Makhura, 2001:25). The challenge that affects the vegetable production is incapability for small-scale farmers to enhance the ability to reach markets and vigorously involve in the market. According to Mugera and Karfakis (2015:1), most small-scale farmers depend on the income that is made from the vegetable production.

2.7 COMMUNAL AND CULTURAL INFLUENCES ON FARMING

According to Fox (2000:55), many farmers of the former Transkei have abandoned their fields. Eastern Cape rural arable fields have been abandoned due to lack of farming equipment and poverty. Farmers left their fields because of the lack of resources that assist in vegetable farming and the former Transkei has a general decline in agricultural production.

These fields cannot be sold but are inherited from generation to generation within the family (Turner 1999:15). This custom makes the newcomers in the village unable to have a right to arable land. Traditionally women do not have the same rights to arable land as men do. Unmarried and married women cannot be allocated rights to arable lands but all the households’ rights to land are normally transferred to the widow on the death of a male household head (Greenberg, 1999:20).

A large percentage of people in African countries, including South Africa, live in rural areas and depend on agricultural activity for their livelihoods (Rumulika et al. 1991). Land ownership in South Africa has long been a source of conflict. The history of conquest and dispossession of forced removals and a racially-skewed distribution of land resources has left the country with a complex and difficult legacy (Department of Land Affairs 1997).
The challenges for South African agriculture today are complex as the country struggles to redress the inequities of the past. It has a fragile and often degraded natural environment and is experiencing the effects of much more open global competition now that the commercial sector has become effectively deregulated. According to the tradition of Tsengiwe village, men used to leave their homes and the wives remained ploughing and doing the farming to provide for the family. Tsengiwe village land use has degraded and agricultural land use has declined and also the rapid growth of settlement areas has been at the expense of grazing lands (Department of Science and Technology, 2012).

2.8 CLIMATE

Recent research indicates that climatic variations, the flow of water and household socio-economic dynamics such as the size of family, extension opportunities, farming experiences, availability of tractors, possession of farming tools and the utilisation of irrigation technology all have a positive effect on net farm profits in all kinds of farms (Mandleni, 2011:22). The household socio-economic dynamics presented an impact in manipulating net farm profits between irrigated farms and dry-land farms owing to the accessibility of capital resources, superior opportunities of extensions and credit on farms irrigation systems (Mandleni, 2011:23).

There are concerns globally regarding changes in climate that are threatening to transform the livelihoods of the vulnerable population segments (Watson, 2010:53). Climate change is therefore proven that it threatens crop production stability and its productivity. Cruz et al. (2007) defined climate change as changes through an increase in frequency and intensity of extreme weather events including storm, flood, drought and irregular rain over time and regular climate signal.
Alteration in weather patterns of the village are revealed to be raining more in autumn than it is subjected to rain in the summer in Tsengiwe village. This phenomenon is frequently associated with heavy pouring rains. The changes in wet weather conditions have necessitated a certain selection of summer crops and given rise to agricultural drought circumstances. The unfavourable state of affairs is worsened by lack of infrastructure and a shortage of supporting services from the municipality. The village needs to be supplied with an upgraded infrastructural services and social prerequisite equipment (UMVOTO, 2013:6).

The most rainfall in the village is most expected in the summer season. The rural area obtains an annual precipitation of 581mm annually. The average temperature of the area is determined to be 16.3˚C (Gunya et al. 2014). According to Beyene et al. (2014), the average of 70% of neighbourhood land of the village is utilized for livestock feeding such as cattle, sheep and goats. Tsengiwe village is vulnerable to climate as the small-scale farmers have faced lack of rainfall for their irrigation.

Climate change is determined as not essentially a damaging factor however, climate is a threat in extreme events that are beyond the farmers control and in some unpredictable events (FAO, 2001). The rural areas face most of the climatic changes as they are exposed to under-controlled events and these changes affect the vegetable productivity and also affect the motivation of the farmers. In Tsengiwe village area, the extreme weather events like droughts, floods, gradual increase in temperatures, abandoned farmlands and increased variability in annual rainfall appear to be common. These changes are seemingly having a damaging effect on the rural area (Aliber and Hall, 2010:122).
According to Peña and Hughes, (2007:2) the major influences that result in low production yield are the high temperatures and partial soil moisture and vegetables are sensitive to these environmental factors. These environmental factors have been a problem to Tsengiwe village as they cause decline in production and degrade the important vegetable yields (Bray et al. 2000:1158). High temperatures are predominant during growth of vegetable growing season and temperature prohibits the variety of vegetable production (Peña and Hughes, 2007:2).

2.9 MEASURING FARMERS PERCEPTIONS

Perceptions are the combination of characteristics of the individual and the characteristic of organization group and perceptions can be measured as multi-dimensional ways (Dolisca et al. 2006:706). It has been stated that perceptions differ from country to country and some perceptions are based on the beliefs and norms (Mandleni, 2011:15). Perception can be constructed as a means by which a person analyses, selects and consolidated the information that have been gathered (Robbins et al. 2013:201). Düvel and Afful, (1997:5) define perception as a process of discrimination and organisation, sensory reception and the resulting organized and meaningful whole totality of view, image, idea or concept being result of dynamic integration of sensory stimuli. Berelson and Steiner, (1992:88) further define perception as a complex process by which people organise and interpret sensory stimulation into a meaningful and coherent picture of the world. Perception is the way that the world is interpreted and the imagination picture. It is important to understand human behaviour because it is not possible to have behaviour without perception (Rao and Narayana, 1996:329).
Perception is the process by which an individual organise and interpret the sensory impressions in order to give meaning to the environment. Furthermore, early research conducted by Lindsay and Norman, (1977:1751) stated that perception is the procedure by which organisms infer and establish impression to produce a meaningful knowledge of the world. Perception makes judgement based on the received information and knowledge and to an extent where the perceiver interprets the information (Nelson and Quick, 2000:92). Perceptions of rural farmers may vary amongst farmers according to their socioeconomic and demographic conditions (Portes, 1971:820).

2.9.1 Emotional perceptions

Nossal and Gooday (2009:92) stipulate that perceptions are affected by a number of characteristics of the perceiver and these perceptions are perceived according to the situation. The characteristics of the perceiver include attitude, mood, reasoning structures and self-concept (Olufayo, 2012:33). Allport (1935:36) define attitude as a psychological or neural state of eagerness, prepared through knowledge, applying a directive or lively impact on the response of the person to all substances and situations to which it is associated. Attitude is therefore a mind-set or a propensity to perform in a certain way due to person’s experience and personality.

Attitude is a combination personality, beliefs, values, behaviours and motivations (Pickens, 2005:44). Perceptions change the mood levels as a person thinks or responds differently to the situation and measuring the ability of remembering things (Olufayo, 2012:33). Reasoning structure refers to any discrepancy that a person observes between two or more of attitudes or between behaviour and one’s self-conduct.
Early research by Festinger (1957:30) detailed “that any form of inconsistency that is uncomfortable for the person will prompt the person to reduce the dissonance”. Reasoning structure basically refer to the way a person thinks however, it is also regarded as the way that people value characters making verdict about others. Self-concept affects perception as it is commonly perceived that people with positive self-concept tend to notice positive attributes in others (Olufayo, 2012:33).

2.9.2 Expectation and motivational perceptions
Mental needs, reward and punishment, emotional connotation, individual values, personality and the values of objects are the influences of perception in a motivational manner (Mcleod, 2007:1). The combination of emotion and motivation affects the way a person perceives things around (Bruner and Mintum, 1955:21). Expectations play a vital role in perception. Bruner and Mintum (1955:23) demonstrated this in an experiment, utilizing figures in the context of letter and numbers. It was determined that the candidates got perplexed with whether the signs were figures or letters because of expectation.

Wood (2012:69) reported that the past experience led people to develop personal constructs which employ to evaluate others. It is the further explained by Welzel (2010:2) in relation of dating and how it affects the choice making. When managing the perception according to expectation one can easily fall to be victim to a misunderstanding which then leads to unproductive interaction.
CHAPTER THREE
RESEARCH METHODOLOGY

3.1 INTRODUCTION

Research can be broadly defined as the reasoning engaged in the methodical examination or search of material and information on a specific subject. Research is the process of scientific investigation and analysis aimed at finding solutions to methodical and communal problems by means of specified objectives (Rajasekar, Philominathan and Chinnathambi, 2013:2). Research is further defined as an academic activity that assists in the improvement of practical implementation (Kothari, 1990:1).

The research enquiry involves delineating the problem or issue being investigated, the creation of a hypothesis, putting together data and then assessing the data, and then coming to conclusions and making recommendations (Kothari, 1990:1). According to Degu and Yigzaw (2006:2), research is a systematic review or study targeted at gaining knowledge regarding a particular topic.

The new information that the study yields can relate to new facts, sentiments, challenging ideas and so forth. Research is, therefore, a methodical way of evaluating, investigating and exploring particular sources in order to achieve or discover new information and conclusions. It is through the particular methodology that is applied in the research that attaining, systematizing and examining information is achieved (Polit and Hungler, 2004:233).
According to Holloway (2005:293), methodology refers to a system of theoretical hypothesis and propositions which form the bases of the modus operandi and strategic operations to be applied in a research study. The methodology can thus be defined as the methods by which knowledge is to be gained through research and its aim is to provide the work plan on which the research is founded.

Burns and Grove (2003:488) defined research methodology as the practice that comprises the various elements of a scientific study, such as the research design, setting, research sample, the delimitations, data collection and data analysis. According to Mouton and Marais (1996:35), research methodology is demarcated as the ability to strategically examine and concerns the comprehensible methods that are amalgamated together to attain the conclusions or findings in response to the research question and that meet the research objectives.

Research methodology describes the projected method and the envisioned methodological strategies that are employed in a research study through data collection techniques and interpretation, as well as the analysis and presentation of such data (Dawson, 2002). Research methodology is, therefore, the source of the research instrument(s) to be used for the delivery of information or data (Kothari, 2004). The research instrument(s) to be used for the purposes of gathering data is therefore derived from the research methodology.

According to Rajasekar et al. (2013:2), research methods provide explanations based on collected facts, measurements and observations. As a systematic way of solving a problem, research methodology is also the science of how research is to be carried out. In this study, research methodology refers fundamentally to the way that the research was approached and was conducted.
This chapter presents the description of the method and procedure that were practiced to achieve the objectives of the study. The sample selection method and the way in which data was collected, as well as the methods of data analysis, and ethical considerations followed in this research, are discussed. In the study, a mixed methods research techniques and approaches were used to attain the objectives and find solutions to the research problem. This chapter further provides a geographic description and demographic profile of the surveyed area. In conclusion, the research methodology that is applied to this research is justified by providing details on the data collection instruments and research approaches in order to obtain the applicable and relevant information.

3.2 DESCRIPTION OF THE STUDY AREA

3.2.1 Geographic information

Since the establishment in 1994 of the new South Africa, the Eastern Cape Province consists of 6 district municipalities that, in turn, comprise 37 local municipalities and 2 metropolitan municipalities. The study was carried out within the Sakhisizwe Local Municipality, situated in the Chris Hani District Municipality. The Eastern Cape is the second largest (following the Northern Cape) of South Africa’s nine provinces. Previously, the Eastern Cape formed part of the Cape Province, along with the former “homelands” of Transkei and Ciskei.

The data collection was conducted primarily in the Tsengiwe village, approximately 100 km west of Umtata. The area in which Tsengiwe village is situated features mildly undulating table land forming the Drakensberg hills. The soil types vary according to topography and the soil generally has high clay content and the surrounding hills consist of strong litho-soils (Sakhisizwe IDP, 2009:12).
According to Statistics South Africa (2011) data, Sakhisizwe Municipality’s population numbers 65,582, divided into the 97.7 per cent black population, 1.1 per cent white population and 1.2 per cent of other population groups. Figure 3.1 shows the research area of Tsengiwe falls between 32°15'07″ S and 34°22'31″ S.

**Figure 3: Map indicating the research area**

---

3.2.2 Socio-economic description of the study area

3.2.2.1 Age and gender

Sakhisizwe Municipality shows a predominantly youthful population – with the age category of 19 years accounting for about 52.9 per cent of the inhabitants and those of 15 years and younger for 39.6 per cent. The ratio per cent age of gender (male to female) is 47:53 (Sakhisizwe IDP, 2009:15).
3.2.2.2 Education and literacy
According to Statistics South Africa’s community review in 2011, the municipal population of 20 years and older, 6.9 per cent completed primary school, 35.2 per cent completed secondary, 14.1 per cent completed matric, 6.4 per cent received higher education and 12.7 per cent have no formal education.

3.2.2.3 Employment status and income levels
According to Statistics South Africa (2011), Sakhisizwe Municipality’s unemployment rate is estimated to be 36 per cent. This situation is compounded by the lack of efficiencies in our employment industries and sectors of the economy (Sakhisizwe IDP, 2009:28).

3.2.2.4 Population density and location of Tsengiwe village
The number of people living in the village of Tsengiwe is approximately 1 800, and comprises 1 600 households, established on the 2012 calculations (Statistic South Africa, 2012). The village is situated close to the sizeable Tsomo River, which has its source in the Drakensberg Mountains and does not run dry. The village falls under a headman, with six sub-headmen below him. Tsengiwe is poverty-stricken due to vast tracts of land not being fenced and therefore not being ploughed, as well as droughts. The size of the Sakhisizwe Municipality is 2 556km² and consists of 9 wards. The size of the population signifies the 7.9 per cent growth of 1.9 per cent per year (Sakhisizwe IDP, 2009:14).
3.3 RESEARCH METHODOLOGY

Research methodology is the process of systematically solving the research problem. It entails studies of the various stages in studying a research problem along with the logic behind them. Essentially, research methodology not only covers the scope of research methods, but also deliberates on the logic behind the methods used in the context of the study and clarifies why a specific method is used and why others are not being used, so that the results can be evaluated by the researcher or by others Kothari (2004:8). The summary of the research methodology as applied to this study is presented in Table 3.
Table 3 Summary of research methodology

<table>
<thead>
<tr>
<th>Research approach</th>
<th>Mixed method approach using qualitative and quantitative methods (triangulation)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data collection instruments (primary data)</td>
<td>Questionnaires and focus groups</td>
</tr>
<tr>
<td>Sources of data from literature (secondary data)</td>
<td>Multiple sources: Government, industry and research articles</td>
</tr>
<tr>
<td>Quantitative research approach</td>
<td>Frequency counts, per cent ages and descriptive statistics</td>
</tr>
<tr>
<td>Qualitative research methods</td>
<td>Content analysis and theme analysis.</td>
</tr>
</tbody>
</table>

3.3.1 Types of data

The research undertaken for this study encompasses the use of two types of data, namely: primary data and secondary data.

3.3.1.1 Primary data

Primary data is the information that is collected in the examination of a particular research problem by means of measures that are appropriate for the research problem. Primary data therefore refers to the original information collected by the researcher from the study area for the first time (Hox and Boeije, 2005:593). For this study, the researcher collected the primary data mainly through the use of questionnaires.
3.3.1.2 Secondary data

Secondary data refers to the information that is collected from other researchers or from sources of data gathered for purposes other than academic research, such as official statistics and administrative records. Secondary data is the vast amount of published or unpublished information relevant to a research subject (Hox and Boeije, 2005:596). For the purposes of this present study, secondary data was collected from many varied sources in order to obtain comprehensive information about the factors that influence vegetable crop production. This aspect of the research study formed part of the literature review and synthesis of findings.

3.3.2 Research design

The research design refers to the plan or proposal to conduct research which involves the intersection of philosophy, strategies of inquiry and specific methods (Creswell 2008:5). According to Bruns and Grove (2003:195), research design can be regarded as a pattern that can be utilised to administer and regulate a research study, providing maximal command of influences that might tamper with the validity of the study conclusions. Parahoo (2014:142) defines research design as the formula that informs how data will be gathered and examined.

Research design is also regarded as the researcher’s all-inclusive comprehension of how to provide adequate answers to the research question and examine the research hypothesis (Polit et al. 2001:167). According to Creswell (2009:3), the research design can be interpreted as “intended procedural styles and techniques that sharpen the research focus from far-reaching presumptive hypothetical viewpoints to more exhaustive and all-inclusive systems of data gathering and analysis”. Fundamentally, research design can be either descriptive or exploratory.
3.3.2.1 Descriptive research design

Descriptive research design refers to the type of research question, design and data analysis that will be applied to a given topic. The descriptive calculations describe the data, whereas the inferential statistics define the cause and the results (Knupfer and McLellan, 1993:1196). Descriptive research involves gathering data that describe measures and then organises, tabularises, portrays and describes the collection of data (Glass and Hopkins, 1994).

The descriptive research design often utilizes visual aids such as graphs and charts to help the reader understand the data being conveyed. It is widely regarded as a useful way of reducing data to a manageable form, because of the difficulty the human mind encounters in attempting to excerpt the full import of a large mass of raw data. Descriptive research uses data collection and analysis techniques that yield reports regarding central tendency, variations and correlation and therefore, data is rendered readily understandable (Kupfer and McLellan, 1993:1197).

Descriptive research design is aimed at finding out “what is”, observational and survey methods are frequently used to collect descriptive data (Borg and Gall, 1989). Descriptive research can be utilized in either a quantitative or qualitative research method. It comprises the collection of quantitative data that is tabulated along range in numerical form (Glass and Hopkins, 1994). The descriptive research design as clarified above was used in this study to analyse data concerning factors that influence vegetable crop production.
3.3.3 Research approach

The difference in research approaches is determined by the procedures selected by the researcher for the purposes of the study. Bryman (1988) states that the research approach is dependent on the appropriate method that is utilized for the research in order to respond to the research question. According to Mack et al. (2005:2), research can be approached by two different methods, namely: qualitative or quantitative. These methods differ in terms of what type of data is produced and the flexibility of the research design. The methodological approach adopted for this current study is a triangulated mixed method, using both quantitative and qualitative approaches.

3.3.3.1 Quantitative research approach

The quantitative research method can be encapsulated as an approach whereby the researcher mainly utilizes positivist or functionalist assertions to produce or provide new knowledge. This refers to such mechanisms as a cause-and-effect reduction to specific variables, hypotheses, questions and use of measurements and observation, and the testing of theories (Creswell, 2013). This approach also puts into practice data-gathering techniques such as experiments and surveys. These data-collecting strategies are often pre-established.

Furthermore, the quantitative approach refers to a numerical form of collecting data by means of statistics. This approach involves the implementation of statistics or mathematical models (Blaxter et al. 2001). The quantitative research approach is widely-used to research that employs experiential approaches, experiential statements and experiential evaluations (Cohen and Manion, 1980).
According to Creswell (1994), quantitative research explains phenomena by gathering arithmetical information that is examined mathematically by means of a statistical model. Quantitative research focuses on testing the strength and persistence of relationships between different measures. The theoretical paradigm of the quantitative method is based on the agreement that the relationship between phenomena can be examined by measuring and analysing variables (McDavid, 2005:168). The approach of this study was quantitative and qualitative. The methods were used to achieve the objectives of the research and to establish the relationship between variables.

3.3.3.2 Qualitative research approach

In the qualitative research paradigm, the researcher often proposes assertions that are derived from constructivist viewpoints. These include a multitude of meanings derived from individual experiences, and social and historical construction of meaning, with a purpose of creating theoretical patterns and advocacy or participatory viewpoints which could be either political in nature, focusing on current issues, or collaborative to bring about change (Creswell, 1994).

The qualitative research approach also makes use of strategic data-gathering instruments such as narratives, phenomenology, ethnographies, grounded theory studies or case studies. The researcher gathers open-ended data with the primary purpose of identifying themes and influences from the data collected (Creswell, 1994). The qualitative approach to research provides the in-depth information that the numerical approach would not provide.

This research method adopts the inductive approach to the collection and examination of data, with no attempt to regulate or operate the setting (McDavid, 2005:176).
According to Richard (2009:39), the qualitative approach unifies the main data into a clear and precise understanding of how the participants understand the research. Brink and Wood, (1998:5) regard the qualitative research approach as “supple and formless” and qualitative data as being as diverse as words, postcards and all sensory information. It is therefore clear that the qualitative approach is the research method that gathers information in a word form and not in a numerical manner, as the quantitative does. The qualitative research approach was used by the researcher to gather supplementary information during data collection.

**Figure 3.2 Comparison of quantitative and qualitative research approaches**

<table>
<thead>
<tr>
<th></th>
<th>QUANTITATIVE APPROACH</th>
<th>QUALITATIVE APPROACH</th>
</tr>
</thead>
<tbody>
<tr>
<td>General framework</td>
<td>▪ Seek to confirm hypotheses about phenomena</td>
<td>▪ Seek to explore phenomena</td>
</tr>
<tr>
<td></td>
<td>▪ Instruments use more rigid style of eliciting and</td>
<td>▪ Instruments use more flexible, iterative style of</td>
</tr>
<tr>
<td></td>
<td>categorizing responses to questions</td>
<td>eliciting and categorizing responses to questions</td>
</tr>
<tr>
<td></td>
<td>▪ Use highly structured methods such as questionnaires,</td>
<td>▪ Use semi-structured methods such as in-depth interviews,</td>
</tr>
<tr>
<td></td>
<td>surveys and structured observation</td>
<td>focus groups and participant observation</td>
</tr>
<tr>
<td>Analytical objective</td>
<td>▪ To quantify variation</td>
<td>▪ To describe variation</td>
</tr>
<tr>
<td></td>
<td>▪ To predict causal relationships</td>
<td>▪ To describe and explain relationships</td>
</tr>
<tr>
<td></td>
<td>To describe characteristics of a population</td>
<td>To describe individual experiences</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>---------------------------------------------</td>
<td>-----------------------------------</td>
</tr>
<tr>
<td><strong>Question format</strong></td>
<td>Closed</td>
<td>Open-ended</td>
</tr>
<tr>
<td><strong>Data format</strong></td>
<td>Numerical (obtained by assigning numerical values to response)</td>
<td>Textual (obtained from audiotapes, videotapes and field notes)</td>
</tr>
<tr>
<td><strong>Flexibility in study design</strong></td>
<td>Study design is stable from beginning to end</td>
<td>Some aspects of the study are flexible (for example, the addition, exclusion or wording of particular interviews questions)</td>
</tr>
</tbody>
</table>

**Source:** Mack, Woodsong, McQueen, Guest and Namey (2005:3)
3.3.4 Main data collection instruments

3.3.4.1 Exploratory investigation

Preliminary research into a theoretical or hypothetical idea is referred to as exploratory research. This aspect of the research design allows a researcher to pursue an idea to gain a better understanding of the issue. Exploratory research lays the foundation for the further development of the study. Most often, exploratory research lays a preliminary foundation for future research (Kowalczyk, 2015). This aspect of the research also involves a study of relevant literature and conducting focus group interviews.

Exploratory research is comprehensive in focus and infrequently provides definite answers to a specific research issue. Burns and Grove (2001:374) reported that exploratory research assists in creating new ideas, in ascertaining new ideas and in developing in-depth knowledge of the phenomenon. This preliminary research also gives researchers an improved understanding of the study and helps establish the best method to be used in a study.

The objective of exploratory research is to identify key issues and key variables. For the purposes of this study, this facet of the research design was used in the gathering of data from the literature, in establishing issues that needed to be addressed in the main research and to generate new ideas and a better understanding of the proposed research.
The exploratory investigation was conducted mainly to assist the researcher in composing a questionnaire for the main process of data collection. This initial phase of the study was twofold: firstly, a pilot study with representatives from the study area, followed by an informal focus group session with key participants. The pilot study entailed testing a questionnaire and also provided an opportunity to discuss the research plan with local leaders and participants. Discussions were held with the village headman and community members or leaders of Tsengiwe. This phase assisted the researcher in improving the questionnaire and research tools. It is of vital importance to include this stage in one’s research as it gives the researcher the opportunity to become familiarized with the participants (farmers) before proceeding to the main phase of data collection.

The last part of the exploratory investigation was conducting focus groups to reveal further information and gain better insight into the study. According to Elliot (2005), the focus group creates an environment that puts participants at ease, allowing them to thoughtfully answer questions in their own words and add meaning to their answers. From this exploratory investigation, common categories or themes across the entries for each question could be identified and synthesised.

Data collection is defined as the practice of gathering and quantifying information on targeted variables in an established systematic approach, which then enables one to answer relevant questions and assess outcomes. In this study, the questionnaire and focus group interviews were applied as the tools for collecting main data. The pilot study assisted in the improvement of the questionnaire, which was analysed and revised for the purpose of collecting the main body of data.
3.3.4.2 Questionnaire design

The use of a questionnaire as a method of data collection, both nationally and internationally, has increased in recent years (Sitzia et al. 1997; Rattray et al. 2004). When developing a questionnaire, items or questions are generated that require the respondent to respond to a series of questions (Rattray and Jones, 2007:235). In this current study, structured questionnaires and interviews were utilised as the main tools for collecting data.

These tools generated data concerning the measurements of all the determinants that influence the vegetable crop production of the community of Tsengiwe. The questionnaire was kept simple and easy to understand. Local concepts were applied in order to avoid ambiguity. The questionnaire was arranged in blocks of topics in a logical flow of questions. The advantage of this method of data collection is that questionnaires are usually relatively swift to complete, are comparatively inexpensive and usually easy to analyse (Bowling, 1997).

The researcher conducted the interviews with the participants using the structured and revised questionnaire. Interviews were conducted face-to-face with the household heads or another adult in the absence of the head of the family. The interview questions were asked in English and translated into IsiXhosa since it is the language spoken locally that is therefore readily understood by the participants.

The questionnaire consisted of the following ten sections:

- Section A – Demographical information,
- Section B – Production information on vegetable crop farming,
- Section C – Land and soil of the area,
- Section D – Irrigation infrastructure and water sources,
• Section E – Market and product destination,
• Section F – Communal and cultural influences,
• Section G – Climate,
• Section H – Crop selection and diversity,
• Section I – Pests, diseases and livestock and section,
• Section J – Perceived health benefits of indigenous leafy vegetables.

3.3.4.3 Pilot study

A pilot study is regarded as a preliminary tool that plays an important role in strengthened research which provides a data for the better planning of the main data collection (Anderson and Prentice, 1999). A pilot study can be constructed as a mechanism to establish the feasibility of and preparation for a full-on research study (Polit, Beck and Hungler, 2001:467). Baker (1994:182-183) pointed out that a pilot study is instrumental in pre-testing or trying out a research instrument. Baker (1994:182-183) also suggested that the pilot study should cover a sample size of between 10 and 20 per cent of participants of the actual study. A pilot study does not automatically translate into the success of the main research but it does play a significant role in pointing out possibilities (Simon, 2011). The researcher conducted the pilot study in the study area. The participants that took part in pilot study were not used for the main data collection. The pilot study assisted on refining the questionnaire.
3.3.4.4 Focus groups

The structure of focus group interviews is more flexible compared to the others aforementioned. This flexibility of structure is due to the degree of difficulty in structuring a group. However, there is an abundance of data that can develop from the interaction in the group (Thomas, 2010:315). According to Shneiderman and Plaisant (2005), focus group interviews are preceded by a chain of individual interviews and to further scrutinise the general comments that were made in the individual interviews.

3.3.4.5 Action research

There is a historic emergence of a new, participatory and democratic process which is aimed at creating practical knowledge regarding human purposes premised on the participatory perspective of the world (Reason and Bradbury, 2001). Action research played an important role in this research where the small-scale farmers gained knowledge on the agricultural realm of practice. The researcher conducted several workshops in the study area. Appendix F demonstrates the researcher giving the feedback and recommendations to small-scale farmers. Appendix G illustrates the cultivation of indigenous leafy vegetables and the engagement of the researcher with the community members.
3.5 RESEARCH ETHICS

The researcher submitted an application to Nelson Mandela Metropolitan University for research ethics clearance to be given the consent by the university’s Research Ethics Committee: Human (REC-H) to conduct the research. This current research involved community participants, which raised unique and complex ethical, legal, social and political issues. According to Walton (2015), research ethics are specifically interested in analysing the ethical issues regarding the involvement of the participants in research. Three important objectives should be taken into account in research ethics. The first objective is to protect participants of the research.

The second objective is to make certain that the research is conducted in such a way that it serves the interests of the community. The third objective is to observe specific research activities and projects with regard to ethical reliability, taking note of the management risk, protection of confidentiality and the process of up-to-date consent. McNamara (1994) identifies the following five ethical concerns as vital when conducting a research survey.
These ethical concerns include voluntary participation, no harm coming to respondents, anonymity and confidentiality, identifying the purpose of the research, and the analysis and report.

- Voluntary participation: The researcher needs to make certain that the participant is voluntarily willing to contribute to the research study.
- No harm is coming to respondents: the second ethical concern is to evade possible harm to respondents. This could also mean embarrassment or feel uncomfortable about the research questions.
- Anonymity and confidentiality: The researcher has a responsibility to ensure anonymity and confidentiality of the participants by protecting the identity of the participant. No names of respondents were used in the current research study.
- Identify the purpose of the study: The researcher informed all prospective participants about the purpose and the objectives of the research and explained why it was important to conduct interviews with the community.
- Analysis and report: a precise report and analysis of the data collected are of vital importance when conducting a study. The researcher should report problems and weaknesses that challenged the research survey and also report the positive results of the study (McNamara, 1994).
CHAPTER FOUR

FINDINGS OF THE STUDY

4.1 INTRODUCTION

This chapter presents the findings from the analysis of the data collected from small-scale farming households around the Tsengiwe area. The following main results are discussed in this chapter; the socio-demographic characteristics of the study sample, the production practices of the respondents, land and soil challenges, irrigation infrastructure and water sources, market production destination, communal and cultural influences, climate, pests, diseases and livestock and health benefits.
4.2 SOCIO-ECONOMICAL CHARACTERISTICS

Socio-demographic characteristics refer to the gender of the respondents participated in the research study, their age, marital status, source of income, educational level, religion, farm size, farming experience and family size.

4.2.1 Gender of the respondents

The findings indicated that women were mainly responsible for the small-scale vegetable farming activities (60%). The findings further indicated that men played a smaller role in small-scale vegetable farming.

Figure 4.1: Distribution according to gender
4.2.2 Variation in age

The study indicated that the respondents predominantly responsible for vegetable farming were elderly (61 years and older). Of these, the percentages showed that 30.8% were between the ages of 61 and 70 years and a further 26.2% were 71 years and above. The percentage represented those between the ages of 51 and 60 years was 18.5%. This showed that older community members are the main participants in small-scale vegetable farming. The younger residents (those of between 25 and 50 years) therefore constituted only a quarter of the active population.

Figure 4.2: Distribution of farming according to farmer's age

![Bar chart showing age distribution of farmers.](image)
4.2.3 Marital status of the respondents

The study findings revealed that the majority of respondents were married (43.1%), 32.3% were widowed 21.5% were single and 3.1% of the respondents were divorced. The figure below indicates that people involved in small-scale vegetable farming were mostly married.

Figure 4.3: Distribution according to marital status

![Bar chart showing marital status distribution]

4.2.4 Source of income of the respondents

Figure 4.4 indicates that most of the small-scale farmers (50.8%) were dependent on a government social grant. This finding was expected as the vegetable farmers of Tsengiwe were elderly and/or infirm, which were characteristic of those that received social grants. Child social grants were drawn by 13.8% of the inhabitants and a further 12.3% were pensioners. The figures show that the respondents were unemployed or were pensioners and that there was no fixed source of income.
4.2.5 Educational level of the respondents

The study shows that the majority of the participants received a formal education (96.9%). Only 3.1% received no formal education. Figure 4.5 below, however, indicates that the majority of the respondents (47.7%) reached only a primary level of education, while 40% attained the secondary level and 9.2% attained a tertiary level. This revealed that the farmers of the village have lower levels of education. The results from the current study also show that a few of the respondents were fortunate to attain a tertiary education.

Figure 4.5: Distribution according to level of educational level
4.2.6 Size of respondents’ families

The findings of the study indicated that the respondents (35.4%) that are more than a third of the respondents had households of 2 to 4 people and that a very similar percentage (32.3%) had household size of fewer than 2 people (only person in the household). Larger families of 5 to 7 people amount to 16.9% and families of 8 people and above to 15.4%.

Figure 4.6: Distribution according to size of households

4.2.7 Size of respondents’ farms

Figure 4.7 illustrates the sizes of the farms cultivated by Tsengiwe farmers. The majority of the respondents (81.5%) farm on land less than a hectare and the minority (18.5%) had farms of between 1.1 and 1.2 hectares.

Figure 4.7: Distribution according to size of farm
4.2.8 Farming experience of the respondents

The findings of the study revealed that the farming experience of the residents of Tsengiwe was more than 15 years. The respondents with 15 years’ experience amounted to 53.8%. This is an indication that the majority of the respondents are elderly people who have worked or had experience with agriculture.

Figure 4.8: Distribution according to farming experience

4.3. FARMING ACTIVITIES AND PRODUCTION

Origin of seeds: The table indicates that the respondents obtain the seeds mostly by buying them from town (92.3%). The findings showed 7.7% of the respondents that share the seeds within the households or community.

Working times: The table demonstrates the amount of time that the farmers spend on their farms. The majority of Tsengiwe farmers spend many hours doing farming activities. As the table shows, 60% of the farmers work the land for more than five hours a day. The farmers that work less than five hours a day amount to 6.9%.

Weeding frequency: Table 4.1 further shows that the majority of farmers (63.1%) mostly weed twice a week; 16.9% weed once a week; 13.8% once a month and 6.2% every two months.
Table 4.1: Farming practices

<table>
<thead>
<tr>
<th>Farming activities</th>
<th>Percentage %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seeds obtained: Shared among community</td>
<td>7.7%</td>
</tr>
<tr>
<td>Bought from town</td>
<td>92.3%</td>
</tr>
<tr>
<td>Working times: Most of the day (&gt;5hrs)</td>
<td>60%</td>
</tr>
<tr>
<td>Few hours per day (&lt;5hrs)</td>
<td>36.9%</td>
</tr>
<tr>
<td>Twice a week</td>
<td>3.1%</td>
</tr>
<tr>
<td>Weeding times: Twice a week</td>
<td>63.1%</td>
</tr>
<tr>
<td>Once a week</td>
<td>16.9%</td>
</tr>
<tr>
<td>Once a month</td>
<td>13.8%</td>
</tr>
<tr>
<td>Every two weeks</td>
<td>6.2%</td>
</tr>
</tbody>
</table>

4.4 LAND AND SOIL

4.4.1 Distribution according to soil preparation

Table 4.2 shows the soil practices by the small-scale farmers of Tsengiwe and it illustrates the methods for nutrient inputs and sources of fertilizers. The application times of fertilizer, the type of fertilizers that were applied, the challenges that were encountered to access the land and soil deterioration.

Use of commercial fertilizers: The majority of the respondents do not utilize commercial fertilizer. Those who do make use of commercial fertilizers were the few farmers who can afford these fertilizers (9.2%).
Use of own fertilizer: The results showed that the majority of the small-scale farmers of Tsengiwe made organic fertilizers for farming purposes.

The respondents that utilized fertilizer amount to 93.8%. The respondents that do not use fertilizer amount to 6.2%.

Soil preparation: The findings indicate that 69.3% of the respondents hired a tractor for ploughing to prepare the soil, while 23.1% prepared the soil by hand, using implements such as hoes and spades. The respondents who do not prepare soil amounted to 4.6% and the respondents who owned their tractors for soil preparation constituted 3.1% of the sample.

Fertilizer application: The study showed that the farmers only apply fertilizer once a season at 87.7%. The respondents who applied fertilizer twice a season amounted to 7.7% and those who do not apply fertilizers constituted 4.6% of the sample.

Type of fertilizer: The study findings showed that 87.7% of the respondents applied organic fertilizer to their arable lands and only 1.5% applied inorganic fertilizer.

The number of respondents who applied both organic and inorganic fertilizer accounts for 6.2% and those who do not apply fertilizer to their arable lands at all to 4.6%.

Land access challenges: The large majority of respondents (92.3%) revealed that they do not encounter difficulties accessing their arable land, while the remainder of the respondents (7.7%) reported having difficulties accessing land.

Soil deterioration: The perception about soil deterioration showed minimal difference between farmers. A 50.8% of respondents perceived no soil deterioration in the village and 49.2% were of the perception that there is soil deterioration in the village.
Table 4.2: Vegetable production practices

<table>
<thead>
<tr>
<th>Soil Preparation</th>
<th>Percentage %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use of commercial fertilizers:</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>90.8%</td>
</tr>
<tr>
<td>No</td>
<td>9.2%</td>
</tr>
<tr>
<td>Use of own fertilizers:</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>93.8%</td>
</tr>
<tr>
<td>No</td>
<td>6.2%</td>
</tr>
<tr>
<td>Soil preparation:</td>
<td></td>
</tr>
<tr>
<td>Hire ploughing</td>
<td>69.3%</td>
</tr>
<tr>
<td>By hand (hoe)</td>
<td>23.1%</td>
</tr>
<tr>
<td>No tillage</td>
<td>4.6%</td>
</tr>
<tr>
<td>Own tractor</td>
<td>3.1%</td>
</tr>
<tr>
<td>Fertilizer application:</td>
<td></td>
</tr>
<tr>
<td>Once a season</td>
<td>87.7%</td>
</tr>
<tr>
<td>Twice a season</td>
<td>7.7%</td>
</tr>
<tr>
<td>None</td>
<td>4.6%</td>
</tr>
<tr>
<td>Type of fertilizer:</td>
<td></td>
</tr>
<tr>
<td>Organic fertilizer</td>
<td>87.7%</td>
</tr>
<tr>
<td>Inorganic fertilizer</td>
<td>1.5%</td>
</tr>
<tr>
<td>Both</td>
<td>6.2%</td>
</tr>
<tr>
<td>None</td>
<td>4.6%</td>
</tr>
<tr>
<td>Land access challenges:</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>7.7%</td>
</tr>
<tr>
<td>No</td>
<td>92.3%</td>
</tr>
<tr>
<td>Soil deterioration:</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>49.2%</td>
</tr>
<tr>
<td>No</td>
<td>50.8%</td>
</tr>
</tbody>
</table>

4.4.2 Soil Problems

With reference to Figure 4.9, during the qualitative analysis of the interviews on soil problems, two main key themes emerged from the discussion: (1) the respondents reported that the soil is dry and contain stones and gravel. Several farmers referred to how these stones caused tractor damage during tillage: (2) farmers referred to the dry soils and the frequency of having to irrigate.
Figure 4.9 Network view of main perceived soil problems

- **[1:23] Water retention**
  - Irrigation because water dries so quickly

- **[1:2] Dry soil**
  - The soil is too dry and drought has caused the soil to be drier.

- **[1:19] Dry soil**
  - Because not all the vegetables grow in this soil because it's dry

- **Dry soil (3-1)**
  - Associated with:

- **Gravel/Stones (14-2)**
  - The problem with the soil in our area is the stones and the sun heats up the stones.

- **Tractor damage (3-1)**

- **Tractor**
  - These stones even break the tractors during soil preparation

- **[1:16] Tractor**
  - Soil puts the tractor at risk

- **[1:18] Gravel/Stones**
  - It is dry and has gravel and small stones but the soil

- **[1:24] Gravel/Stones**
  - The soil is giving me problems because of the stones that are in the soil and they affect the growth of vegetables.

- **[1:22] Gravel/Stones**
  - The problem of the soil is that there is too much gravel

- **[1:1] Gravel/Stones**
  - Soil has gravel and small stones

- **[1:10] Gravel/Stones**
  - What I see in the soil is that it has too many stones

- **[1:9] Gravel/Stones**
  - The soil problem is stones and/or gravel because the soil in our village

- **[1:4] Gravel/Stones**
  - There are too big stones on the surface

- **[1:14] Gravel/Stones**
  - The soil has gravel and small stones

- **[1:3] Gravel/Stones**
  - Vegetables because the soil has these big stones

- **[1:27] Gravel/Stones**
  - Of big stones that forced us to stop planting on the soil.
4.5 IRRIGATION INFRASTRUCTURE AND WATER SOURCES

4.5.1 Methods of irrigation used by participant farmers

Figure 4.10 indicates the distribution according to the various methods of irrigation that are mostly used in Tsengiwe. The majority of the respondents (87.7%) irrigated their vegetable crops by hand. The number of respondents who used sprinkler irrigation in their vegetable production accounts for 6.2%. A smaller number of participant farmers (1.5%) used both sprinkler and hand methods, while an equal 1.5% used both flood and hand irrigation.

**Figure: 4.10: Distribution according to type of irrigation methods**

<table>
<thead>
<tr>
<th>Method</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sprinkler &amp; Bucket/hand irrigation</td>
<td>1.5%</td>
</tr>
<tr>
<td>Flood &amp; Bucket/hand irrigation</td>
<td>1.5%</td>
</tr>
<tr>
<td>Sprinkler irrigation</td>
<td>6.2%</td>
</tr>
<tr>
<td>Bucket/hand irrigation</td>
<td>87.7%</td>
</tr>
</tbody>
</table>
4.5.2 Irrigation frequency

The study showed that the majority of the respondents (64.6%) irrigate the arable land twice a day. The respondents that irrigated the land once a day amounted to 20%. A minimal 3.1% revealed that they do not irrigate but rely on rain. The respondents who irrigated twice a week amounted to 4.6%, whilst the same number of respondents (also 4.6%) reported that they rely on rainfall but irrigate twice a day. The lowest number of respondents, at 1.5%, reported that they irrigate their vegetable crops three to four times a day, and an equal per cent age (1.5%) irrigated twice a week but also rely on rainfall.

Figure 4.11: Distribution according to frequency of irrigation
4.5.3 Irrigation challenges

With reference to Figure 4.12, during the qualitative analysis of the interviews regarding irrigation challenges, the main key themes emerged from the discussion was that water shortage was the main challenge with irrigation. Water shortage problem correlates with Figure 4.30 and it was illustrated that lack of water from taps was the crisis for vegetable farming. During the interviews, the respondents reported that the irrigation scheme they used was consuming the energy and strength due to age and sicknesses. The respondents further explained that they do not irrigate the vegetables most seasons due to lack of water from taps and due to lack of rainfall as they rely on tap water and rainfall.
Figure 4.12 Network view of main perceived irrigation challenges

1.31 Too long
- The challenge about irrigation is a lack of water and distance to get water is too long and tiring.

1.20 Too far
- Is that the taps are far and there is also a lack of water.

1.38 Too old
- I am using is that I am too old and I get tired easy to use bucket for irrigation and I am unable to collect water because I am old.

1.13 Too old
- I am old now I struggle to fetch water.

1.39 Too old
- I am too old to collect water for irrigation and I sometimes hire someone to collect water for me when I am able to pay them.

1.43 Tiring
- The challenge about irrigation system is because it is tiring and water is too far to collect and it makes the irrigation inconsistent.

1.46 Tiring
- The challenge about irrigation system I am using is watering can that consumes a lot of my energy. I get tired to irrigate.

1.17 Tiring
- Collecting or fetching water from the dams is tiring and there insufficient water in the dams because the livestock is also drinking from the same dams.

1.16 Tiring
- I face with the irrigation is that it is tiring. I get tired to fetch water.

1.12 Tiring
- I am using the irrigation system in the river and the most important challenge is that the irrigation system I am using is tiring.

1.12 Tiring
- The irrigation system I am using is tiring.

1.8.0 WATER SHORTAGE
- Reliant on taps
- River and taps not adequate
- We face for irrigation is the lack of water when the water is scarce we do not irrigate.
- Taps run out
- Takes time to collect
- Takes a month to have water in our village
- Lack of water
- Irrigation difficult
- We are all complaining about not having enough water in our village.

1.10 Energy and efforts
- Reliant on taps
- River and taps not adequate
- Water from taps risk
- Lack of water from the taps especially when there is no rain I get discouraged

1.11 Lack of water
- Lack of water
- Here in our village is a lack of water.
- Lack of water in our village.

1.14 Lack of water
- The challenge with the irrigation is a lack of water.
- A lack of water is the main challenge I have in irrigation.
4.6 MARKET AND PRODUCT DESTINATION

4.6.1 Trading of vegetables

As shown in Figure 4.13, the findings of the study indicated that the majority of the respondents (61.5%) do not trade vegetables, but that the remaining 38.5% sell their produce for income.

Figure 4.13: Distribution according to respondents’ vegetable trading

4.6.2 Monthly income from vegetable production

The findings of the study indicated that slightly more than 60% of the respondents do not trade their vegetable produce. The respondents who trade vegetables and derived monthly incomes of between R200 and R500 accounted for 18.5% of the sample and those who derived a monthly income of less than R200 for 12.3%. Those whose monthly income from their vegetable produce was between R500 and R1 000, and those who earned R1 000 and above, represent 4.6% of the sample respectively.
4.6.3 Main reasons for growing vegetables

The findings of the study indicated that the main reasons for cultivating vegetable were for health and food purposes, at 44.6% and 40%, respectively. The respondents who grew vegetables because they enjoyed working the land represented 15.4%. The small-scale farmers of the village grew vegetables for health reasons as many were old and frail and needed to consume vegetables to maintain health.
4.7 COMMUNAL AND CULTURAL INFLUENCES

4.7.1 Traditional methods of vegetable production

The study established that the majority of the respondents (61.5%) no longer follow the traditional ways of growing vegetables. The Tsengiwe small-scale farmers who still do apply traditional methods constituted 38.5%.

Figure 4.16: Application of traditional methods of vegetable production

4.7.2 Vegetable farming responsibility within the family

The findings of the study indicated that in the majority of the respondents' households (41.5%) those that were responsible for vegetable farming were women (the mother). As the graph above indicates, at 32.3%, that men (the father) were less responsible for farming than women. However, in the case of 15.4% of the respondents, everyone in the household had vegetable farming duties. The remaining 10.8% of the respondents indicated that the youth carry farming responsibilities.
4.7.3 Irrigation responsibility

The study findings indicated that, in the majority of the households of respondents with families, the women were mostly responsible for irrigation. The women constituted 43.1%. At 24.6%, some men participated in the irrigation. The findings further indicated that youth (21.5%) also contributed to irrigate the crops. The findings indicated that 10.8% of all the members of the families participated in irrigation.

Figure 4.18: Distribution of respondents according to irrigation responsibilities
4.8 CLIMATE

4.8.1 Perception of climate influence on vegetable production

According to the farmers, the heat was regarded as the most influential climatic factor, at 72.3%. The responses also indicated that water was as a factor impacting the vegetable production (20%) and some attributed problems due to wind at (7.7%).

Figure 4.19: Distribution according to climate influence on production

4.8.2 Change in rainfall patterns and levels

The study showed that farmers have noticed a change in rainfall patterns in the past five years. According to the majority of the respondents (92.3%), rainfall patterns and levels have decreased. A minority (7.7%) were of the view that rainfall patterns and levels have increased in the past five years.

Figure 4.20: Alteration in rainfall patterns and levels in the past five years
4.9 CROP SELECTION AND DIVERSITY

4.9.1 Spinach varieties

The study findings indicated that the majority of the respondents (70.8%) do not have knowledge of the different varieties of spinach. However, 29.2% have knowledge of different varieties of spinach. This is an indication that the small-scale farmers of Tsengiwe were not knowledgeable about vegetable crop diversity.

Figure 4.21: Distribution according to selection of spinach varieties

4.9.2 Selection of crops

The study findings indicated that slightly more than a third of the respondents (36.9%) made their crop selection according to the time of year. Approximately a third (33.8%) selected crops according to family health, while slightly less than a third (27.7%) selected crops according to rainfall. Those who do not have much choice as to crop selection due to lack of seeds and seedlings that have been given to the participants at any particular time comprise 1.5%.
4.9.3 Crop rotation

The study showed that the majority of the respondents (87.7%) practiced crop rotation in vegetable production. A minimal 12.3% do not practice crop rotation. This was an indication that the small-scale farmers of Tsengiwe village followed sound vegetable practice in terms of crop rotation.

Figure 4.23: Distribution according to crop rotation

![Diagram showing distribution according to crop rotation]
4.10 PESTS, DISEASE AND NUTRIENT DEFICIENCY

4.10.1 Pests

Table 4.3 shows different types of pests that were reported to be problematic in vegetable crop production. The study indicated that (44) respondents found stalk borer as a problem during growth of vegetables and crops. The study further indicated that alfalfa weevil (21), locust (17), millipede (17), unknown insects (16) and unknown beetle (10) were the main pests that were reported to be the challenge in small-scale farmer’s vegetable production. During the interviews, the respondents further explained that the pests, insects and livestock result in difficulty of vegetable production and had a substantial influence on vegetable production.

Table 4.3 Distribution according to pests in vegetables

<table>
<thead>
<tr>
<th>Pest names</th>
<th>Total Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stalk borer</td>
<td>43</td>
</tr>
<tr>
<td>Alfalfa weevil</td>
<td>21</td>
</tr>
<tr>
<td>Locust</td>
<td>17</td>
</tr>
<tr>
<td>Millipede</td>
<td>17</td>
</tr>
<tr>
<td>Unknown insects</td>
<td>16</td>
</tr>
<tr>
<td>Unknown beetle</td>
<td>10</td>
</tr>
<tr>
<td>Birds</td>
<td>9</td>
</tr>
<tr>
<td>Grasshoppers</td>
<td>9</td>
</tr>
<tr>
<td>Butterflies</td>
<td>6</td>
</tr>
<tr>
<td>Ants</td>
<td>4</td>
</tr>
<tr>
<td>Mole</td>
<td>4</td>
</tr>
<tr>
<td>Lady bug</td>
<td>4</td>
</tr>
<tr>
<td>Snails</td>
<td>2</td>
</tr>
<tr>
<td>Aphid</td>
<td>1</td>
</tr>
<tr>
<td>Termites</td>
<td>1</td>
</tr>
</tbody>
</table>
4.10.2 Vegetable diseases

With reference to Table 4.4, during the qualitative analysis of the interviews on vegetable diseases, the main key disease characteristics emerged and also showed which main crops where effected. The farmers were not familiar with the disease names and the researcher depended on analysing the characteristics or symptoms of diseases. The finding suggested that the main areas of influence on vegetables were on indicative on leaves and instigating rot. The study indicated that cabbage was the main crop affected by diseases.

Table 4.4 Distribution according to diseases in vegetables

<table>
<thead>
<tr>
<th>MARKERS</th>
<th>#beans</th>
<th>#beetroot</th>
<th>#cabbage</th>
<th>#carrot</th>
<th>#maize</th>
<th>#potato</th>
<th>#pumpkin</th>
<th>#spinach</th>
<th>#tomato</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colour change</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Leaf deficiency</td>
<td>3</td>
<td>0</td>
<td>17</td>
<td>0</td>
<td>3</td>
<td>0</td>
<td>3</td>
<td>7</td>
<td>0</td>
</tr>
<tr>
<td>Rotting</td>
<td>1</td>
<td>2</td>
<td>5</td>
<td>5</td>
<td>12</td>
<td>16</td>
<td>2</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Spot / Marks</td>
<td>4</td>
<td>0</td>
<td>17</td>
<td>1</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td>TOTAL</td>
<td>8</td>
<td>2</td>
<td>43</td>
<td>6</td>
<td>19</td>
<td>18</td>
<td>8</td>
<td>13</td>
<td>2</td>
</tr>
</tbody>
</table>
4.10.3 Pesticide application

The findings of the study indicated that the majority of the respondents (53.8%) do not apply pesticides at all to their crops. Of those who do, slightly more than a third (38.5%) applied pesticides once to twice a season. A minimal proportion of 3.1% of the participant farmers applied pesticide 3 to 4 times a season and the remaining 4.6% applied pesticide 5 to 6 times a season.

Figure 4.24: Distribution according to application of pesticide

4.11 PERCEIVED HEALTH BENEFITS OF INDIGENOUS LEAFY VEGETABLES

4.11.1 Indigenous leafy vegetables

Table 4.5 indicates the indigenous leafy vegetables that are known and consumed by small-scale farmers in Tsengiwe village. The study showed that the respondents had knowledge of indigenous leafy vegetables. The majority of respondents (65) reported the knowledge of black jack wild vegetable that grows in the arable lands and in the wild. The respondents further reported the knowledge of wild spider flower (27), lamb’s quarters (16), annual flower (13) and black night shade (11).
During the interviews, the respondents revealed that leafy vegetables were growing naturally and were nutritious; nurses recommend the consumption of these vegetables. The vegetables grow well during heavy rains but scarce during drought times.

Table 4.5 Distribution according to indigenous leafy vegetables

<table>
<thead>
<tr>
<th>COMMON – ISIXHOSA – SCIENTIFIC REFERENCE</th>
<th>Total Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pigweed – Tyuthu – Amaranthus spp.</td>
<td>65</td>
</tr>
<tr>
<td>Common sow thistle – Ihlaba – Sonchus aleraceus L.</td>
<td>27</td>
</tr>
<tr>
<td>Lamb’s quarters – Mbikicane – Chenopodium album L.</td>
<td>16</td>
</tr>
<tr>
<td>Chinese cabbage – Isiqwashumbe – Brassica rapa L.</td>
<td>13</td>
</tr>
<tr>
<td>Black night shade – Umsobo – Solanum nigrum L.</td>
<td>11</td>
</tr>
<tr>
<td>Sow thistle – Irhwabe – Sonchus asper L.</td>
<td>8</td>
</tr>
<tr>
<td>Sticky ground cherry – Iguzi – Physalis viscosa L.</td>
<td>7</td>
</tr>
<tr>
<td>Black jack – Umhlabangula – Bidens pilosa L.</td>
<td>5</td>
</tr>
<tr>
<td>Sow thistle – Umantombazane – Sonchus asper L.</td>
<td>4</td>
</tr>
<tr>
<td>Annual nettle – Irawu – Urtica urens L.</td>
<td>3</td>
</tr>
<tr>
<td>Pigweed – Imbuya – Amaranthus spp.</td>
<td>3</td>
</tr>
<tr>
<td>Pigweed – Unomdlomboyi – Amaranthus spp.</td>
<td>3</td>
</tr>
<tr>
<td>Pumpkin leaves – Imithwane – Cucurbita pepo L.</td>
<td>2</td>
</tr>
<tr>
<td>Traditional pumpkin – Ámabolosa – Cucurbita spp.</td>
<td>1</td>
</tr>
</tbody>
</table>
4.11.2 Distribution according to perceived health benefits of indigenous leafy vegetables

The study findings indicated that the majority of the respondents (58.5%) indicated that they benefit from indigenous leafy vegetables. The women respondents that benefit from indigenous leafy vegetables make up 38.5%. The elderly benefit from indigenous leafy vegetables at 1.5% and sick benefit at 1.5%. The findings indicated 20% difference in the percentages between the categories of both men and women, on the one hand, and women, on the other.

Figure 4.25: Health benefits of indigenous leafy vegetables

4.11.3 Responsibility for growing indigenous leafy vegetables

The findings of the research study indicated that the majority of respondents responsible for indigenous leafy vegetables were women, at 76.9%. The men of the village responsible for indigenous leafy vegetables constituted 12.3%, the youth 3.1%. A further 7.7% of respondents reported that no one was responsible for indigenous leafy vegetables.
4.11.4 Collection of indigenous leafy vegetables

The findings of the study indicated that the majority of the small-scale farmers (95.4%) collect indigenous leafy vegetables and that a minimal 4.6% of the respondents do not collect indigenous leafy vegetables. This indicated that the indigenous leafy vegetables were important to the small-scale farmers of Tsengiwe as a valuable source of nutrients.
4.11.5 Time of harvesting of indigenous leafy vegetables

The study findings showed that the majority of the respondents (89%) collect indigenous leafy vegetables in summer. A small number (3.1%) indicated that the farmers collected indigenous leafy vegetables in summer and spring, and an equal percentage collected the vegetables in spring. A further minimal 1.5% collected the leafy vegetables in winter.

Figure 4.28: Distribution according to seasonal collection of leafy vegetables

4.11.6 Challenges in making use of indigenous leafy vegetable

The study findings indicated that, for the majority of the respondents (79.1%), making use of indigenous leafy vegetables presented difficulties. 17.5% of the respondents revealed that leafy vegetables were not obtainable in sufficient quantities and a further 3.2% of the respondents indicated that these leafy vegetables were too far to buy. The respondents also pointed out that indigenous leafy vegetable were very difficult to cultivate because of their particular requirements, such as regular, heavy rainfall.
4.12 PERCEIVED CHALLENGES FACED IN VEGETABLE PRODUCTION

The results in Figure 4.30 indicated that the majority of respondents (60%) find vegetable production problematic due to lack of water. The research results further indicated that drought was a factor that 52.3% of the respondents cited as a major complicating factor in their vegetable production.

Financial limitations were cited by 41.5% of the respondents as a factor that influenced vegetable production. 27.7% indicated that they also experience problems with stray livestock destroying the production. Due to a lack of fencing and fencing materials the farms lie open and were invaded by livestock left roaming around. A lack of equipment for vegetable production was found to be a difficulty for 24.6% of the respondents.

A lack of farming inputs (fertilizer, pesticides and seeds) was a challenge experienced by 20% of the participant farmers. Equal per cent ages of the respondents (15.4%) indicated that pests, on the one hand, and old age, on the other, are the main challenges experienced in vegetable production, respectively.
Poor soil quality presented a further challenge to 13.8% of the respondents, influencing the growth and affecting the production of their vegetables. Among the elderly, 1.5% indicated that vegetable production was made difficult by the lack of help or support from family members.

**Figure 4.30: Factors constraining vegetable production challenges**
CHAPTER 5

DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

5.1 INTRODUCTION

The study envisioned to determine farmer’s perceptions on factors influencing small-scale vegetable production in the village of Tsengiwe in the Eastern Cape. The research concentrated on the following possible determinants: investigating socio-economic factors that influence vegetable production, identifying the main perceived determinants in vegetable crop production and a review of skills and practices for sustainable vegetable production. The study also comprised an investigation of the influence of indigenous vegetable on commercial vegetables and for household consumption.
5.2 SOCIO-ECONOMIC FACTORS INFLUENCING SMALL-SCALE VEGETABLE PRODUCTION

5.2.1 Gender

The research findings revealed that small-scale farming at Tsengiwe is dominated by women farmers. The reasons for this occurrence vary from the absence of husbands due to death, men having migrated for employment, and most women in the village being single parents. During the study, mostly women were available to participate in the interviews and men were not prepared to participate. In the study conducted by Moseley (2015), it is highlighted that women in vegetable farming suffer in terms of access to agricultural resources due to their inability to afford agricultural resources.

5.2.2 Age

The research revealed that the small-scale farmers are mostly elderly. The older community members have the responsibility of looking after their households and families and they resort to farming to assist with the monthly food expenses. The youth of rural areas are perceived as indolent by the older generation. There is also a belief among the older generation that the unwillingness of the youth to participate in the agricultural sector is affected by the amalgamation between the school system and agriculture (Funder, Hirsi and Madsen 2001:39). These findings suggest that the elderly see vegetable production as important for own consumption and supplementation of their daily and monthly needs. In terms of health and physical strength the age of the small-scale farmers of the village clearly influences vegetable production and its sustainability. Findings indicating that the participants were mostly elderly also suggested a lack of familiarity about market accessibility. Besides providing nutrition, vegetable farming also assists in keeping the elderly active.
5.2.3 Marital status

The findings revealed that the participants who mostly participate in vegetable production were married. During the study interviews, the researcher observed that most of those widowed and that some live alone but with grandchildren in their care. Marital status has important implications for vegetable crop production in terms of land ownership and household leadership status. Ideally, married respondents work the land together, which affects positively on the farming. Single, divorced and widowed respondents do not obtain such assistance and support from spouses and therefore their vegetable production may not be sustainable.

These results correlate with the results of gender differentiation that showed that vegetable production is practised more by women (60%) than men (40%). According to applicable literature, men leave their homes for reasons of employment, leaving the women taking care of the land, and return during the seasons of the year to cultivate the land (Department Of Science And Technology, 2013).

5.2.4 Source of income

The findings showed that the respondents were dependent on government social grants and pensions for meeting household expenses. The results were an indication that the participants were elderly and lacked the strength for employment that requires laborious activities and would rather depend on social grants for support. The study conducted by Moseley (2015) highlights the plight of women farmers not having sufficient resources to fund production inputs.
5.2.5 Educational levels

The findings showed that the majority of the youth from the study area obtained education only until secondary level. It is widely accepted that education plays an important role in vegetable cultivation and therefore the production in this village is influenced by the educational level of the farmers. The present findings also showed that the respondents who achieved tertiary level education were pensioners. Disadvantaged by a predominantly lower level of education, the farmers of Tsengiwe are at risk in terms of change and adoption of improved agricultural practices; it is also disadvantageous to the farmers notably in terms of skilled job opportunities. There is a high rate of illiteracy in Tsengiwe (Department of Science and Technology Info, 2012) -- a factor that markedly influences vegetable production (Masood et al. 2012:343).

5.2.6 Family size

The larger family sizes suggest that the parents face a greater challenge to feed their families than just from the inadequate social grant which they are mostly dependent on. During the interviews, the respondents further explained that some family members do not reside in Tsengiwe but reside in other provinces for employment purposes. Older villagers are therefore left living alone with grandchildren to take care of.

5.2.7 Farm size

During the interviews, the respondents pointed out that vegetable production has traditionally been practised in rural areas for a long time. Vegetable farming was a main source of food and much of the available food traditionally was derived from crops and vegetables.
In the past, the respondents explained, there was no need to buy groceries from the markets because most of the types of food were available and home-grown. The researcher observed that some homesteads stand vacant and arable lands are no longer in use, either because some inhabitants do not live in the village permanently or the elderly inhabitants had passed away.

5.2.8 Farming practices

Some of the respondents acknowledged that they have stopped cultivating their arable lands because they lack fencing and farming equipment. They further explained that they no longer work their fields because of theft and stray livestock consuming the produce. From the researcher’s observation, the majority of respondents utilize smaller portions of arable land because, being elderly, they lack family support as well as farming resources. The land that is utilized for vegetable farming is mostly for household consumption and not for profit.

5.3 MAIN PERCEIVED DETERMINANTS IN VEGETABLE CROP PRODUCTION

5.3.1 Production activities and practices

The lack of finance for buying seeds and seedlings from town results in farmers sharing amongst each other. During the study interviews, the researcher observed that maize, beans and pumpkin were the main crops shared amongst community members. These were the crops that were mostly planted in the area and some villagers kept the seeds for the next season. According to Murphy (2012:3), unemployment and poverty (lack of capital) in rural agricultural communities results in limited purchasing ability.
This socio-economic circumstance affects vegetable production in Tsengiwe as the farmers do not always have the means to buy seeds to sustain vegetable farming. Most of the inhabitants are unemployed and have free time to work the land. From field observation, many of the farmers find enjoyment in vegetable farming, but they are demotivated by the lack of resources such as equipment, farming inputs and water tanks that are needed for sustainable vegetable farming. Lipton (2005:8) agrees that small-scale farmers are demotivated in terms of participating in vegetable production due to poor resources.

Similarly, the purchase of commercial fertilizers require money to be available for farming; the farmers do not have a primary source of income and therefore lack the means to utilize commercial fertilizer. The participants explained that they obtain the fertilizer at no cost, without having to spend money on it, as manure from cows, pigs, chickens and sheep is easily obtainable.

The participants explained that they apply fertilizer in one season and then skip two or three seasons before applying fertilizer again. The respondents revealed that kraal manure is the main source of organic fertilizer, besides pig and chicken manure. Fertilizer is essential to vegetable crop production as it contributes to both growth and yield. The farmers mostly use the organic fertilizers because they do not cost money and are freely obtainable. The respondents further explained that inorganic fertilizer is mostly used in the cultivation of cabbage. The respondents who do not use fertilizers explained that fertilizers could sometimes disturb the growth of other vegetables. However, the keeping of livestock is declining and therefore these fertilizers are becoming more difficult to procure.
Soil preparation involves incurring expense for the majority of the village farmers. The participants revealed that these practices are irregular due to a lack of money to hire a tractor. The participants explained that there is only one tractor that is used by the village as well as neighbouring villages, which means that it is sometimes not available when it is needed.

The farmers also explained that they stopped farming on a larger scale as they do not have sufficient funds for ploughing. The participants who prepare the soil by hand are mostly the farmers that no longer cultivate a large area of land and prefer to work a smaller area to obtain vegetables for household consumption. The participants who practise no tillage explained that hiring a tractor is costly and that they prefer to work the land without soil preparation. Insufficiency of funds for soil preparation may therefore further contribute to vegetable crop production uncertainty.

5.3.2 Irrigation infrastructure and water sources

The participants explained that a lack of water sources, as well as interrupted municipal water supply, contribute to irrigation being inconsistent. The small-scale farmers of Tsengiwe mostly own water tanks of 2 000 litres. The water tanks are not sufficient for both household utility and vegetable farming; this leads to water shortages and unsustainable vegetable production. According to Statistics SA (2016), households’ access to water taps has increased from 9 million to 16 million in the Eastern Cape. Lack of water and low rainfall are significant challenges to vegetable crop production at Tsengiwe. Appendix A shows the water source that was used by the villagers of Tsengiwe but which is no longer in use.
The few respondents who can afford irrigation equipment purchase the pipes and devise home-made sprinkler irrigation systems and make sprinkler nozzles. However, few farmers use irrigation equipment because it is expensive.

The participants use home-made watering cans for irrigation as illustrated in Appendix B. As the respondents are mainly elderly people, irrigation is cumbersome work for them. They first have to collect water from distant water sources and then still irrigate the land. These elderly farmers mostly live by themselves and therefore do not have any assistance to collect water for irrigation.

The respondents who own water tanks mostly do not use the water from the water tanks for irrigation but use tap water from the municipal supply for irrigation. Water from their water tanks is kept for household use. Farmers explained that the irrigation practices of the village are not consistent due to interrupted water supply and, due to lack of municipal maintenance; the village finds itself without water for lengthy periods (even months). When the rainfall is poor, the river in the area also dries up.

According to Department of Science and Technology Info (2013:5), small-scale farmers do not all have water tanks Interruption of the municipal water supply, when taps in the village run dry, is an on-going challenge for the participants. It was explained that the municipal taps do not function for three to four weeks at a time and have even been without water for up to two months. In terms of irrigation, immense difficulties are encountered. Not only does production suffer, but vegetable production sustainability is put at severe risk.

Collecting water in Africa is risky in terms of women who have to collect it from very long distances (Taylor, 2016). It has been reported that women and children are exposed to sexual abuse, illnesses and dropping out of school.
Collecting water in rural areas is a challenge and therefore influences vegetable production. Water is the essential source of good production in vegetable farming. Collecting water is documented as being a daily activity which consumes people’s energy – to the extent that children sacrifice school for collecting water (Taylor, 2016). Lack of water remains a major obstacle to and daily challenge in vegetable production for Tsengiwe small-scale vegetable farmers.

5.3.3 Market access and product destination

The farmers of Tsengiwe grow vegetables for their own household consumption as they cannot afford to buy vegetables from the marketplace due to their dependence on government social grants. The respondents further explained that growing vegetables assists in making food available in their homes. The respondents who trade vegetables indicated that they also produce vegetables for household consumption. All the participants confirmed that the vegetables grown on their farms are utilized for household consumption.

Some participants further explained that they used to trade vegetables in the past but, because of low production, it is not possible any longer to make an income from vegetable production. The respondents indicated that they trade vegetables when they are in need of, for instance, electricity or having to buy equipment or school uniforms for children and grandchildren.

The income that respondents earn from selling vegetables is not enough to cater for all their needs, because it is not a consistent income as it is mainly dependent on the amount of vegetables produced.
The participants further explained that trading any surplus vegetables they might have, happens infrequently when there has been regular rainfall and when the produce is good in that particular season. Spinach, carrots, potatoes and beetroot are main vegetable crops used for market purposes and a good income or profit can be earned from these when produced well.

5.3.4 Climate

The respondents explained that hot weather presents a challenge in vegetable production, particularly in times of poor rainfall or drought, and due to lack of farming equipment. The respondents further explained that the soil that is available for vegetable farming contains gravel and stones. When temperatures are high, heat is absorbed by the stones, which then burns and destroys the vegetable roots (Appendix C). The organic content in the soil decompose faster in hot weather. Hot weather also affects the growth of the produce and is one of the critical factors impacting the vegetable production of the small-scale farmers of Tsengiwe.

The scarcity of rain during the past five years has been a major obstacle for the farmers of the village, as elsewhere in the province. Rainfall has decreased in both summer and winter. The lack of rainfall has severely reduced the farmer’s natural water supply as many dams and rivers are susceptible to running dry. Water is critical to vegetable growth and production stability. Poor rainfall presents a challenge in terms of irrigation and is a further indication of inconsistency in vegetable farming and practice in the area.
The participants revealed that, over the past three years, the drought in the area had been problematic, causing inconsistency in production. The farmers explained that there are crops that depend on the rain for irrigation. Under drought conditions, crop growth and production, as well as soil moisture levels, are severely affected. Poor rainfall resulting from the drought experienced countrywide over the past five years, changing rainfall patterns and a drop in levels of rainfall have all impacted negatively on vegetable farming and production at Tsengiwe, threatening sustainability.

5.4 SKILLS AND PRACTICES FOR SUSTAINABLE VEGETABLE PRODUCTION

In the past, oxen and donkeys were used for ploughing and for collecting water for irrigation, as well as for long-distance deliveries around the communities. Oxen, donkeys and horses played an important role in the past as a source of transport for the villagers. The respondents further explained that they no longer own donkeys and oxen for vegetable production purposes. The donkeys that are still owned by a few farmers are no longer used for agriculture.

The research findings show no difference between the categories of participant farmers in terms of selecting crops according to rainfall, according to the time of the year and according to family health. The majority of the respondents depend on social grants and purchase food as needed. The farmers highlighted that the poor rainfall had made crop selection very challenging. The respondents showed themselves to be knowledgeable about crop rotation and its importance for both the soil and vegetable production.
The findings suggested that the small-scale farmers of Tsengiwe cannot afford pesticides. It is not possible for them to meet all their personal and household needs as well as those of vegetable production. The respondents indicated that the only pesticide that is utilized by many of Tsengiwe small-scale farmers is for cabbage production which is a powder that is applied to cabbage seedlings. However, the respondents elaborated that the pesticide was not very effective and, due to lack of money, many of the respondents stopped using the pesticide. Ineffectiveness of the pesticide might be a result of a build-up of resistance in the pest due to overuse of the chemical.

5.5 INDIGENOUS LEAFY VEGETABLES HARVESTED FOR HOUSEHOLD CONSUMPTION

The respondents explained that, in the past, indigenous leafy vegetables traditionally used to be consumed mainly by women, but today some men also consume indigenous leafy vegetables. Leafy vegetables generally start to grow in spring and are available mostly in summer. The vegetables are collected and used for household consumption. Indigenous leafy vegetables are regarded as “women’s” and “poor people’s” food (Voster and Van Rensburg, 2005). Xhosa men traditionally viewed these indigenous greens as “women’s food that would make them weak, but that perception is now outdated and today men regularly eat it” (Hollins, 2015) However, men generally do not take responsibility for or have much knowledge of indigenous leafy vegetables.
The respondents explained that indigenous leafy vegetables are sourced from the weeding periods during cultivation of commercial crops. Women mostly take care of weeding in vegetable farming -- separating the weeds without agricultural value from the indigenous leafy vegetables, which are then used for health and cooking purposes (Taleni et al. 2012:3). Appendix D indicates the types of leafy vegetables that were observed to be growing in some of the participant’s gardens during data collection.

Shava (2000) and Nesamvuni (2000) stated that indigenous leafy vegetables are commonly utilized as a traditional favourite and are mixed into other dishes for consumption. Literature affirms the nutritional value of these traditional greens -- indicating that indigenous leafy vegetables contain high levels of micronutrients such as folic acid, iron, vitamin C and beta-carotene (Taleni et al. 2012:4).

The farmers further explained that, being indigenous, these leafy vegetables occur naturally and are also found to be growing on their vegetable farms, taking root and growing in the arable soil much as weeds do. These nutritious vegetables are available in summer, but they are not able to withstand drought. According to Lewu and Mavengahama (2010) and Matenge et al. (2012), indigenous leafy vegetables are not cultivated but grow in the wild, and are a good source of nutrients and also adapt well to demanding conditions.
A cultural perspective provided by the respondents was that, at a time when indigenous leafy vegetables were consumed, the ancestors lived a longer life – confirming how beneficial these naturally occurring vegetables are for human health and as a means of alleviating starvation and malnutrition. A more practical advantage of Indigenous leafy vegetables is that, occurring naturally, they do not require seedlings and seeds for cultivation. Seedlings and seeds may be required if an individual intends to grow them in a given piece of land.

The indigenous leafy vegetables also serve to supplement the vegetables that farmers either grow themselves – which, the respondents explained, again assists in supplementing the food that is bought from town. Factors such as drought, lack of water and poor rainfall influence the availability of leafy vegetables and, as stated, also pose a challenge to access to indigenous leafy vegetables. Eastern Cape small-scale farmers that rely on vegetable production as the livelihood in rural areas are susceptible to food insecurity (Ndlovu, 2013:121). Food insecurity is an on-going challenge for the small-scale farmers of Tsengiwe. According to reports, food security has been declining throughout South Africa in recent years. The Eastern Cape has been reported to be the most vulnerable -- with no progress in South Africa’s food security (WHO, 2011).

Indigenous leafy vegetables (imifino) are regarded as a gift from God (Hollins, 2015). African vegetables are cultivated for household consumption and for medicinal purposes. Leafy vegetables are cultivated for medicinal purposes to treat human illnesses. However, the findings show that their use by the villagers of Tsengiwe is small – despite their nutritional and medicinal value. The leafy vegetables are prepared and used to treat illnesses like diarrhoea in children, inflammation, wounds, ulcers, ringworms and are used to aid digestion.
5.6 CONCLUSION

The village’s small-scale farmers cultivating vegetables are vulnerable in terms of socio-economic characteristics such as age, gender, marital status, educational level, farm size, income and family size. These factors have an enormous impact on vegetable farming in the village. Among the challenges, the small-scale farmers face old age as one of the key factors influencing vegetable production and its sustainability. Vegetable production is in jeopardy and at risk of unsustainability due to the socio-economic factors that result in general lack of farming resources. Further worsening scenario is that the small-scale farmer generally is only familiar with outdated farming practices.

Small-scale farming needs to be developed with the assistance of government and agricultural programmes specifically designed for small-scale farming. According to earlier research, “small-scale farmers have encountered challenges and problems linked with insecurity and disjoint land rights, communal tenure arrangements, non-viable and small-farm units, over-stocking and land deterioration, and support infrastructure, water supplies, transportation networks, financial support, extension and research services” (Van Rooyen and Nene, 1995:45).

During the researcher’s stay in the village, the small-scale farmers explained that indigenous leafy vegetables are merely used for household consumption and, because of their nutritional value. Indigenous leafy vegetables are therefore mainly used for food consumption in Tsengiwe village and not essentially for medicinal purposes.
The small-scale farmers of Tsengiwe are passionate about vegetable farming. Their produce provides a source of food and also assists in maintaining good health. However, vegetable farming in the village is deteriorating due to climate influences, financial constraints and lack of farming resources.

5.7 RECOMMENDATIONS

5.7.1 Support for the elderly women in development and production practices

Small-scale farmers who practise vegetable farming should be encouraged to have regular meetings mentored by agricultural extension officers to improve their skills. The youth of the village should be encouraged to become involved in vegetable farming to support the elders and for vegetable production sustainability. Programmes that will encourage the attention of the youth are recommended such as agricultural trainings, workshops and awarenesses. The researcher further recommends that small-scale farmers should be trained in modern ways of conservation agriculture.

The elderly women should receive skills training to improve their understanding of farming practices in order to improve vegetable production. Small-scale farmers should be encouraged to have meetings on dealing with behaviours and attitudes to improvement of vegetable production. Department of Agriculture intervention is important in order to provide skills and attitudes on improving and sustaining vegetable farming.
Small-scale farmers that are well-trained promote good production of vegetables (Van Rooyen and Nene, 1995:45). Agriculture extension services should therefore conduct workshops and skills programmes to improve the knowledge of elderly women farmers of Tsengiwe. The researcher further recommends greater community involvement in terms of improving and promoting vegetable farming.

5.7.2 Interventions to address factors affecting vegetable production

The main factors influencing vegetable production were limited sources of water, financial constraints and drought. Small-scale farmers in Tsengiwe face constant challenges in terms of access to municipal resources such as inadequate supply of water from taps. These challenges influence both vegetable production and human health. Repair of boreholes around the village is therefore recommended. Sakhisizwe municipality must ensure that the water taps in the village are fixed and have a constant supply of running water. The municipality should also address and promote water conservation and improve water infrastructure in the area to improve water availability.

5.7.3 Improving soil structure

Soil erosion is a major challenge to the villagers’ vegetable production as it has disturbed the soil structure and soil nutrients. Appendix E shows that severe soil erosion has taken place in Tsengiwe in recent years. The findings suggest that the farmers are not fully aware of the soil deterioration. The researcher therefore recommends application of a soil management programmes for improvement of the soil, lessening of soil disturbance and in order to maintain organic matter in the soil.
Adopting mulching techniques in the practices are recommended, as it convalesces the structure of the soil and lessens soil erosion, decreases evaporation and increases organic content. It is vital that the small-scale farmers of Tsengiwe follow these practices for the betterment of vegetable production and its sustainability. Reducing tillage is recommended as minimum tillage improves soil aggregates. The small-scale farmers should be encouraged to reduce tillage practice for the development of soil structure. Natural composting application, which can be food waste, manure, leaves, grass trimmings, paper, wood, feathers, and crop remains, is essential to improve and develop soil structure. This practice is strongly recommended. All the above-mentioned recommendations require no financial input.

5.7.4 Working towards food self-sufficiency

The results of this research have indicated that the small-scale farmers of Tsengiwe village are vulnerable to food insecurity. The factors that influence vegetable production such as drought, lack of water and financial limitations have been the difficulty in producing enough vegetables and indigenous leafy vegetables for household consumption and as well as market purposes. The researcher therefore recommends that small-scale farmers to work on gaining food self-sufficiency by more involvement and developing a stronger network between stakeholders, farmers, agricultural departments and municipality.
5.7.5 Moving away from dependence on mechanisation in small-scale farming

The researcher has recommended that the rural small-scale farmers to move away from depending on mechanism style of vegetable farming. The respondents indicated that for soil preparation, tractor is used and it is mostly hired. The style of farming is costly for rural vegetable farmers. The study indicated that small-scale farmers do not afford and lack funds for vegetable farming development and sustainability.

Expatriate management came into being as a result of several influences such as depending on mechanism ways of administering agricultural development as well as the notion of ‘optimum resource of use and the modern farming strategies in countries surrounds South Africa. This was instrumental in the process of developing modernised agricultural systems in the homesteads (Hartzenberg, 1977, cited in Van Rooyen and Nene, 1995:45).

Small-scale farming was not attended to in terms of improvement and development during the introduction of modern farming systems. It has been shown that little has been done to improve small-scale farming methods (Van Rooyen and Nene, 1995:45). Small-scale farming systems remained outdated and the small-scale farmers adapted to the modern styles of farming – but due to financial constraints this is not feasible. Those practices negatively influence small-scale vegetable farming production and its improvement. The researcher therefore recommends that the small-scale farmers of Tsengiwe look at improving traditional ways of farming, such as utilizing livestock for soil preparation and for other farming preparations and activities.
REFERENCE LIST


Altshul, H., 1998. Output to purpose review of DFID’s crop post-harvest programme, value addition to agricultural products. In *Natural Resources International Symposium* (pp. 53-61).


Department of Agriculture, fisheries and Forestry (DAFF), 2010. Annual report 2010/11 - South Africa.


Department of Science and Technology Info, 2012. [online], Available: www.ufh.ac.za/sites/default/files [25/04/2016].


Jari, B., 2009. Institutional and technical factors influencing agricultural marketing channel choices amongst smallholder and emerging farmers in the Kat River Valley. *MSc Agricultural Economics thesis, University of Fort Hare, South Africa*.


Local Economic Development Plan (LEDP), 2014. [online], Available: http://www.grangeoversandstowncouncil.gov.uk [05/08/2016].


Tancott, G., 2014. Calls for constitution amendment to deal with water crises.

Richard, T., 2009. Qualitative versus quantitative methods: Understanding why qualitative methods are superior for criminology and criminal justice.


Town, C., 2013. Self-reliance in times of change. IMIESA.


Van Averbeke, V. W., Mnkeni P. N. S., Phil J C Harris P. J. C. and Mkile, Z., 2008. Fertility status of cropped soils in smallholder farming systems of the Transkei region, Eastern Cape Province, South Africa. Centre for Organic and Smallholder Agriculture, Department of Agronomy, University of Fort Hare, School of Science and the Environment, Coventry University, pp.1-15.


Walton, R.E., 2015. Ethical issues in the practice of organizational development. Division of Research, Graduate School of Business Administration, Harvard University.


APPENDICES

Appendix A: Obsolete water resources
Appendix B: Home-made watering can
Appendix C: Stones and gravel in growing areas
Appendix D: Examples of indigenous leafy vegetables
Appendix E: Severe soil erosion – North of Tsengiwe village
Appendix F: Workshop on research findings feedback and recommendations
Appendix G: Cultivation of indigenous leafy vegetables