THE SOCIO-ECONOMIC IMPORTANCE OF INDIGENOUS VEGETABLES TO THE NTUZE SMALLHOLDER FARMING COMMUNITY IN KWAZULU-NATAL, SOUTH AFRICA

by

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In accordance with Rule G4.6.3, I hereby declare that the above-mentioned thesis is my own work and that it has not previously been submitted for assessment to another University nor for any other qualification.

..........................................................
SIGNATURE

..........................................................
DATE
DEDICATION:

To my loving mother and grandparents, *ngiyabonga ngothando nokungeseka kwenu. UNkulunkulu anibusise imihla yonke yokuhamba kwenu!*
CONFERENCE PRESENTATIONS

Some of the findings of this dissertation were presented at the following conferences:


Both presentations addressed the importance of indigenous vegetables in relation to their contribution and influence on food security and rural livelihoods.
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ABSTRACT

South Africa continues to face multiple socio-economic challenges – one of the direst being food insecurity, especially in rural areas. Compounding the challenges is the impact of changing weather patterns on agriculture. The current study presents evidence indicating that indigenous vegetables provide a sustainable yet inexpensive answer to several of these challenges. The research was aimed at determining the socio-economic impact of indigenous vegetables in the Ntuze community of northern KwaZulu-Natal. A mixed-methods methodology was employed to achieve a holistic understanding of the relationship between the use of indigenous vegetables and socio-economic influences. The study discovered that indigenous vegetables play an important role in the livelihood strategy of this rural farming community. Findings revealed that the utilisation of indigenous vegetables makes an essential contribution to the livelihoods and well-being of the Ntuze people, especially in terms of curbing food poverty, income generation and medicinal benefits. However, the value of these vegetables was found to be appreciated mostly by the elderly. Conclusions therefore indicate a possible decline in future production and use of indigenous vegetables if indigenous knowledge is not passed on to the next generation. Integration of indigenous knowledge in agricultural technology transfer programmes is therefore vital to promote production of indigenous vegetables as a sustainable food resource. Actively addressing the stigma attached to indigenous vegetables as being “low-status food” is also crucial to enhance perception and understanding of the value of these vegetables. This would contribute to both preserving cultural heritage and conserving valuable indigenous flora. Such intervention would safeguard this sustainable and renewable resource in its pivotal socio-economic role in terms of rural food security as is substantiated by this study.
TABLE OF CONTENTS

DECLARATION ........................................................................................................................................i

DEDICATION: ......................................................................................................................................ii

CONFERENCE PRESENTATIONS .......................................................................................................iii

ACKNOWLEDGEMENTS ......................................................................................................................iv

ABSTRACT ..............................................................................................................................................v

TABLE OF CONTENTS ......................................................................................................................vi

LIST OF ANNEXURES .........................................................................................................................xiii

LIST OF FIGURES ...............................................................................................................................xiv

LIST OF TABLES .................................................................................................................................xv

ACRONYMS AND ABBREVIATIONS ..................................................................................................xvi

DEFINITION OF TERMS .....................................................................................................................xvii

CHAPTER 1

INTRODUCTION AND ORIENTATION OF RESEARCH

1.1 BACKGROUND AND RATIONALE .................................................................................................1

   1.1.1 Background .........................................................................................................................1

   1.1.2 Rationale .............................................................................................................................3

1.2 PROBLEM STATEMENT ..............................................................................................................5

1.3 STUDY AIM ....................................................................................................................................5

1.4 RESEARCH QUESTIONS .............................................................................................................6
1.5 OBJECTIVES ...................................................................................................................... 6

1.6 DELIMITATION OF THE STUDY ......................................................................................... 6

   1.6.1 Geographic demarcation......................................................................................... 7

   1.6.2 Participants (Smallholder Farmers)..................................................................... 8

   1.6.3 Home Profile ........................................................................................................... 9

1.7 RESEARCH DESIGN: TRIANGULATION APPROACH ..................................................... 10

1.8 DISSERTATION OUTLINE ................................................................................................ 12

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION .............................................................................................................. 13

2.2 INDIGENOUS VEGETABLES, A SOUTH AFRICAN CONTEXT ......................... 14

   2.2.1 Indigenous vegetables in South Africa .............................................................. 14

   2.2.2 Awareness of indigenous vegetables ................................................................. 15

   2.2.3 Gender roles and indigenous agriculture .......................................................... 17

   2.2.4 The role of women in indigenous knowledge systems ........................................ 18

   2.2.5 Research interest on indigenous vegetables ......................................................... 19

   2.2.6 Risk considerations with regards to the consumption of ivS ....................... 19

   2.2.7 Food Preparation methods .................................................................................. 20

2.3 INDIGENOUS VEGETABLES IN THE COMMUNITIES OF KZN ......................... 22

   2.3.1 Popularity of indigenous vegetables in northern KZN ...................................... 23
<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.3.2</td>
<td>The commercialisation of indigenous vegetables</td>
<td>25</td>
</tr>
<tr>
<td>2.3.3</td>
<td>Vegetable production Constraints in the northern KZN</td>
<td>25</td>
</tr>
<tr>
<td>2.3.4</td>
<td>Smallholder farming support</td>
<td>26</td>
</tr>
<tr>
<td>2.4</td>
<td>SOCIO-ECONOMIC IMPORTANCE OF INDIGENOUS VEGETABLES</td>
<td>27</td>
</tr>
<tr>
<td>2.4.1</td>
<td>Non-timber forest products (NTFPs) on food security</td>
<td>27</td>
</tr>
<tr>
<td>2.4.2</td>
<td>Economic role of NTFPs</td>
<td>29</td>
</tr>
<tr>
<td>2.4.3</td>
<td>Threats associated with indigenous vegetables</td>
<td>30</td>
</tr>
<tr>
<td>2.5</td>
<td>THE CULTURE OF NORTHERN KWAZULU-NATAL COMMUNITIES</td>
<td>33</td>
</tr>
<tr>
<td>2.5.1</td>
<td>Community dynamics</td>
<td>33</td>
</tr>
<tr>
<td>2.5.2</td>
<td>Classification of indigenous vegetables</td>
<td>34</td>
</tr>
<tr>
<td>2.5.3</td>
<td>Status of indigenous vegetables</td>
<td>35</td>
</tr>
<tr>
<td>2.6</td>
<td>USES OF INDIGENOUS VEGETABLES</td>
<td>36</td>
</tr>
<tr>
<td>2.6.1</td>
<td>Medicinal Uses</td>
<td>36</td>
</tr>
<tr>
<td>2.6.2</td>
<td>Food security</td>
<td>38</td>
</tr>
<tr>
<td>2.6.3</td>
<td>Household Consumption</td>
<td>40</td>
</tr>
</tbody>
</table>

CHAPTER 3

RESEARCH METHODOLOGY

3.1 INTRODUCTION | 42
3.2 SELECTION OF SUITABLE RESEARCH METHODOLOGY | 43
3.3 METHODOLOGICAL TRIANGULATION | 44
3.3.1 Advantages of Methodological Triangulation .......................................44
3.3.2 Disadvantages of Methodological Triangulation ..................................46

3.4 RESEARCH DESIGN ..................................................................................46
3.4.1 Quantitative approach .......................................................................46
3.4.2 Qualitative approach .........................................................................47

3.5 STUDY POPULATION AND SAMPLE ......................................................49

3.6 SAMPLING PROCEDURE .........................................................................50

3.7 IDENTIFICATION OF THE TARGET POPULATION ...................................51

3.8 SOCIO-ECONOMIC DESCRIPTION OF THE STUDY AREA ......................51

3.9 GEOGRAPHICAL INFORMATION OF THE STUDY AREA .........................54

3.10 ANTICIPATED CHALLENGES AND MITIGATION METHODS ................54

3.11 THE PILOT STUDY ..............................................................................55

3.12 RESEARCH SCHEDULE ........................................................................56

3.13 DATA COLLECTION PROCESS ................................................................56

3.14 RESEARCH INSTRUMENT .....................................................................57

3.15 SURVEY DESIGN ..................................................................................58

3.16 INTERVIEWS .........................................................................................59
3.16.1 Length of interviews .........................................................................59

3.17 QUESTIONNAIRE ................................................................................60
3.17.1 Questionnaire format ........................................................................61

3.18 DATA ANALYSIS ..................................................................................62
CHAPTER 4
RESEARCH FINDINGS

4.1 INTRODUCTION ........................................................................................................... 67

4.2 SOCIO-DEMOGRAPHIC ANALYSIS ............................................................................. 68

4.2.1 Gender ....................................................................................................................... 68

4.2.2 Variation in age ......................................................................................................... 69

4.2.3 Origin and period of residence in the Ntuze community ........................................... 70

4.2.4 Marital status .......................................................................................................... 71

4.2.5 Educational level ..................................................................................................... 71

4.2.6 Employment ............................................................................................................ 72

4.2.7 Government monetary support ............................................................................... 73

4.2.8 Agricultural revenue ............................................................................................... 74

4.2.9 Land tenure ............................................................................................................ 75

4.3 FARMING OF ALIEN VEGETABLES IN THE NTUZE COMMUNITY ....................... 76

4.4 THE ROLE AND FARMING OF INDIGENOUS VEGETABLES .................................. 77

4.4.1 Vegetables grown in the Ntuze community .............................................................. 78

4.4.2 Cultivation status of alien vegetables and morphological parts ......................... 79
4.4.3 Growth habit and cultivation status of indigenous vegetables ...........81
4.4.4 Vegetables of preference and funding support ................................82
4.4.5 Reason(s) for preference .................................................................82
4.4.6 Farming inputs of the Ntuze smallholder farmers .........................83

4.5 COMMUNITY USES SURROUNDING INDIGENOUS VEGETABLES ..........84
4.5.1 Agricultural inputs used on vegetables ...........................................84
4.5.2 Vegetables of convenience ............................................................85
4.5.3 Reason for the purchase of indigenous vegetables .........................85
4.5.4 Trading of indigenous vegetables ..................................................86
4.5.5 Indigenous medicinal use ...............................................................86
4.5.6 Indigenous vegetable yields ............................................................87
4.5.7 Indigenous vegetable mode of preparation .....................................88
4.5.8 Most preferred indigenous vegetables ...........................................92
4.5.9 Farming support ............................................................................93
4.5.10 Indigenous vegetable cultivation ..................................................94
4.5.11 Source of knowledge ...................................................................95
4.5.12 Extension services .......................................................................95

4.6 RELATIONSHIPS BETWEEN VARIABLES ........................................96
4.6.1 Climatic conditions and species of preference ...............................96
4.6.2 Income generated through agricultural production and trade ........96
4.6.3 Farm activity support and trade of indigenous vegetables .............96
CHAPTER 4

4.6.4 Indigenous vegetables used for medicinal value and employment ...96
4.6.5 Land size and sugarcane .................................................................97
4.6.6 Sugarcane and income generated through agricultural production...97
4.6.7 Species of preference and cultivation period .................................97
4.6.8 Species of preference and farming inputs .......................................97
4.6.9 Indigenous vegetable yields and extension services ......................98
4.6.10 Indigenous vegetables and climatic conditions .........................98

4.7 MAIN CHALLENGES EXPERIENCED IN THE CULTIVATION OF IVs ..........99

4.8 AGRICULTURAL EXTENSION SERVICES .............................................101

4.9 INDIGENOUS VEGETABLES USED FOR PERCEIVED MEDICINAL VALUE.......104

4.10 OTHER SOURCES OF INCOME ...............................................................107

CHAPTER 5

DISCUSSION, CONCLUSION AND RECOMMENDATIONS

5.1 INTRODUCTION .........................................................................................110

5.2 FARMERS’ KNOWLEDGE AND USE OF INDIGENOUS VEGETABLES ........111

5.2.1 Dominant indigenous vegetables .....................................................111

5.2.2 Effect of gender and age on the knowledge of and preference .........114

5.2.3 Convenience .....................................................................................116

5.2.4 Perceived medicinal and health benefits .........................................119

5.3 THE CONTRIBUTION OF IVs TO FOOD SECURITY .............................120
5.3.1 The Ntuze smallholder farm households’ food security status ..........120
5.3.2 Access to indigenous vegetables ........................................123
5.3.3 Availability of indigenous vegetables ..................................123
5.3.4 Effect of climate on access and availability of indigenous veg ....124
5.3.5 Utilization and stability ....................................................124

5.4 UTILISED AND UNUTILISED FUNCTIONS OF INDIGENOUS VEGETABLES IN
SMALLHOLDER AGRICULTURE .................................................127
5.4.1 Resilient household farms ..................................................127
5.4.2 Livelihood vulnerability .....................................................128
5.4.3 Unutilised functions of indigenous vegetables Ntuze ..............128

5.5 INTERSECTION OF QUALITATIVE AND QUANTITATIVE PARADIGMS ....130
5.6 CONCLUSIVE SUMMARY ........................................................133
5.7 COMMUNITY FEEDBACK .......................................................134
5.8 RECOMMENDATIONS ............................................................135

REFERENCES .............................................................................137

LIST OF ANNEXURES

Appendix A: Researcher’s Food security casual loop diagram .............154
Appendix B: King Cetshwayo District Municipality Map .......................159
Appendix C: Ethics Approval ................................................................156
Appendix D: Declaration and Checklist for Independent Contractor .......157
LIST OF FIGURES

Figure 3.1: Basic triangulation model ................................................................. 44

Figure 3.3: Map of the Ntuze smallholder community ........................................ 53

Figure 4.1: Distribution according to period of residence ..................................... 70

Figure 4.2: Distribution according to marital status ............................................ 71

Figure 4.3: Employment history ........................................................................... 72

Figure 4.4: Employment history ........................................................................... 73

Figure 4.5: Income generated through agricultural production ............................. 74

Figure 4.6: Distribution according to land ownership ........................................... 75

Figure 4.7: Frequency of alien species grown in the household ............................. 78

Figure 4.8: Indigenous vegetables grown in the Ntuze community ..................... 79

Figure 4.9: Distribution according to vegetable preference ................................. 82

Figure 4.10: Distribution according to farming equipment ................................... 83

Figure 4.11: Distribution according to farming inputs ......................................... 84

Figure 4.12: Reason for purchasing indigenous vegetables .................................. 85

Figure 4.13: Indigenous vegetable cooking methods ............................................ 88

Figure 4.14: Preservation of indigenous vegetables used in Ntuze ....................... 89

Figure 4.15: Indigenous vegetable cultivation period ......................................... 94
LIST OF TABLES

Table 1.1: Typology of smallholder farmers ................................................................. 9

Table 2.1: Some of the popular Indigenous food crops grown in South Africa........ 24

Table 3.1: Level of education in the northern KZN district municipalities ............ 52

Table 4.1: Distribution of respondents by gender......................................................... 68

Table 4.2: Farmers’ age distribution .............................................................................. 69

Table 4.3: Distribution according to educational level .................................................. 72

Table 4.4: Codes of alien vegetables (AVs) of different species utilised in Ntuze .... 76

Table 4.5: Codes of indigenous vegetables (IVs) of different species utilised......... 77

Table 4.6: Alien vegetable distribution according to family, and parts used .......... 80

Table 4.7: Indigenous vegetable distribution according to parts used ..................... 81

Table 4.8: Indigenous vegetables utilised for indigenous medicinal value .......... 86

Table 4.9: Indigenous vegetable yield (range of use) and harvest frequency ........ 87

Table 4.10: Distribution by method of cooking indigenous vegetables ................. 91

Table 4.11: Distribution by method of preservation of indigenous vegetables....... 92

Table 4.12: Indigenous vegetables of preference ......................................................... 93

Table 4.12: Relationship between the farming inputs and species of preference..... 98
**ACRONYMS AND ABBREVIATIONS**

<table>
<thead>
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<tbody>
<tr>
<td>AVs</td>
<td>Alien Vegetables</td>
</tr>
<tr>
<td>ALVs</td>
<td>African Leafy Vegetables</td>
</tr>
<tr>
<td>FAO</td>
<td>Food and Agriculture Organization</td>
</tr>
<tr>
<td>IVs</td>
<td>Indigenous Vegetables</td>
</tr>
<tr>
<td>IRD</td>
<td>Integrated Rural Development</td>
</tr>
<tr>
<td>NTFPs</td>
<td>Non-Timber Forest Products</td>
</tr>
<tr>
<td>SONA</td>
<td>State of the Nation Address</td>
</tr>
<tr>
<td>SSA</td>
<td>Statistics South Africa</td>
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This research project has allocated codes to the various indigenous vegetables for the convenience of the reader.

<table>
<thead>
<tr>
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<td>Indigenous vegetable – Amadumbe</td>
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<td>IV – IMB</td>
<td>Indigenous vegetable – Imbumba</td>
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<tr>
<td>IV – IMBY</td>
<td>Indigenous vegetable – Imbuya</td>
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<td>IV – INTS</td>
<td>Indigenous vegetable – Intshungu</td>
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<tr>
<td>IV – MBK</td>
<td>Indigenous vegetable – Imbilikicane</td>
</tr>
<tr>
<td>IV – MDB</td>
<td>Indigenous vegetable – Umdumbulu</td>
</tr>
<tr>
<td>IV – UBH</td>
<td>Indigenous vegetable – Ubhatata</td>
</tr>
<tr>
<td>IV – UMS</td>
<td>Indigenous vegetable – Umsobo</td>
</tr>
<tr>
<td>IV – UQ</td>
<td>Indigenous vegetable – Uqadolo</td>
</tr>
<tr>
<td>IV – ZD</td>
<td>Indigenous vegetable – Izindlubu</td>
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DEFINITION OF TERMS

Food security

The term “security” generally refers to the quality of being secure and free from any form of threats. Food security thus refers to a situation that exists when all people have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy lifestyle (FAO, 1996).

Indigenous vegetables

The Department of Agriculture, Forestry and Fisheries (DAFF) defines indigenous vegetables as those crops which are native and unique to a specific area (DAFF, 2013:1). These vegetables are usually home-grown and produced through traditional production practices. They are not produced commercially but are consumed by certain groups in a specific area.

Smallholder farmers

Although there is no universally accepted definition for the term “smallholder farmers”, Lewu and Assefa (2009:1149) define smallholder farmers as those farmers that occupy pieces of farming land ranging from 0.2 to 0.9 hectares. In the context of this study, a smallholder farmer refers to a person who operates a vegetable garden which is less than one hectare. According to Vignola, Martinez, Solis, Avelino, Rapidel, Donatti, and Harvey (2015:127) and Binns, Englehart, Jackson, and Vestal (1996), smallholder farmers are vulnerable in the extreme to climate change because the intensity of extreme weather events directly affect crop productivity, household food security, income and well-being.
Often these farmers rely on family labour and are dependent on their farms as the primary source for food security and income-generation (Vignola et al., 2015:127).

**Socio-economic status**

Socio-economic status is generally understood as the social standing of an individual class or group. It is often measured as a composite of education, income and occupation. The American Psychological Association (APA) dictionary of psychology (2007) defines the term socio-economic status as the position of an individual or group on the socio-economic scale which is formed by a combination or interaction of social and economic factors, such as level of income and type of education, prestige and education, place of residence, and in some societies even ethnic origin and religious background.
CHAPTER 1

INTRODUCTION AND ORIENTATION OF RESEARCH

1.1 BACKGROUND AND RATIONALE

1.1.1 Background

South Africa is regarded as a food-sufficient country (FAO, 1996), with the ability to increase its food-trade (Ramaila, Mahlangu & Toit, 2011:24). In 2005, the country ranked 39th worldwide on the strength of its imports and exports and accounted for 0.5% for both world exports as well as world imports (Daya, n.d.). However: within the country, there is still a high prevalence of malnutrition – and, most specifically, micronutrient deficiencies, which is a phenomenon described as “hidden hunger” among the low- or marginal-income bracket of the population (Lewu & Mavengahama, 2010:3044). According to Hart (2009:365), although South Africa may be counted among food-secure countries in Africa, it still experiences food insecurity at household level. This socio-economic challenge calls for a strategy that is not only limited to the increase of production in the commercial agricultural sector, but an integrated approach which addresses all aspects of food security – with specific attention given to the promotion of integrated rural development (IRD) and the implementation of support programmes for smallholder farmers (Van Zyl & Kirsten, 1992:181). The IRD strategy highlights a need for South Africa not only to aim at achieving food security in certain poverty-stricken regions of the country, but at both national and household levels, and is also recognised as one of the strategies to enhance community well-being.
In most instances, populations that mostly face the food security challenge live in areas that are rich in highly nutritious wild vegetables which provide abundant nutrients, and which are also believed to be of medicinal value (Lewu & Mavengahama, 2010:3044). In South Africa, as in every other country across the globe, everyone has a right to food. This right to food guarantees freedom from hunger and access to safe and nutritious food. Contrary to this, as in many other countries, the country faces food insecurity and poverty.

The food insecurity predicament tends to be a challenge among the majority of communities residing in South African rural households by virtue of the fact that they usually lack farming resources, they lack sufficient financial input and support from extension agencies, which result in a low-yield response (Lewu & Assefa, 2009:1148). These challenges require improved crop production strategies which could be achieved through high levels of expertise from both farmers and extension officers in order to be implemented effectively (Van den Berg, 2013:4491).

The western tradition has influenced African people’s food preference and pattern of consumption, but indigenous vegetables are still common in resource-poor communities throughout the developing world, including South Africa (Ntuli, Zobolo, Siebert & Madakadze, 2012:6027). However, the utilization of indigenous vegetables is decreasing due to a number of factors (Mnguni & Giampiccoli, 2015:24), such as the decline in production as well and utilisation due to overreliance on alien species (Lewu & Mavengahama, 2010:3044). Nonetheless, a study in Zimbabwe by Maroyi (2011:5726) found traditional vegetables to be an important source in support of livelihoods – with some families harvesting them for sale.
1.1.2 Rationale

In South Africa, communities that are affected by poverty and under-nutrition frequently reside in areas that are rich in agricultural biodiversity, including indigenous vegetables that are native to the African continent (Van den Heever, 1997; Mavengahama, 2013). These vegetables make a positive contribution among resilient smallholder farmers due to their contribution toward sustainable livelihoods. Among other uses, indigenous vegetables can be used for income-generation, consumption and medicinal benefits. They also can withstand harsh environmental conditions (Mavengahama, 2013). Recent extreme temperatures and low rainfall, which have resulted in severe drought in South Africa and left farmers with losses due to water shortages, serve as evidence that much research needs to be done as a means of addressing food security at national level, particularly among disadvantaged communities.

The Eastern Cape Province is known for being an underdeveloped province with a standard of living of the majority of its population falling under the poverty line. Statistics South Africa (SSA) describes the term “poverty line” as a minimum threshold required by every household to meet basic needs and which is usually expressed in monetary terms (SSA, 2014). A comparable population profile would apply to KwaZulu-Natal as a province as it is home to many rural poor. These circumstances could potentially be due to a number of factors which may include the triple challenges that South Africa currently faces (poverty, unemployment and inequality) as conceded by the then president of the country, who highlighted that “South Africa still faces the triple challenge of poverty, inequality and unemployment” (SONA, 2014).
The northern KZN region is comprised of four predominantly rural districts namely; King Cetshwayo, Umkhanyakude, Zululand and Umzimkhulu municipalities. Despite some infrastructural developments in this sub-region of the province, rural communities still suffer from poverty, including food insecurity. According to Lewu and Mavengahama (2010:3045), poverty in the northern KZN is higher in rural areas (78.2%) than in urban areas (28.9%). As a livelihood strategy, rural communities of the northern KZN region have resorted to the production and utilisation of indigenous vegetables for survival. The reason for this is because of the food source convenience that indigenous vegetables provide the rural farmers with (Ntuli et al., 2012, Mavengahama, 2013)

It is thus imperative that smallholder farmers’ perceptions are explored to establish the value of their indigenous knowledge (IK) towards resilience and food security. This study therefore aims to promote sustainable agricultural production and appropriate use of indigenous vegetables as a means of contributing to the improvement of the livelihoods of smallholder farmers. The study will also contribute to the understanding of the socio-economic importance of indigenous vegetables among the rural smallholder farming sector of northern KwaZulu-Natal – particularly in the Ntuze community.
1.2 PROBLEM STATEMENT

Most South African rural communities rely on farming for livelihood. However, hunger, malnutrition and rural poverty are some of the current challenges facing previously disadvantaged communities in South Africa (Pauw, 2005).

Many households in the rural parts of South Africa are affected by food insecurity and poor nutrition. According to Lewu and Mavengahama (2010:3045), many studies have been conducted on wild vegetables – but as yet much remains unknown and unexplored. In most instances, indigenous vegetable production is still practised by the marginal population. According to Garutsa and Nekhwevha (2016:12), one of the reasons for this is due to the nature of varying climatic conditions and poor access to agricultural resources. Legwaila, Mojeremane, Madisa, Mmolotsi, and Rampart (2011:172) state that indigenous vegetables contribute to food security and provide dietary supplements for the rural poor. However, little is known about the uses of indigenous vegetables in the Ntuze community. Therefore, the main research question of the study was:

**What is the socio-economic importance of indigenous vegetables in the Ntuze smallholder farming community?**

1.3 STUDY AIM

The study sought to investigate the role played by indigenous vegetables in meeting the socio-economic needs and the development of sustainable livelihoods, particularly for small-scale indigenously-based agriculture in the Ntuze community. It also aimed to contribute to the body of scientific knowledge towards the alleviation of rural poverty and subsistence farming through promoting cultivation of indigenous crops.
1.4 RESEARCH QUESTIONS

The research questions were:

a. What are the farmer’s perceptions and knowledge of indigenous vegetables?

b. How and what do indigenous vegetables contribute to food security?

c. Do indigenous vegetables have potential for increased utilisation in the South African smallholder agriculture sector?

1.5 OBJECTIVES

The specific objectives of the study were:

i. To examine the farmer’s knowledge and use of indigenous vegetables.

ii. To investigate how indigenous vegetables contribute to food security.

iii. To identify utilised and unutilised functions of indigenous vegetables in smallholder agriculture.

1.6 DELIMITATION OF THE STUDY

The South African agricultural sector is dualistic and includes a highly capitalised commercial sector – with approximately 35 000 white farmers producing about 95% of the country’s agricultural output on 87% of total agricultural land (Cousins, 2009:7). On the contrary, around 4 million black farmers are smallholders and practise their agricultural activities in the former homeland areas on 13% of the total area of South African land (Pienaar & Traub, 2015).
In the interest of this study, the term “smallholder farmers” refers to those farmers that own small plots of land for agricultural production of less than a hectare and whose agriculture contributes only to a part of household income, as in the case of subsistence farming. Cousins (2010:7) asserts that smallholder farmers are also categorised as the “rural poor”. This study was confined to the smallholder farmers under the King Cetshwayo District Municipality of KwaZulu-Natal. These farmers conduct their cultivation practices – and hence their utilisation and experiences – of indigenous vegetables on smallholder communal land with a size between 0.1 to 1.0 hectare, as permitted to occupy by the traditional authorities.

The focus area for the study was the Ntuze rural community, situated on the outskirts of Richards Bay, in the north of KwaZulu-Natal. Smallholder farmers in the Ntuze community rely almost exclusively on subsistence farming – with much of their produce being indigenous vegetables. Much of these indigenous vegetables are used for household consumption and as a source of income, while some are used for their medicinal value. The study comprised 40 smallholder participants (households) who met the criteria discussed below.

1.6.1 Geographic demarcation

The research study was delimited to the Ntuze rural farming community, located in the northern region of KZN at 28°52‘03.82”S and 31°44’22.48E, in the King Cetshwayo District.
1.6.2 Participants (Smallholder Farmers)

This study focused only on subsistence-oriented and market-oriented smallholders in loose value chains – whose production objective is mainly household consumption and minimal cash income, as asserted by Manderson (2015:7). The majority of the farmers in the Ntuze farming community are black South Africans and are Zulu-speaking. The participants were limited to smallholder indigenous vegetable farmers from the age of 20 and above. All the participants in the study reside within the parameters of the Ntuze community, and the sample that was used consisted of participants that were actively involved in the utilisation of indigenous vegetables. The size of land which was used for indigenous vegetable farming was not greater than a hectare.
Table 1.1: Typology of smallholder farmers

<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>Household consumption</td>
<td>household consumption</td>
<td>household consumption + cash income</td>
<td>cash income + some home consumption</td>
<td>profit</td>
</tr>
<tr>
<td>Proportion of marketed output</td>
<td>none or insignificant</td>
<td>50% or &gt;</td>
<td>75% or &gt;</td>
<td>100%</td>
</tr>
<tr>
<td>Contribution to household income</td>
<td>reduces expenditure on food</td>
<td>variable – from small to significant</td>
<td>significant</td>
<td>very significant</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>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 South Africa</td>
<td>2-2.5 million</td>
<td>200-250 000</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Source: Manderson (2015:7)

1.6.3 Household Profile

This research area was Ntuze, which is home to a disadvantaged community located on the outskirts of Richards Bay, in northern KwaZulu-Natal. The community comprises households whose source of food is mainly attributed to agricultural production. The area is dominated by Zulu-speaking people whose governance is strongly influenced by patriarchal tribal monarchs.
The inhabitants still suffer from the ubiquitous challenges faced by rural communities in most other parts of the country, such as unemployment and poverty. There is no infrastructural development and the gravel roads serving the area are only graded thrice per annum on average. There are also a limited number of schools with dwindling resources. In some parts of the community, the residents rely on storage tanks for water, which are filled by municipal water trucks at least once or twice every month. One of the growing challenges facing the Ntuze community is that of increased birth rates among young pupils, who, in some cases, have to drop out of school due to parenting. Although some individuals comprehend the importance of education, young males tend to drop school after their primary education in search of employment in local firms and industries. This dropout rate could be attributed to the reason that most of the households are headed by unemployed and powerless elderly people, who are subject to chronic conditions such as high blood pressure and diabetes. The community relies on agriculture as a livelihood strategy but still faces the challenge of a socio-economic decline.

1.7 RESEARCH DESIGN: TRIANGULATION APPROACH

The study employed a triangulation approach wherein an integration of qualitative and quantitative paradigms was used. The rationale behind the concurrent use of mixed methods was to minimize bias by means of data validation through cross-verification. According to Hussein (2009:8), the triangulation approach best suits areas of information and phenomena which have never been explored. It also enables the researcher to interpret findings which are valid and accurate (Halcomb & Andrew, 2005:72).
Using triangulation, the researcher sought to explore the link between the use of indigenous vegetables and the socio-economic status of the Ntuze community. As a means of ensuring the validity of the study, the research consisted of a literature study, participant engagement, a preliminary study and survey questionnaires. The Statistica analysis software package (StatSoft) was employed for the statistical analysis of data. In this, the Pearson Chi-square test was used at a significance level of $P=0.05$ as a means of determining the correlation of relationships between variables.
1.8 DISSECTATION OUTLINE

This dissertation follows a publication format, which includes a specific content, such as materials and methods, the outcomes, as well as the discussion and reference sections. The overall research project is comprised of five chapters:

**Chapter 1**: The introductory chapter provides an overview of the overall research project, highlighting the fundamental drivers of the study. These aspects include the main research question, the problem statement, the research design and delimitations, as well as the rationale for the study.

**Chapter 2**: This chapter reviews literature that is relevant to the broad objective of the study. It provides insight into what previous researchers have found in association with indigenous vegetables.

**Chapter 3**: The research methods applied in the study are presented in this chapter, as is justified for the type of mixed methods approach adopted.

**Chapter 4**: The results of the primary, empirical data collected from the Ntuze community are presented in this chapter.

**Chapter 5**: The concluding chapter presents the general discussion, conclusion and recommendations.
CHAPTER 2
LITERATURE REVIEW

2.1 INTRODUCTION

This chapter serves as a narrative to the study and explores previous research and literature that is appropriate to this study. It comprises the current knowledge as well as substantive findings and theoretical contributions to the role played by indigenous vegetables in the lives of smallholder farmers. Several themes form part of this discussion, including indigenous vegetables, rural agriculture, food security, smallholder farmers’ perceptions on indigenous vegetables and the KwaZulu-Natal community demographics.
2.2 INDIGENOUS VEGETABLES, A SOUTH AFRICAN CONTEXT

2.2.1 Indigenous vegetables in South Africa

Throughout the African continent, the use of indigenous (leafy) vegetables plays an important role in both the agricultural domain, within the farming systems and also within households through consumption (Jansen van Rensburg, Venter, Netshiluvhi, Heever, Vorster & De Ronde, 2004:52). This is due to various benefits that indigenous vegetables offer which are consumed by people in many parts of the world to enhance nutrient and vitamin intake – as they have been proven to be highly nutritious, containing a number of macro and micronutrients which among others include vitamins A and C, as well as Iron and Calcium minerals (Jansen van Rensburg et al., 2004; van den Hoeven, Osei, Greef, Kruger, Faber & Smuts, 2013).

In South Africa, the majority of rural households are still deprived of poverty and social exclusion as a result of their inability to afford some of the living necessities hence the weak socio-economic status (Modi, 2015:947). Some of these indigenous plants, as asserted by Street and Prinsloo (2013:1) are of medicinal value and have been used by generations of people from different cultures for primary health care needs. This use of indigenous plants for medicinal purposes is a cost-effective alternative for an economically challenged society. It also helps with the use money that could be used on modern first aid assistance for attaining other basic needs, including food and clothes. According to Jansen van Rensburg et al. (2004:52), many indigenous vegetable plants, more especially vegetables in which the edible parts are leaves, normally grow voluntarily in the wild or as competitors of the cultivated plants (weeds).
Indigenous vegetables are conveniently suitable for cultivation in marginalised areas as they do not require many inputs when domesticated (Jansen van Rensburg et al. 2004:52), and they also have the ability to thrive in areas where the production of alien vegetables may be a challenge. However, one of the challenges associated with naturally occurring indigenous vegetables is that rural farmers cannot predict the availability of these vegetables as they do not have control over their production (Mavengahama, McLachlan & Clerq, 2013:231). While it may be believed that some of these indigenous plants (Amaranthus and Bidens pilosa) may be occurring naturally, Jansen van Rensburg, Van Averbeke, and Slabbert (2012) have proven that Amaranthus can be grown for subsistence purposes. If this notion was well articulated and promoted throughout the country, specifically in rural communities where the utilization of wild vegetables is mostly practiced; the fear of these vegetables being extinct would be avoided as the primary users would cultivate and preserve them (Kwapata & Maliro 1995; Odhav, Beekrum, Akula & Baijnath, 2007).

2.2.2 Awareness of indigenous vegetables

The Department of Agriculture, Forestry and Fisheries (DAFF, 2013) defines indigenous food crops as those crops that originate within South Africa of which some of them were introduced to the country and are now recognised as naturalised and/or traditional crops (e.g. Ipomea batatas) due to their adaptability to local conditions and production methods. These traditional crops are usually consumed by both urbanised and indigenous communities through custom, habit, or tradition (Ntuli et al., 2012:6027).
In agreement with the DAFF, indigenous food crops may not entirely be indigenous to a country, but could be associated with traditional production systems, local knowledge and have a long history of local selection and usage (Keller, Mndiga & Maass, 2004). Several researchers argue that there is a need for government and relevant non-government organisations (NGO’s) to intervene on investing in education and research as a means of ensuring that wild vegetables do not result in the anticipation of being extinct as they contribute to food security and provide a source of income for some households. In some instances, indigenous vegetables play an important role in the enhancement of primary health (Lewu & Mavenghama, 2010; Mnguni & Giampiccoli 2015; Nesamvuni, Steyn & Potgieter, 2001; Shackleton & Shackleton 2004; Van den Berg 2013). In support of this, Jansen van Rensburg et al. (2004:53) stressed that most of these indigenous species which are harvested from the veld have the potential for cultivation; however an emphasis of research on cultivation practices is still needed.

Some indigenous crops are the African leafy vegetables (ALVs) which have been described as those vegetables that are indigenous to Africa and whose shoots, leaves and flowers are mostly consumed (Schippers, 2000; n.p). Of these leafy vegetables are the non-timber forest products (NTFPs), which according to Shackleton and Shackleton (2004:658), are the most commonly used forest products in the daily lives of rural South Africans in more than 85% households. Most of these NTFPs occur naturally and are often referred to as wild vegetables. In the context of this study; indigenous vegetables refer to those plants that are semi-cultivated, cultivated, or grow naturally in the wild and are used for household consumption either as a snack, relish, and source of income or for medicinal purposes.
These may be leafy vegetables (*Amaranthus*), root crops (*Ipomea batatas*), tubers (*Colosacia esculenta*) or seed crops (*Vigna subterranea*). In the larger sub-Saharan Africa, the use of indigenous vegetables has been observed to be of great importance; however, Jansen van Rensburg *et al.* (2004:52) argue that due to stereotypical beliefs such as their association with poor women, indigenous vegetables have resulted in inadequate research and development. This gender-related challenge contributes to the setback of agricultural production and development as some of the communities are mostly dominated by female farmers who are bread winners in the households in the absence of their husbands which may be due to mortality or other peculiar reasons (Modi, Modi & Hendriks, 2006:4).

### 2.2.3 Gender roles and indigenous agriculture

In most rural households the primary role of women in agriculture is to assist with the harvesting and preparation of the produce, it is only their male counterparts that dominate the agricultural sector and who are actively involved in the farming practices (Oladele, 2011:3). However, in South Africa – particularly in KwaZulu-Natal, women are the main practitioners of vegetable production (Modi *et al.*, 2006:4). Of similar opinion, Jansen van Rensburg *et al.* (2004:52) argue that women do not only constitute as consumers and sellers of indigenous vegetables but are also the primary producers. Contrary to this; research focused on farmers knowledge in the cropping systems of northern KwaZulu-Natal, reports that men constitute a greater portion of farmers (Lewu & Assefa, 2009:1149). This then challenges the gender biases which may be a cause of underdevelopment in communities dominated by women farmers resulting from stereotypical beliefs.
2.2.4 The role of women in indigenous knowledge systems body of knowledge

Indigenous knowledge interest has been lost due to the association of indigenous vegetables with women. This leads to the underuse of indigenous vegetables; resulting to their potential value not being fully identified (Jansen van Rensburg et al., 2004:52). Several researchers have conducted baseline studies in some of the rural communities in relation to indigenous vegetables and highlighted the rich indigenous knowledge that is possessed by rural women (Afolayan & Jimoh, 2009; Allemann, Laurie, Thiart & Voster., 2004; Bvenura & Afolayan, 2015; Dovie, Witwowski & Shackleton, 2003; Jansen van Rensburg et al., 2004; Lewu & Assefa, 2009; Mavengahama et al. 2013; Njume, Goduka & George, 2014; Shackleton, 2003; Street & Prinsloo, 2013; Van den Beg, 2013; van der Hoeven et al., 2013; van Niekerk & Viljoen, 2008.), of which some have placed their focus on the northern regions of KwaZulu-Natal (Lewu & Assefa, 2009; Lewu & Mavengahama, 2010; Modi, 2015; Ntuli et al., 2012). These studies contribute to the information gaps and information that may be essential to upcoming scholars and researchers as they form part of fundamental literature through which new knowledge on indigenous vegetables can be built upon.
2.2.5 Research interest on indigenous vegetables

According to Lewu and Mavengahama (2010:3046), in as much as there may be numerous studies that have been conducted on indigenous vegetables in marginalised communities, most of these studies are not aimed at enhancing communities in terms of developing their indigenous farming systems and coordinate efforts to domesticate and commercialise indigenous vegetables but are rather only based on the fulfilment of the researchers interests. Modi (2015:947) confirmed that in the rural communities, development projects with the potential to be a success are often introduced but result in failure due to the reason that traditional knowledge is often ignored while the focus is on methodologies that have been proven successful in the developed world. However; with specific reference to the northern KwaZulu-Natal region, this seclusion may be a result of the lack of documented indigenous knowledge pertaining agricultural production systems (Lewu & Assefa, 2009:1149).

2.2.6 Risk considerations with regards to the consumption of indigenous vegetables

In South Africa, the value of woodland resources (wild, indigenous, domesticated and indigenised) is not well appreciated and the causal factor of this could potentially be that there are too many variables across various studies (Mnguni & Giampiccoli, 2015:28). Wild indigenous vegetables may not be well appreciated because they are sometimes associated with toxicity to human health which has led to the devaluation, lack of confidence, and decrease in the consumption of these vegetables (Orech, Akenga, Ochora, Friis & Aagaard-Hansen, 2005:4).
Shackleton (2003:25) highlights a need for concrete frameworks that focus on the development strategies of indigenous vegetables and in order to achieve this, a thorough understanding of this valuable vegetation is required to allow appropriate decision-making processes with regards to their allocation as well as their policy frameworks. The understanding of indigenous vegetables and well-established frameworks in the wide spectrum of their developmental strategies could potentially help in the livelihoods of rural smallholder farmers where their utilisation is greatly observed. Provided that there are well-established frameworks, there would be an appropriate establishment on the compensation of the scarce resources as their loss could be prevented in times of radical developmental transformation which may require the eradication of indigenous natural resources in pursuit of different developmental land use, such as improved agriculture, industries (Jansen van Rensburg et al., 2004:57).

2.2.7 Food Preparation methods

People prepare different foods in different ways. This includes indigenous vegetables which are prepared in different methods depending on the consumers’ preferences and cultural influence (Matenge, Van der Merwe, De Beer, Bosman & Kruger, 2012:2245). In many different parts of Africa, the preparation of these indigenous vegetables varies depending on the culture and type of plant species (Jansen van Rensburg et al. 2004:58). While previous research reports some indigenous foods (tubers) being mostly boiled as a preparation method (DAFF 2013), a study conducted by Matenge et al. (2012:2245) reports that some indigenous and traditional foods are prepared with potatoes and onions, salt and vegetable oil, groundnut powder, or just salt and vegetable oil.
According to Vorster, Jansen van Rensburg, van Zijl, and van den Heever (2002), the preparation of indigenous vegetables can vary from a few minutes up to two hours. In agreement with Matenge et al. (2012:2245), Vorster et al. (2002.) further assert that for most indigenous leafy vegetables (*morogo or imifino*), leaves are mixed into a relish which is often prepared by frying onions, together with tomatoes and minced peanuts or peanut butter to savour with stiff porridge. One of the advantages of these indigenous and traditionally grown vegetables is that the consumers who utilise them can actually prolong their shelf-life through partial cooking and drying (Jansen van Rensburg et al. 2004:58); this is usually done with an aim of ensuring that there is an ample supply of food for the winter periods.
2.3 INDIGENOUS VEGETABLES IN THE COMMUNITIES OF NORTHERN KWAZULU-NATAL

The main deprivations in which rural farmers are trapped in is that of poverty (refer to appendix A). Consequently, poverty has in the past led to the migration of men to from rural areas to cities, leaving their families behind, particularly those from Empangeni area in the northern region of KwaZulu-Natal (Gcabashe, 1995:30). Today this poverty has led to increased joblessness as well as high levels of crime in many increasing parts of the world. In rural areas, poverty is one of the major contributors to increased rural to urban migration, more especially among the youngsters whose belief is that rural areas and the culture that is followed in these areas is a drawback and denotes a poor living standard (Matenge et al. 2012; Njume et al., 2014). This attainment also includes the consumption of indigenous vegetables which is now perceived as either poor people’s food or famine food, more especially by the youth (Afolayan & Jimoh 2009; Ekesa, Walingo & Onyango, 2008; Maroyi 2011). Such a misconception indicates a challenge that South Africa is facing as its many provinces are suffering from high levels of poverty, more especially the northern rural areas of KwaZulu-Natal where the poverty rate in some communities is as high as 78.2% (Lewu & Mavengahama 2010:3045). However; provided that there is no stigma associated with indigenous vegetables, they could be a solution to addressing severe hunger through inclusion in the diets of people (Modi et al., 2016; Njume et al., 2014). Several studies on indigenous agriculture seem to be mostly focused on the production and use of leafy vegetables but there are also root and tuber crops which are also in the cluster of indigenous vegetables. These vegetables are very popular among developing communities and their utilisation is associated with those who are poor (Allemann et al., 2004:60).
2.3.1 Popularity of indigenous vegetables in northern KZN

In South Africa there are different types of vegetables, some of which are leafy vegetables, grains, and tubers (refer to table 2.1). In the northern KZN, indigenous tubers such as the Taro and Cassava have been reported to be some of the major produced tubers in the province, especially in rural communities (DAFF 2013; Ntuli et al. 2012). Of similar nature, one of the most popular consumed root crops worldwide is the sweet potato crop (*Ipomea batatas* L.) which also happens to be vastly popular in the KZN province.

Due to high temperatures in the KZN area, the province has been reported to be conducive to produce the sweet potato crop and this is proven by its dominance among the smallholder farmers’ fields (Motsa, Modi & Mabhaudhi, 2015:2). Some of the major concerns that have been raised by previous researchers are that not much information about indigenous produce is well documented and that the production methods as well as the nutritional content associated with indigenous plants is not well known (Lewu & Mavengahama, 2010:3045). This information gap is that which upcoming researchers could focus on as it could potentially contribute to the achievement of the first Millenium Development Goals (MDGs) which is aimed at addressing poverty worldwide (UNDP, 2015:4).
Table 2.1: Some of the most popular Indigenous food crops grown in South Africa (DAFF 2013; Ntuli et al. 2012)

<table>
<thead>
<tr>
<th>Grain Crops</th>
<th>Leafy Vegetables</th>
<th>Fruit Crops</th>
<th>Roots/Tuber Vegetables</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearl Millet (Pennisetum glaucum)</td>
<td>Amaranth (Amaranthus)</td>
<td>Marula (Sclerocaryacaffra)</td>
<td>Cassava (Manihot esculenta)</td>
</tr>
<tr>
<td>Grain sorghum (Sorghum bicolor)</td>
<td>Common Blackjack (Bidens Pilosa L.)</td>
<td>Red milkwood (Mimusops zeyheri)</td>
<td>Amadumbe (Colocasia esculenta)</td>
</tr>
<tr>
<td>Cowpea (Vigna unguiculata)</td>
<td>Cleome (Cleome gynandra)</td>
<td>Mobola plum (Parinari curatellifolia)</td>
<td>Sweet potato (Ipomoea batatas)</td>
</tr>
<tr>
<td>Bambara groundnuts (Vigna subterranean)</td>
<td>Jews Mallow (Corchorus olitorius L.)</td>
<td>Wild medlar (Vangueria infausta)</td>
<td>Imbumba esheshhayo (Vigna unguiculata L. Wlp.)</td>
</tr>
<tr>
<td>Mung bean (Vigna radiate)</td>
<td>iMbilikicane (Ipomea plebeia R.Br.)</td>
<td>Num-num (Carissa macrocarpa)</td>
<td></td>
</tr>
<tr>
<td>iziNdlobu (Vigna subterranea L. Verdc.*)</td>
<td>iKlabeklabe (Sonchus oleraceus L.*)</td>
<td>iNtshungu (Momordica balsamina L)</td>
<td></td>
</tr>
</tbody>
</table>
2.3.2 The commercialisation of indigenous vegetables

Wild indigenous vegetables that grow naturally (*Amaranthus, Bidens pilosa*) have been proven through nutritional evaluation to be of high nutrition in comparison to the popular alien species (*Brassica oleracea, Spinacia oleracea*) – (Modi *et al.*, 2006:9). They also play a major role in income generation and subsistence. One of the challenges that South Africa faces in the smallholder farming sector that produces indigenous crops is that they are confined within the subsistence scale and are rarely commercially marketed (Shackleton & Shackleton 2004:663). An example of this is that of Allemann *et al.* (2004:61) who are of opinion that the likes of cassava are mainly grown in South Africa as subsistence crops but are limited in their commercial usage.

2.3.3 Vegetable production Constraints in the northern KZN

Vegetable farming is generally associated with a number of challenges, with drought being one of the most common ones. Similarly, vegetable production in the cropping systems of the northern KwaZulu-Natal is associated with the following constraints as reported by Lewu and Assefa (2009:1150):

- Pest problems contributing to the hindrance of the maximum growth of crops.
- Although it is not as much of a constraint in comparison to that of pests, but water stress is one of the factors that is detrimental to the production.
- The lack of access to production inputs is one of the challenges that farmers face.
- Financial constraints
- Varying climatic conditions
- Labour issues and soil fertility
According to Hart, Vorster and Jansen van Rensburg (2009), the majority population of the Sub-Saharan Africa at large mainly depends on resource-poor agriculture without any use of the modern inputs and technologies to enhance their farming skills and maximise production. This is one of the constraints that could potentially be a major contributor to the imminent loss of indigenous vegetables among rural farming communities that depend on indigenous vegetables as part of their livelihood strategy.

2.3.4 Smallholder farming support

Despite the contribution of indigenous vegetables to the livelihoods of smallholder farmers in rural communities and their contribution to the gross domestic product (GDP) in developing countries at large, smallholder farmers are deprived of financial support (World-Bank, 2012). This financial deficit is a major challenge to marginalised rural farmers as they rely on these indigenous vegetables for food security. An example of this is that of the potato producers in Livingstone who protested that they were not provided with enough planting material and inputs in order to be able to keep up with their demand (Allemann et al., 2004:63).
2.4 SOCIO-ECONOMIC IMPORTANCE OF INDIGENOUS VEGETABLES

According to Adegboye (2016:2), the term ‘socio-economic status’ denotes an individuals’ position in a community with respect to their amount of cultural possession, effective income, material position, prestige as well as social participation. It is basically an individual's ranking and position in the society in which they live.

2.4.1 Non-timber forest products (NTFPs) on food security

About 85% of the South African rural households use NTFPs which include wild spinaches, fuel wood, wooden utensils, hand brushes, edible fruits as well as twig brushes (Shackleton & Shackleton, 2004:658). NTFPs are biological products that originate from the wild – which are harvested for both commercial and household use as a means of helping in the enhancement of livelihood security, particularly among rural dwellers. Of the same opinion; Hunter, Twine and Johnson (2008:4) reported that in relation to rural livelihoods; natural resources are usually extracted from both communal forests and rangelands around rural settlements which practically include the likes of wood as source of fuel, wild figs and other foods, medicinal plants, fiber, and wood for carving as well as construction material.

The harnessing of NTFPs could therefore be a potential solution to alleviating rural poverty and helping towards the socio-economic constraints that the marginalised communities in South African rural areas often face. This includes the Ntuze rural community in which this study is focused where some of the residents still make use of the indigenous NFTPs.
Although the utilization of NTFPs is believed to be of good nutritional value to many, particularly the disadvantaged, Orech et al. (2005:8) among many other researchers have reported that some NTFPs (traditional leafy vegetables) may contain a range of phytochemicals that could be lethal to humans. The utilisation of the non-timber forest products is highly essential among the livelihoods of the rural poor as they contribute towards their livelihood diversification (Shackleton & Shackleton 2004:663). The practice of utilising these products highlights the importance of NTFPs as they offer fundamental sources of food to the rural poor and to some extent, the medicinal benefits and other essentials exploited within the households.

Despite the richness brought about by the NTFPs, people do not utilise these products because of the interest and appreciation of their value – but rather because they are forced by circumstances (Shackleton & Shackleton, 2004:663). Such coercion may hypothetically result to the gradual deterioration of NTFPs soon as more people are migrating from rural households where NTFPs are paramount – to developed cities where even their remnants are barely witnessed. In the event where people harness and put into good use the NTFPs through trade, it is not often a matter of choice but rather of a livelihood strategy that is used in order to generate income and earn a living which may be a solution resulting from lack of alternative income-earning opportunities, retrenchment and need for cash income (Shackleton & Shackleton, 2004:663). This serves as confirmation that the use of these indigenous products is perceived as a setback and is associated with those of low economic status (Afolayan & Jimoh, 2009; Ekesa et al., 2008 and Maroyi, 2011).
2.4.2 Economic role of NTFPs

Although the use of non-forest timber products may be perceived to be in association with being of low socio-economic status, the contribution of NTFPs is of remarkable assistance. According to a study conducted by Dovie et al. (2003:355), it was discovered that in as much as smallholder cropping may be of benefit for consumption at household level through provision of food security, there is still lack of social, economic and market infrastructure to help in the generation of meaningful financial returns. On the contrary; Shackleton and Shackleton (2004:659) documented the utilization of NTFPs to be of benefit as they help in dire times of sudden changes in the economic, social or bio-physical environments in which households exist and function – more especially amongst rural households. The Department of Agriculture, Forestry and Fisheries reported that despite the nutritional value contained by indigenous vegetables, they have never been commercialised but have rather been traded informally within communities to help generate income for the farmers (DAFF 2013). Because of this, there has been a decline on the production and utilization of these indigenous vegetables (Lewu & Mavengahama 2010; Madisa & Tshamekang 1997). In light of this, there has been a stimulation of interest by the government and other stakeholders in attributing the value of indigenous vegetables to address food security which is one of the major challenges that South Africa is currently battling with (DAFF 2013). This initiative is a potential solution to the sustainability of indigenous vegetables in South Africa as has been recommended by previous researchers (Lewu & Assefa, 2009:1153).
Adebooye, Ajayi, Baidu-Forson and Opabode. (2005:1483) believe that in order to help effect the developments associated with the productivity of indigenous vegetables, there is a need to form a network between research-based institutes, public and private seed multiplication agencies as well as non-governmental organisations. Davis, Giuseppe and Zezza. (2017:3) believe that in the rural economic sector, agriculture is still the main source of livelihoods, regardless of the nature of the husbandry, whether of cultivating the land or raising stock. In agreement, Shackleton and Shackleton (2004:660) indicated that the provision brought about by the NTFPs among the rural poor is essential in that it helps to lessen enormous amounts of rands that the government would expend if the likes of food, shelter and medicine would solely have to be provided for at the governments’ expense.

2.4.3 Threats associated with indigenous vegetables

The following are some of the most escalating threats associated with indigenous vegetables which could be potential causes leading to the decline of indigenous vegetables, more especially those of the wild population:

- There is a rapid growth in the loss of interest in utilising indigenous vegetables among the young generation (Odhav et al., 2007:430).
- Currently, the utilization of indigenous vegetables, especially those growing in the wild is based on a zero-cultivation practice (Mavengahama et al., 2013:231).
- The consumers exploit these vegetables without taking any initiatives of reproducing them (Mavengahama et al., 2013:231).
Due to the notion that wild vegetables are weeds, much use of chemicals as methods of eradicating these vegetables contributes to their decline (Lewu & Afolayan 2009; Shackleton 2003).

Excessive cultivation of field crops has also contributed in the decline of indigenous vegetables and habitat exchange which includes deforestation (Kwapata & Maliro 1995:29).

The limited transfer of knowledge among generations resulting from the changing social systems contributes to the deterioration of indigenous knowledge (Hart et al., 2009).

Within rural households, through excessive harvesting and land transformation and other development practices; there could be a loss of NTFPs which could have severe consequences for poor societies (Shackleton & Shackleton 2004:663).

Because of these threats, South Africa still faces the challenge of unending rural poverty which has resulted in the escalation of urbanisation, lack of job opportunities as well as high levels of crime in the country (Jansen van Rensburg et al., 2004:58). Swanepoel and De Beer (2011:6) are of opinion that lack of assets are the major contributing factors that cause rural poverty and that in order for the poor to overcome these predicaments, the links of the poverty cycle and the deprivation trap (refer to Appendix A) ought to be broken through the analysis of relevant communities in the manner in which they are deprived. Nevertheless, rural poverty could be addressed through increased production and marketing of indigenous vegetables which are easy to access due to popularity and abundance among the rural poor (Shackleton, 2003:25).
Increased subsistence production could potentially reduce the dependence on market purchases and improve food insecurity among vulnerable households (Baiphethi & Jacobs, 2009:6). This increase could be a possible breakthrough for the rural communities as these indigenous vegetables are said to be perishable and can be preserved using the very same indigenous techniques that are used to ensure their availability for winter seasons (Jansen van Rensburg et al., 2004:58). One of the disadvantages associated with indigenous vegetables is that they spoil rapidly. However; their shelf-life can be prolonged through partial cooking and drying, and through drying and storage to assist during the winter periods where production is likely to be limited (Jansen van Rensburg et al., 2004:58).
2.5 BACKGROUND OF NORTHERN KWAZULU-NATAL COMMUNITIES

The KZN province documented 82.9% Africans as the majority constituents of the total population in the province – of which the King Cetshwayo District Municipality (formerly known as uThungulu District) consisted of 700013 Africans out of 732529 total district population (Pauw, 2005:4), making up 95.6% total Africans in the district and 7.8% in the province from an overall total population of 8991109 people. Similar to Pauw’s documentation, Statistics South Africa (SSA, 2011:29) reported black South Africans as the major constituents of all KZN district municipalities compared to other races as they constitute a greater majority of the KZN province.

2.5.1 Community dynamics

Another study which was confined in four districts of the northern region of KwaZulu-Natal, including the King Cetshwayo District, reports that the area is dominated by Zulu speaking people as it still belongs to the former KwaZulu homelands of the apartheid era (Lewu & Assefa, 2009:1149). In these communities, there is a variation of economic status; some have reliable sources of income than others. This was corroborated by Lewu and Mavengahama (2010:3045) who reported that households that practice agriculture generate less income in comparison to their non-agricultural counterparts. This imbalance could potentially be due to the reason that most of the smallholder farmers have limited access to the market areas, be it formal or non-formal (Lewu & Assefa, 2009:1149). This could be detrimental for those households that largely depend on indigenous agricultural vegetation for survival and whose primary source of income are indigenous vegetables.
With specific reference to indigenous leafy vegetables, the decline of these species can have a negative impact on both food security and income generation to the farmers, more especially women as they have been found to be the primary consumers and marketers of these vegetables (Jansen van Rensburg et al., 2004:52). For the northern KZN peasant farmers, this could be a downfall as most inhabitants of these communities are still reliant on natural resources and pension money granted by the government for subsistence (Lewu & Assefa, 2009:1149).

2.5.2 Classification of indigenous vegetables

In the rural KZN, leafy vegetables are collectively known as *imifino* regardless of their species type and the habitat in which they grow (Lewu & Mavengahama 2010:3046). These vegetables grow naturally in the wild, or as weeds in cultivated fields and sometimes even grow on the yards within the households (Faber, Jaarsveld & Wenhold, 2010:33). Leafy vegetables as asserted by Lubbe, Siebert and Cilliers (2011:352) can be grouped in four categories of origin:

- Native vegetables: these occur naturally within the study area and are not cultivated.
- Indigenous-cultivated vegetables: these vegetables are indigenous to the country in which they are cultivated but they do not occur naturally within the study area. They are often cultivated in gardens.
- Naturalised vegetables: these are the alien plants which are also known to be exotic to the country; however, they grow and adapt easily in the study area without requiring any form of nurturing through cultivation practices (*e.g.* *Ipomea batatas* L.).
• Alien-cultivated vegetables: these are the vegetables which are neither exotic nor indigenous to the country and are not naturalised in the area. However they are cultivated in gardens.

2.5.3 Status of indigenous vegetables in the northern KZN

Ntuli et al. (2012:6029) recorded 72 vegetable species that were utilized in the northern region of KwaZulu-Natal, of which 47% were naturalized alien species and 53% were indigenous species. These indigenous vegetables aid as an important source of income and contribute to food security within the rural households (Lewu & Mavengahama, 2010:3047). In agreement, Shackleton & Shackleton (2004:658) recorded indigenous vegetables be of cultural significance and value.
2.6 USES OF INDIGENOUS VEGETABLES IN KWAZULU-NATAL

KwaZulu-Natal is the second leading province which utilises wild indigenous vegetables (Bvenura & Afolayan, 2015:1002). These vegetables are a good source of food towards the reduction of hunger, poverty and malnutrition considering that South African households are not entirely food secure (Hart, 2009:365). This food insecurity as further stated by Modi (2015:946) perpetuates both hunger and malnutrition and has a negative effect on the quality of life altogether. Therefore, these indigenous plants play an important role in the lives of the marginalised as they are used not only for consumption purposes but for other activities as well. Matenge et al. (2012:2252) indicated that health and nutrition, as well as tradition, culture and food safety are the key drivers for indigenous vegetable utilisation. Some of them may even be used both as food and medicine (Maroyi, 2011:5722).

2.6.1 Medicinal Uses

According to Street and Prinsloo (2013:10), traditional medicine has been used for hundreds of years to treat several diseases and till this very day many cultures still rely on indigenous medicinal plants for their primary health care. Medicinal plants are referred to as traditional medicine because they are profoundly rooted in the sociocultural context that varies from one community to another (Okigbo, Anuagasi & Amadi, 2009:087). Regardless of the value of these indigenous plants to the society; their use is in decline as their importance is hardly transferred to younger generations hence the ever-changing social values, livelihoods and migration to urban areas where indigenous plants are hardly ever utilised (Njume et al., 2014:1934).
However, for those countries and communities where the consumption of indigenous vegetable diets is still appreciated; studies have shown that they are less likely to be prone to cardiovascular diseases and other nutrition-related adverse consequences (Kimiywe, Waudo, Mbithe & Maundu., 2007:4).

A nutritional evaluation showed indigenous wild vegetables (*Amaranthus* and *Bidens pilosa*) not only to be exceptionally highly nutritious in comparison to alien species but also to be valuable sources of vitamins A, C and E, as well as Zinc and Iron (Modi *et al*., 2006:9). *Bidens Pilosa* is one of the most consumed uncultivated leafy vegetables in rural South Africa, particularly in the northern KwaZulu-Natal (Bvenura & Afolayan, 2015; Ntuli *et al*., 2012). Although not much South African researchers have reported medicinal uses associated with the use of this plant (*Bidens pilosa*), a study in Zimbabwe reported that it is consumed for medicinal purposes. In Zimbabwe, the *Bidens pilosa* plant helps with the ease of blood pressure worries, oral thrush, stomach pains, as well as the boosting of the immune system and rheumatism (Maroyi, 2011:5722).

Similarly, in the South African households of Limpopo and KwaZulu-Natal respectively; *Bidens pilosa* is not only used for consumption but also as a therapeutic plant. According to Faber *et al.* (2010:34), children with flu are given the leaf extract for drinking or are bathed in it when sick. *Bidens pilosa* also aids as a source of medicine to those with high blood pressure. Regardless of all these therapeutic benefits that indigenous vegetables offer contribute to the well-being of people, they could also be a potential threat to the users as their nutritional and toxic properties are not well evaluated (Orech *et al*., 2005:8).
2.6.2 Food security

The Food and Agricultural Organization (FAO) defines food security in an internationally comprehended manner as a situation that exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life (FAO, 1996). In a narrow sense, food security refers to sufficient availability of food, be it globally, nationally, within the community, or at household level. This widely accepted definition by the FAO points out four dimensions of food security, namely; availability, access, utilisation, and stability.

2.6.2.1 Food Availability

Despite the political and economic advancements that were seen in South Africa since she transitioned to a democratic country, there is still a challenge of food insecurity within the country. A national survey review on food security in South Africa between years 1999-2008 reported that food availability is different across all South African provinces. Other than the Western Cape, all provinces were found to be of low food variety, precisely in poorer and rural households in comparison to their higher-income and urban household counterparts (Labadarios, Mchiza, Steyn, Gericke, Maunder, Davids & Parkera 2011:894). This imbalance in food availability contradicts the United Nations (UN) definition that food availability always proves true when there is adequate food supply of basic food to sustain a stabilized expansion of food consumption, and to counterbalance variations in production and prices (United Nations, 1975).
2.6.2.2 Access to food

The food security status within the household is a sensitive livelihood predicament which changes over time. In South Africa food accessibility remains one of the greatest challenges among the previously disadvantaged and the rural poor. Despite this apparent challenge, there is often a policy constriction with regards to focusing on the rural poor due to the assumption that low-income households are generally concentrated in poor municipalities (Altman, Hart & Jacobs, 2009:354). For a household to be food secure, there must always be a sustainable access to adequate food and the risk to losing access to food because of haphazard shocks (economic or climatic crisis) or cyclical events, for instance, resulting to seasonal food insecurity – ought to be minimised.

2.6.2.3 Food Utilization and Stability

The utilization of food as outlined by the FAO covers the components of well-being where all the physiological needs are met. The conception of stability can therefore refer to both the availability and access dimensions of food security (FAO, 2006).
2.6.3 Household Consumption of indigenous vegetables

Indigenous vegetables are popular to rural smallholder farmers. They can be consumed on their own without requiring any relish, whether boiled or on their raw state, such as tuber and root crops like the taro and sweet potatoes (Motsa et al., 2015:2), or can be used as relish, such as leafy vegetables (Faber et al., 2010; Van Wyk, 2011). A review of wild foods in the agricultural systems outpoints malnutrition as one of the common health burdens in the developing countries world-wide (Bharucha & Pretty, 2010:2917). In KwaZulu-Natal, most of the rural population are trapped in poverty and are socio-economically excluded while major developments are focused on urban areas (Modi, 2015:947). This indicates a development imbalance between different societal groups. South Africa, amongst other African countries, is a country that is believed to be food self-sufficient but despite that, it still faces the challenge of hunger & malnutrition which are still prevalent in many rural areas (van den Heever, 1997).

Consumers of indigenous vegetables; precisely the old generation, perceive indigenous vegetables as ‘safe, natural and pure’ sources of food as they are neither processed nor manipulated after production since they are not contaminated by fertilisers or chemicals which may be lethal to human health as their production is mostly organic (Matenge et al., 2012:2246). According to van der Hoeven (2013:2), for over millennia indigenous and traditional plants have been a main source of food for many rural communities. However; due to the over reliance on alien species that have been introduced to rural smallholder farmers, indigenous sources of food are becoming extinct (Lewu & Mavengahama, 2010:3044).
This extinction could possibly be because government authorities, extensionists, researchers and development planners currently do not pay much recognition on the use and value of indigenous vegetables (Mavengahama, 2013; Shackleton, 2003). Consequently, rural households commonly return to indigenous sources of food in times of temporary setbacks either through an increase on the consumption of these products that are already part of their livelihood or though selling them on local and regional markets (Shackleton & Shackleton, 2004:659).

The production and use of indigenous vegetables is usually on small-scale and is generally aimed at fulfilling subsistence purposes (DAFF 2013). However, not much information has been documented on the farmers’ indigenous farming knowledge and their production systems (Lewu & Assefa, 2009:1149). This limited information is evident in the northern KwaZulu-Natal where there is practically no work that has been conducted on wild vegetables (Lewu & Mavengahama, 2010:3047).

This study, therefore, is aimed to expand on the use of indigenous vegetables through exploring the potential role that is played by indigenous vegetables in meeting the socio-economic needs and development of sustainable livelihoods in small-scale indigenous based agriculture among the rural smallholder farmers in the Ntuze rural community of northern KwaZulu-Natal.
CHAPTER 3

RESEARCH METHODOLOGY

3.1 INTRODUCTION

This chapter is aimed at providing an in-depth rationale for the research methods applied in the study as a means of ensuring a clear understanding between the problem statement and the broad objective of the study. The study was conducted primarily in the Ntuze rural community, located in northern KwaZulu-Natal. An in-depth description of the geographical area, the study design, research population and sample are articulated in this chapter. Furthermore, the research instruments used for the collection of data are described, as well as the methods that were implemented to maintain the validity and reliability of the research. The aim of this study was to determine the socio-economic importance of indigenous vegetables to the Ntuze smallholder community.
3.2 SELECTION OF SUITABLE RESEARCH METHODOLOGY

According to Creswell (1994:110), data collection is a series of interrelated activities aimed at gathering sound information (empirical evidence) to answer research questions. In this study, a triangulation approach was adopted in respect of the data collected. Such primary data were generated by means of a questionnaire as the main research instrument – used in combination with qualitative and quantitative methodologies, the researcher could access the knowledge associated with the utilisation and production of indigenous crops in the Ntuze smallholder community.

As a step towards meeting the objectives of the study, a pilot study was initially conducted in 2017 as a means of identifying indigenous vegetable that were utilised in the Ntuze community. Following this pilot study, primary data were later collected by means of the survey, which was aimed at investigating the role played by indigenous vegetables in meeting the livelihood strategy of the Ntuze smallholder farmers. Only the small-scale vegetable farming residents were considered for the research sample as they are both historical and cultural users of indigenous vegetables under study. As means of ensuring a representative sample for the farming community population, a suitable sample size was determined to present this community. Contributing to this research, secondary data (addressed in Chapter 2) were gathered from academic journals and books. According to Matthews and Ross (2010:44), any data produced by earlier studies and which are available to the researcher to use are regarded as secondary data. Although similar research to this study has been previously conducted, no other research study has focused on the Ntuze area. Furthermore, research regarding South African indigenous vegetables in general is limited (Lewu & Mavengahama, 2010:3045).
3.3 METHODOLOGICAL TRIANGULATION

As a means of meeting the set objectives, the research study employed methodological triangulation (also known as mixed methods approach). By means of triangulation, researchers collect and analyse both numerical data (the norm for quantitative research) is, and theoretical data (which is customary for qualitative research) to address the research questions defined for a research study (Williams, 2007:70). Methodological triangulation can thus be described as an integration of the qualitative and quantitative research methods.

To collect this mixture of data, the researcher primarily made use of a survey method; the survey included both closed-ended questions to collect numerical data, as well as open-ended questions to collect theoretical data.

The triangulation model can be depicted as follows:

![Basic triangulation model](image)

**Figure 3.1: Basic triangulation modelled from Yeasmin and Rahman (2012:156)**

3.3.1 Advantages of Methodological Triangulation

Unlike other research methods, which tend to be narrow in scope, the triangulation approach is diverse in the sense that it allows the researcher to use a wide variety of research methods, allowing the researcher to be confident in their results because of the confirmatory nature of the technique (Yeasmin & Rahman, 2012:159).
Perone and Tucker (2003:55) state that the use of triangulation as a research method helps validate studies and allows researchers to obtain a more complete, holistic and contextual depiction that reveals the varied dimensions of a given phenomenon, with each source contributing an additional piece to the puzzle. Furthermore, Perone and Tucker are of the opinion that, through the use of triangulation, bias can be minimized, and validity can thus be enhanced, which cannot be achieved by using either qualitative or quantitative methods exclusively.

According to Johnson and Onwuegbuzie (2004:21), the use of the triangulation method is also of benefit to the researcher due to the following reasons:

- Meaning can be added to numbers through the use of words, narrative and pictures.
- Triangulation contains both the qualitative and quantitative research strengths.
- Researchers have the advantage of both generating and testing the grounded theory.
- A complete range of research questions can be answered because the researcher is not limited to a single method.
- If one method has weaknesses, the researcher could use the strengths of the other method to overcome those weaknesses.
- Stronger evidence could be provided for a conclusion by means of the collaboration of findings.
3.3.2 Disadvantages of Methodological Triangulation

The triangulation method does not only consist of strengths, but just like any other research approach it does have its weaknesses – some of which are outlined by Johnson and Onwuegbuzie (2004:21):

- If both the qualitative and quantitative approaches are used concurrently, it may not be an easy task for the researcher to carry out the process and may even require a research team.
- The researcher has to understand different research methods and know how to mix them appropriately.
- It is more expensive and time-consuming as compared to when the researcher is using only one research approach.

3.4 RESEARCH DESIGN

The research design is a pattern that is utilised to administer and regulate a research study, with the aim of providing maximal command of influences that might tamper with the validity of the study conclusions (Burns & Grové, 2003:195).

3.4.1 Quantitative approach

Quantitative research, as argued by Williams (2007:66), is one of the overriding research methods which have dominated the western culture as the principal research method to create meaning and new knowledge. Today quantitative research is one of the most common research methods used in the fields of both natural and social sciences.
Muijs (2004:1) defines quantitative research as phenomena that are explained through the collection of numerical data which can be analysed using mathematical-statistical methods. To generate quantifiable data for the present study, a survey method – through use of structured interviews, was followed.

### 3.4.2 Qualitative approach

Qualitative research methods were initially developed in the social sciences as a means of allowing researchers to study social and cultural phenomena (Myers, 1997). Myers further states that qualitative research methods include action research, ethnography and case studies – its sources including observation, fieldwork, interviews and questionnaires, as well as the researcher's impressions and perceptions on the problem being investigated. In this study, the researcher employed a survey questionnaire, used complementarily with interviews.

Applying the qualitative approach enabled the researcher to develop both a complex and holistic understanding of the smallholder farmers’ perceptions of indigenous vegetables with regards to their role in the livelihoods of the Ntuze community. The qualitative approach also enabled the researcher to fully understand the link between indigenous vegetables and the farmers’ livelihoods. As a result, the researcher was able to develop themes and further build a descriptive picture.

The following diagram is an illustration of the ‘strength and weaknesses’ model designed by Choy (2014:101) categorising the respective strengths and limitations of each of the two main research paradigms.
Figure 3.2: Researcher's own construction of strengths and weaknesses of qualitative and quantitative research methodologies, based on model developed by Choy (2014:101)
3.5 STUDY POPULATION AND SAMPLE

The process of selecting participants for a research study is commonly known as sampling. Sampling is generally understood as a process of selecting a certain number of subjects from which to draw an inference about the entire population. Filita (2013:44) describes sampling in social research as a procedure that involves a random selection of elements from a target population. Simply put, a sample can be defined as a subset of a population and is drawn from the population so as to make generalisations about the entire population. According to Mouton (2011:132), the primary aim of sampling in social research is to produce representative selections of the population of elements. The main aim of the sampling procedure is to obtain a reasonable number of elements representing the entire population from which they are drawn and to be able to draw an inference based on the data collected.

For the purpose of this study, the target population in the Ntuze community was selected purposively due to the researcher’s past experience that the sample might contain most characteristics and attributes of the population (De Vos, Strydom, Fouche & Delport, 2002:207). As such, a snowball sampling technique was employed to select the sample. The snowball sampling technique used in the study was not free from bias as the informants were chosen on account that they utilised indigenous vegetables. According to Tongco (2007:154), non-probability sampling methods (snowball sampling method) mostly contribute to internal validity in comparison to external validity. Tongco further asserts that, despite the incoherent bias, purposive sampling can provide reliable and robust data.
Babbie and Mouton (2004:166) in agreement with Saunders, Lewis and Thornhill (2003:173), stated that the purposive sampling technique is of great advantage in the sense that the researcher already has a measure of knowledge of both the population and elements under study. In order to meet the overall objective of the study, the study participants were expected to be producers as well as consumers of indigenous vegetables. Ten types of vegetable that are mostly grown and consumed in the Ntuze community were selected as indicators, following the initial pilot study. These included cultivated vegetables such as *Colocasia esculenta* (L.) Schott, *Vigna unguiculata* (L.) Walp., *Ipomea batatas* (L.), *Manihot esculenta* Crantz and *Vigna subterranea* (L.) Verdc., as well as wild vegetables (*Amaranthus*, *Bidens pilosa* (L.), *Momordica africanus*, *Solaum retroflexum* Dunal and *Ipomea plebeia* R.Br. For the purpose of this study, a non-probability sampling technique, namely snowball sampling, was applied. This technique was used due to participants being selected because of convenient accessibility and proximity to the researcher.

### 3.6 SAMPLING PROCEDURE

Given the large number of small-scale vegetable farming households in the Ntuze area, the researcher drew a sample from the population using the snowball sampling method. The motivation for the selection of the snowball sampling method was because the study only sought to engage active vegetable farmers. From the results obtained, the researcher drew a case inference about the entire population of the Ntuze community. For the purpose of this study, the sample consisted of 40 participants that represented the population of the Ntuze community.
3.7 IDENTIFICATION OF THE TARGET POPULATION

The target population refers to the set of components that the researcher focuses upon and to which the results obtained by testing the sample should be generalised (Bless & Higson-Smith, 1995:87). The target population for this research only consists of the Ntuze residents. The population of Ntuze numbers approximately 400 in total. Unlike the random sampling procedure, where care is taken against a biased sample, the study participants were purposefully selected through access and availability to the researcher. Furthermore, only small-scale vegetable growers with experience in indigenous vegetable production formed part of the sample. The target respondents comprised of 40 members of the Ntuze farming community whose livelihoods were attributed to vegetable production.

3.8 SOCIO-ECONOMIC DESCRIPTION OF THE STUDY AREA

The northern KwaZulu-Natal rural farming system is dominated by smallholdings with small tracts of land that range from 0.2 ha to 0.9 ha (Lewu & Assefa, 2009: 1149). The majority of the inhabitants of the region practise subsistence agriculture and some of the farmers generate their income through their agricultural production. However, households that are solely involved in agricultural activities generate less income in comparison to their non-agricultural counterparts (Lewu & Mavengahama, 2010:3045). A provincial report by Statistics South Africa (2011) revealed that:

- In 2011, 10.6% of the population aged 20 years and above reported to have received no schooling. A minimal 4.8% reported to have achieved a tertiary qualification, while just less than a third (30.4%) reported to have passed Grade 12.
• When comparing the census findings of 2001 and 2011, there was a substantial drop in the percentage of those without schooling. However, the findings regarding the northern KwaZulu-Natal district municipalities have proven to be progressing well. The report shows that the level of education for persons aged 20 and older was improving – hence the following educational attainment:

Table 3.1: Level of education in the northern KZN district municipalities

(Statistics South Africa, 2011)

<table>
<thead>
<tr>
<th>District Municipality</th>
<th>Educational Attainment (aged 20+ years)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No Schooling</td>
</tr>
<tr>
<td></td>
<td>2011</td>
</tr>
<tr>
<td>King Cetshwayo</td>
<td>31.6</td>
</tr>
<tr>
<td>Umkhanyakude</td>
<td>46.3</td>
</tr>
<tr>
<td>Zululand</td>
<td>38.6</td>
</tr>
</tbody>
</table>

• The overall unemployment rate in 2011 had also improved from that of 2001 as it had dropped from 49% in 2001 to 33% in 2011. The youth unemployment rate had also dropped – from 58.4% in 2001 to 42.1% in 2011.

• In 2011, the KZN province had an estimated total of 46.6% female-headed households, of which the King Cetshwayo District (formerly known as uThungulu District) Municipality consisted of an estimated 48.9% female-headed households – 2.4% greater than the 2001 findings.
• Of the entire province’s population, 89% were indicated to have access to piped water. In the King Cetshwayo District Municipality only 16.2% of the households indicated having no access to piped water.

Figure 3.3: Map of the Ntuze smallholder community, located within the King Cetshwayo (previously uThungulu) District Municipality (Google Maps, 2018)

According to Lewu and Mavengahama (2010: 3045), poverty rates among KZN households that practise agriculture are as high as 81.2% in comparison to non-agricultural households (49.5%). Lewu and Mavengahama further state that the poverty rate is worse in northern KwaZulu-Natal, affecting 64.4% of the population – of which 78.2% live predominantly in rural communities and only 28.9% in urban areas. Almost all the elderly of northern KwaZulu-Natal relies on governmental pension payments for financial support (Lewu & Assefa, 2009:1149).
However, some inhabitants still rely only on agricultural practices for survival. This is outlined in several studies (Lewu & Assefa, 2009; Lewu & Mavengahama, 2010; Ntuli et al., 2012) that were conducted in northern KwaZulu-Natal, revealing that most of the communities – specifically African communities – rely on agriculture for their survival.

### 3.9 GEOGRAPHICAL INFORMATION OF THE STUDY AREA

The northern region of KwaZulu-Natal province constitutes most Zulu-speaking people. According to Lewu and Assefa (2009:1149), many aspects of traditional culture are still observed in the homesteads of the region – many of which rely on natural resources as well as pension payments for subsistence. Northern KwaZulu-Natal falls within latitude 27° 26’ – 28° 44’S and longitude 31° 23’ – 31° 56’ (Lewu & Assefa, 2009: 1149) and, under apartheid, was designated the KwaZulu homeland. With specific reference to the King Cetshwayo District Municipality, within which this study is focused, Ntuli (2013:42) reports that the district has a subtropical climate, with an annual rainfall ranging between 1640mm and 1740mm, maximum mean summer temperature of 32°C and maximum mean winter temperature of 18°C.

### 3.10 ANTICIPATED CHALLENGES AND MITIGATION METHODS

There was a possibility that some of the selected informants would not be willing to partake in the study. To address this challenge, the researcher would continue collecting data until the number of selected participants reached the first selected 40-participant sample size. The risk also existed that participants would think that the researcher was a “change agent” and could expect the researcher to bring about change in the community under study.
The researcher, therefore, made use of the participant's consent letter (as detailed in the ethics application), which addresses not only the participants’ rights but also the purpose of the study. The researcher stressed that the study was strictly for academic purposes and that there was no government affiliation in relation to the research being conducted.

3.11 THE PILOT STUDY

A pilot study, also known as the preliminary study, is one of the research tools that provide for a strengthened main data collection (Anderson & Prentice, 1999). Its primary function is the pretesting of a research instrument. According to Baker (1994:182), the preliminary study should involve at least 10 to 20 percent of participants of the main study. Although the pilot study does not necessarily guarantee the success of the actual research, it significantly points out possibilities (Simon, 2011). In 2017, the researcher conducted a preliminary study at eSihuzu village, a neighbouring community to the Ntuze rural community. Only 12.5% of overall respondents were included in the preliminary study and the results were not used for analysis and discussion. The main aim of this pilot study was to pre-test the feasibility of the planned research methods. The other reasons for the pilot study were similar to those outlined by Teijlingen and Hundley (2001):

- To develop and test the adequacy of research instruments.
- To assess the feasibility of a full-scale survey/study.
- To assess whether the research protocol is realistic and workable.
- To establish whether the sampling frame and technique are effective.
- To identify logistical problems which might occur using the proposed methods.
- To determine the resources that will be needed for the planned study.
The preliminary study was also aimed at determining the approximate duration that the researcher would spend with each respondent, as well as assisting with the refining of the interview schedule.

3.12 RESEARCH SCHEDULE

The following methodological work plan was followed:

1. Review of the relevant literature
2. The preliminary study (pilot study)
3. Development of interview schedule (questionnaire)
4. Face-to-face interviews with community members
5. Analysis of data
6. Interpretation and discussion
7. Feedback
8. Final report

3.13 DATA COLLECTION PROCESS

Before embarking on the data collection journey the researcher first visited the tribal authorities. Permission to access and conduct the study in the Ntuze community was granted by the wife of the chief (induna) in absentia of the chief. The chief’s wife approved the request and a written letter explaining the core purpose of the study was provided. Only 40 participants were required for sampling. Primary data were collected according to an interview schedule. To avoid possible errors, the researcher recorded in writing the responses with the participant’s consent. All participants were visited separately and interviewed one-on-one.
For ethical reasons, all participants were required to give consent before taking on the study and it was made clear to them that they had a right to discontinue participation at any time during the interview process.

3.14 RESEARCH INSTRUMENT

This study utilised both structured and semi-structured interviews. According to Bailey (1987:174), semi-structured interviews are convenient to both the researcher and the participants as they allow a great deal of flexibility – with the researcher being able to ask follow-up questions and the participants being able to express themselves in detail. This flexibility, according to De Vos et al. (2004:302), allows for the researcher to be empathetic to the participant being interviewed; thereby enabling the researcher to fully understand the participant's beliefs, perceptions or accounts of that particular topic. The interviews were guided by the predetermined set of questions of the interview schedule. In agreement with De Vos et al. (2005:296), the schedule was used as a guide and not to dictate the interview.

This use of interviews allowed for the participants to provide answers as close as possible in the direction of the research topic. The interview schedule was used as the map-guide to be followed by both the researcher and the participants in order to cover relevant issues in relation to the study (Green & Nieman, 2003:172). The interview schedule was divided into three sections:

- demographic data,
- access to gain knowledge about indigenous vegetables (social dimension), and
- uses of indigenous vegetables (economic dimension).
Every question on the interview guide was aimed at answering one or more research objectives. Although the questionnaire was written in English, the interviews were conducted in isiZulu, the participants’ native language. This helped the researcher to make observations and provide clarification where necessary. Data were recorded through extensive note-taking.

3.15 SURVEY DESIGN

This research study made use of a survey for data collection. A survey is generally understood as an empirical systematic method of data collection and analysis of information obtained from a sample of units. The main purpose for applying this method was because the researcher anticipated obtaining information concerned with the socio-economic association between the population of the Ntuze rural farming community and indigenous vegetables. An interview schedule, presented in the form of a questionnaire, was employed as a data collection tool.

However, due to the primary concern that some of the participants were illiterate and might need assistance with writing and require clarity on some questions, the researcher used the questionnaire as a guideline for conducting face-to-face interviews. Therefore, the researcher asked the questions as posed in the questionnaire (structured interviews) and filled in the answers, as provided by the participants, on the interview schedule. The use of this approach helped in enhancing the validity and reliability of the data as the researcher provided clear explanations in instances where the study participants seemed to become confused.
3.16 INTERVIEWS

The practice of using interviews as a data collection tool continues to gain popularity among researchers. This is justifiable in social research as social researchers aim to fully understand real-life situations as complex as they are. This complexity can only be accessed by allowing participants to express themselves. According to Rubin and Rubin (1995:195), interviews are about hearing how people see, understand and interpret the world. Data of this nature generally tend to fall within the paradigm of qualitative research. The responses were recorded in a manner that did not threaten respondents and their anonymity was ensured.

3.16.1 Length of interviews

According to Field and Morse, as cited by Holloway and Wheeler (1998:56), the length of interviews is not supposed to be too lengthy and should not be continued beyond 60 minutes. On the contrary, however, Holloway and Wheeler (1998:56) are of the opinion that the length of time it takes for an interview to run depends on the participants. It should be taken into consideration that some people require more time to grasp meaning than others. For example: old people generally respond more slowly than younger individuals. This could be because of physical weakness, for instance, which may require interrupting the interview process after 20 to 30 minutes.
3.17 QUESTIONNAIRE

Questionnaires are generally understood as a set of questions presented on a survey form which the respondent completes in respect of a research project (De Vos et al., 2007:166).

Questionnaires consist of a list of questions that the researcher intends to put to a sample of elements from the population, be it individuals, households or organisations. Often times, questionnaires are sent to participants to complete on their own, but in some instances, the researcher is available to apply expertise wherever the participant encounters difficulty.

Usually, questionnaires consist of both open- and closed-ended questions (also simply referred to as closed questions). Filita (2013:48) asserts that open-ended questions help respondents to fully explain the issue at hand, while closed-ended questions have a pre-set choice of encrypted answers. The purpose of using a survey questionnaire in this study was to obtain both quantifiable and qualitative data, on the basis that the study follows a methodological triangulation approach.

The survey questionnaire employed in this study consisted of:

- A request for co-operation from the respondents.
- The demographic data (for record purposes only: names and addresses not recorded to assure anonymity of the participants).
- The questions specifically related to the topic under study.
- A closing statement, thanking respondents for their participation and valuable time.
3.17.1 Questionnaire format

The questions formulated for this research project were carefully designed with the aim of protecting the participants' anonymity and providing confidentiality. Sensitive questions were excluded as they could potentially evoke counterproductive emotional reaction from the respondents and, to some extent, render the research project unsuccessful. To ensure that these provisions were properly adhered to, the questionnaire template was approved by the Nelson Mandela University's Research Ethics Committee (Appendix B), and where necessary, amendments were made.

The researcher also applied the following guidelines:

- The wording was kept simple and easy to understand.
- Questions were translated into the vernacular of the respondents.
- Complex questions were avoided.
- Words with similar meanings were used as often as possible.
- Leading questions were avoided.
- Double-barrelled questions were not used.

The questionnaire consisted of three types of questions:

- Open-ended questions, allowing participants to respond freely to questions, with no pre-formulated set of answers.
- Multiple-choice questions, requiring the respondents to choose an answer from a list of set answers.
- Dichotomous questions, with set answers; in some instances, with neutral alternatives.
In order to fully explore the farmer’s perceptions, six types of questions as suggested by Greenfield (1996:21) were included:

- Background or demographic questions: asked in order to be able to identify the characteristics of the respondents.
- Sensory questions: focusing on what is touched, tasted or smelled.
- Knowledge questions: asked to find out in-depth information that the participants have.
- Behavioural questions: focusing on what a person does or has done.
- Opinion or value questions: aimed at understanding the cognitive and interpretive processes of the participants.
- Feeling questions: aimed at understanding the emotional responses of participants to their past experiences and thoughts.

3.18 DATA ANALYSIS

The study, as indicated, follows a methodological triangulation approach, consisting of both qualitative and quantitative data. Data were therefore analysed in a manner that suits both these research methods. According to De Vos et al. (2002:223), the term ‘analysis’ refers to categorising, putting to order, manipulating and summarising data in order to obtain answers to the research question(s). In terms of this stage of the research process, an interpretivist approach was adopted. Skelton (2001) refers to interpretivism as an attempt to describe and explain real experiences of people, their sentiments and feelings from a humane angle – rather than a quantification and measurement of these experiences and feelings.
The justification behind the use of the interpretivist approach was to enable the researcher to provide a holistic picture, in all its complexity, of the Ntuze smallholder farmers in relation to indigenous plants.

Qualitative data were analysed using thematic and content analysis approaches. A thematic analysis, as described by Matthews and Ross (2010), is the process that involves examining raw data with a view to identify and interpret key themes. Content analysis, on the other hand, is understood as the application of analysis to textual data which can then be used to illustrate data in graphic format. In addition to that, content analysis is essentially a coding operation (Babbie, 2004:314). The data analysis process is essential in the sense that the volume of raw information is reduced. Filita (2013:50) argues that the data analysis process helps with the identification of significant patterns and themes and further involves finding general statements about relationships among categories of data.

Quantitative data were analysed by means of statistical measures through use of the Statistica analytics software (StatSoft) wherein each question was treated as a case and a variable; allowing for qualitative findings to be converted to quantitative findings and report on frequencies. The Chi-square test was applied to assess correlation relationships between a set of observed values at a significance level of \( P=0.05 \). Data were also presented by means of descriptive statistics, with graphic summaries illustrating figures related to the sample population.
3.19 ETHICAL CONSIDERATION

This study involved human participants and, in collecting data from people, raises ethical concerns. In the light of this, ethical clearance was sought and approved by the Nelson Mandela University’s Research Ethics Committee: Human (refer to Appendix B).

The ethical clearance was sought because of the risk that several questions might possibly violate the participants' safety. Ethical clearance was also required to ensure that, during the course of the study, people who partook in this research were not harmed, their privacy was ensured, respected as individuals and was not subjected to unnecessary research (Wayne & Stuart, 2001:49). The Nelson Mandela University’s ethical guidelines are in line with those of the Human Science Research Council (HSRC). This protocol ensures the protection of the four basic rights of research participants as stipulated by the HSRC (1997):

1. Right to informed consent: this right protects participants against taking part in an activity that they do not understand. The researcher has to ensure that potential participants fully comprehend what they are asked to participate is all about, what the findings will be used for and what the researcher will do with the contributions made by participants – before they are asked to decide on their participation.

2. Right to anonymity: this right protects the identity of participants. It demands that the researcher explain the procedures that will be used to keep the identity of participants confidential.

3. Right to confidentiality: this right protects the privacy of the information provided by participants. It demands from researchers that they explain who will have
access to the information that was supplied by participants and how access to that information by others will be controlled.

4. Right to discontinue participation: this right ensures that participants feel completely free to withdraw their participation. It demands from researchers that they explain that participants have a right to end their participation at any given time during the process without needing to provide a reason to do so.

3.20 CHALLENGES AND LIMITATIONS ENCOUNTERED

The study was not free from limitations as it did not focus on all communal residents and activities, but only focused on agricultural practitioners that grew and utilised indigenous vegetables. One of the greatest challenges encountered was that of time management. Some participants felt a need to diverge from questions being asked while some multi-tasked during the interviews. This was understandable as data was collected during the festive season and people were busy with Christmas preparations.

Although the purpose of the study was explained to the participants and an attempt at not raising any hopes was maintained, participants still hoped for immediate intervention following their current struggles. Notably, most participants – especially the elderly – saw interviews as a platform to freely express themselves in the hope that the researcher might be a “change agent”. All the methods used for collecting data during the course of the study were reliable and appropriate. This was confirmed when the findings from the initial preliminary study proved that the methods applied would yield the anticipated results for the study.
3.21 SUMMARY

This study employed the method of triangulation to meet the set objectives. The research design for the study includes both quantitative and qualitative research paradigms. A preliminary study was conducted before the formal data collection process to test whether or not the planned methods of collecting and analysing data would generate the required data suitable for analysis. Following data collection, the data generated were subjected to analysis by means of thematic and content analysis approaches (multiple-coding) in respect of qualitative data, and by means of statistical measures, such as descriptive statistics and the Chi-square test, to present quantifiable correlations. The qualitative and quantitative findings were then triangulated, thereby bringing about a holistic contextual description of the socio-economic importance of indigenous vegetables and their contribution toward the livelihood of the Ntuze smallholder farmers.
CHAPTER 4
RESEARCH FINDINGS

4.1 INTRODUCTION

This chapter presents the results obtained from the research on the socio-economic importance of indigenous vegetables in the Ntuze smallholder farming community. To derive a full understanding of the farmers’ perceptions and experiences of the use of indigenous vegetables, three research objectives were focused on:

(i) Determining the farmer’s knowledge and use of indigenous vegetables.
(ii) Measuring how indigenous vegetables contribute to food security, and
(iii) Identifying utilised and unutilised functions for indigenous vegetables in smallholder agriculture.

As a means of achieving these set objectives, the questionnaire was structured in a manner that would fully extract information to address these three objectives. The questionnaire was therefore divided into three sections, which related to:

(i) Demographics and profile of vegetable users
(ii) The role and farming of indigenous vegetables
(iii) Uses and community activities surrounding indigenous vegetables
4.2 SOCIO-DEMOGRAPHIC ANALYSIS

The social and demographic factors were investigated as a means of establishing the profile of the Ntuze farmers. The socio-demographic variables include the research participants’ age and gender, marital status, source of income, household employment and literacy level, as well as farming experiences.

4.2.1 Gender

A comparative analysis of respondents according to gender is presented in Table 4.1. Findings indicated that mainly females (90%) are involved in small-scale agriculture compared to their male counterparts (10%) in the Ntuze area.

Table 4.1: Distribution of respondents by gender

<table>
<thead>
<tr>
<th>Gender</th>
<th>N=40</th>
<th>Total percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>04</td>
<td>10</td>
</tr>
<tr>
<td>Female</td>
<td>36</td>
<td>90</td>
</tr>
<tr>
<td>Total</td>
<td>40</td>
<td>100</td>
</tr>
</tbody>
</table>
4.2.2 Variation in age

Table 4.2 indicates that the elderly, between the ages of 61-70 (28%), were predominantly responsible for vegetable production. The second-largest group consisted of farmers between the ages of 51-60, (23%). Young adults between the ages 20-30 followed (22%). Jointly, participants between the ages 41-50, 31-40 and >71 respectively constituted only 27% of the total active population.

Table 4.2: Respondents’ age distribution

<table>
<thead>
<tr>
<th>Age group</th>
<th>n=40</th>
<th>Total percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20-30</td>
<td>09</td>
<td>22</td>
</tr>
<tr>
<td>31-40</td>
<td>03</td>
<td>07</td>
</tr>
<tr>
<td>41-50</td>
<td>06</td>
<td>15</td>
</tr>
<tr>
<td>51-60</td>
<td>09</td>
<td>23</td>
</tr>
<tr>
<td>61-70</td>
<td>11</td>
<td>28</td>
</tr>
<tr>
<td>&gt;71</td>
<td>02</td>
<td>05</td>
</tr>
<tr>
<td>Total</td>
<td>40</td>
<td>100</td>
</tr>
</tbody>
</table>
4.2.3 Origin and period of residence in the Ntuze community

All the sampled participants indicated that they originate within the borders of the KwaZulu-Natal province. All were of the Zulu ethnic background and thus predominantly Zulu-speaking. Most of the farming residents (52.5%) indicated that they had been residing in the Ntuze community since birth.

Figure 4.1: Distribution according to period of residence in the Ntuze area
4.2.4 Marital status

Figure 4.2 below shows that most respondents (42%) were single. Only 35% of respondents indicated that they were widowed and 23% married.

![Population distribution according to marital status](image)

**Figure 4.2: Population distribution according to marital status**

4.2.5 Educational level

Findings indicate that the majority of the participants (85%) have a formal education background in comparison to those who never had any form of formal education (15%). Table 4.3 indicates distribution according to the participants’ educational status. Thirty-five percent of the study participants received primary education and, similarly, 35% received secondary education. Participants who indicated that they had had access to higher education at a tertiary level amounted to 15%. Only 15% of the study participants indicated that they have never received any form of formal education.
Table 4.3:   Distribution according to educational level

<table>
<thead>
<tr>
<th>Level of education</th>
<th>n=40</th>
<th>Total percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>06</td>
<td>15</td>
</tr>
<tr>
<td>Primary</td>
<td>14</td>
<td>35</td>
</tr>
<tr>
<td>Secondary</td>
<td>14</td>
<td>35</td>
</tr>
<tr>
<td>Tertiary</td>
<td>06</td>
<td>15</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>40</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

4.2.6 Employment status

Figures 4.3 and 4.4 show the employment status of the heads of households and their spouses in the past five years since 2017. According to the research findings, the majority of the participants were currently unemployed (78%) as opposed to those who were employed (22%). Findings also show that in the past five years, 70% of the study participants were unemployed and 30% were employed.
Of the married participants, 73% indicated that their spouses were unemployed, in contrast to those whose spouses were employed (22%). In the preceding five years, the majority of participants (59%) had unemployed spouses and 41% spouses who were employed. In addition, 60% indicated that within the household there were members who were currently working and 40% stated the opposite.

![Employment history of spouse](image)

**Figure 4.4: Employment history of spouse**

4.2.7 Government monetary support

The study indicated that at least one member in every household was a pensioner, receiving a government pension; this increased to some households having three pensioners. Similarly, all study participants indicated that, per household, there was at least one beneficiary of a child support grant, which in some households increased to three beneficiaries. In essence, every household interviewed received a form of social grant.
4.2.8 Agricultural revenue

According to the study findings, a large proportion of participants in the Ntuze community generate their income through agricultural production (65%). On the contrary, only 35% do not source their income through agricultural production.

Figure 4.5: Income generated through agricultural production
4.2.9 Land tenure

Findings of this study shown in Figure 4.6 indicate that 92.5% of participants owned their farming land and only 7.5% make use of communal land under the authority of traditional leaders. None of the participants stated that they lease their land or access the land in any other form.

![Figure 4.6: Land ownership status](image)

The majority of farmers (85%) also indicated that they use the same plot of land every year for the production of indigenous vegetables. In contrast, 15% stated that they do not use the same plot of land on a yearly basis for indigenous vegetable production. Findings also indicate that the majority of the Ntuze farming residents are property owners and only a smaller fraction reside on properties that they do not own. The greater majority (82.5%) of the Ntuze residents own the properties where they reside and only a minority (17.5%) occupy houses that they do not own.
4.3 FARMING OF ALIEN VEGETABLES IN THE NTUZE COMMUNITY

Ten alien vegetables which are grown by the Ntuze community were identified in the pilot study (Table 4.4). All of these vegetables are cultivated, and none occur naturally in the wild. All these alien vegetables form part of the Ntuze residents’ basic diet.

Table 4.4: Codes of alien vegetables (AVs) of different species utilised in Ntuze

<table>
<thead>
<tr>
<th>IV code</th>
<th>Vernacular (Zulu)</th>
<th>SA vernacular (English)</th>
<th>Scientific name</th>
</tr>
</thead>
<tbody>
<tr>
<td>AV-ON</td>
<td>Anyanisi</td>
<td>Onion</td>
<td><em>Allium cepa</em></td>
</tr>
<tr>
<td>AV-CB</td>
<td>Klabishi</td>
<td>Cabbage</td>
<td><em>Brassica oleracea var. capitata</em></td>
</tr>
<tr>
<td>AV-TM</td>
<td>Utamatisi</td>
<td>Tomato</td>
<td><em>Solanum lycopersicum</em></td>
</tr>
<tr>
<td>AV-EP</td>
<td>Isitshalo seqanda</td>
<td>Eggplant/Brinjal</td>
<td><em>Solanum melongena</em></td>
</tr>
<tr>
<td>AV-LT</td>
<td>Ulethisi</td>
<td>Lettuce</td>
<td><em>Lactuca sativa</em></td>
</tr>
<tr>
<td>AV-P</td>
<td>Uphizi</td>
<td>Peas</td>
<td><em>Pisum sativum</em></td>
</tr>
<tr>
<td>AV-CR</td>
<td>Izaqatha</td>
<td>Carrot</td>
<td><em>Daucus carota</em></td>
</tr>
<tr>
<td>AV-BT</td>
<td>-</td>
<td>Beetroot</td>
<td><em>Beta vulgaris</em></td>
</tr>
<tr>
<td>AV-SP</td>
<td>Isipinashi</td>
<td>Swiss chard</td>
<td><em>Beta vulgaris var cicla</em></td>
</tr>
<tr>
<td>AV-G</td>
<td>Ugaliki</td>
<td>Garlic</td>
<td><em>Allium sativum</em></td>
</tr>
</tbody>
</table>
4.4 THE ROLE AND FARMING OF INDIGENOUS VEGETABLES

This study had focused mainly on 10 indigenous vegetables identified in the pilot study (Table 4.5) and which are grown and/or utilised in the Ntuze farming community. Five of these are cultivated and five occur naturally in the wild. However, some of these, such as *Bidens pilosa* L. and *Amaranthus*, which are naturally occurring, can be cultivated. All indigenous vegetables under investigation form part of the basic diet to the Ntuze residents.

**Table 4.5: Codes of indigenous vegetables (IVs) of different species utilised in Ntuze**

<table>
<thead>
<tr>
<th>IV code</th>
<th>Vernacular (Zulu)</th>
<th>SA vernacular (English)</th>
<th>Scientific name</th>
</tr>
</thead>
<tbody>
<tr>
<td>IV-AMD</td>
<td>Amadumbe</td>
<td>Taro</td>
<td><em>Colocasia esculenta</em> (L.) <em>Schott</em></td>
</tr>
<tr>
<td>IV-IMBY</td>
<td>Imbuya</td>
<td>Pigweed</td>
<td><em>Amaranthus</em></td>
</tr>
<tr>
<td>IV-ZD</td>
<td>Izindlubu</td>
<td>Bambara</td>
<td><em>Vigna subterranea</em> (L.) <em>Verdc.</em></td>
</tr>
<tr>
<td></td>
<td></td>
<td>groundnuts</td>
<td></td>
</tr>
<tr>
<td>IV-UQ</td>
<td>Uqadolo</td>
<td>Blackjack</td>
<td><em>Bidens pilosa</em> (L.)</td>
</tr>
<tr>
<td>IV-UBH</td>
<td>Ubhatata</td>
<td>Sweet potato</td>
<td><em>Ipomea batatas</em> (L.)</td>
</tr>
<tr>
<td>IV-INTS</td>
<td>Intshungu</td>
<td>Wild cucumber</td>
<td><em>Momordica foedita</em></td>
</tr>
<tr>
<td>IV-IMB</td>
<td>Imbumba</td>
<td>Cowpea</td>
<td><em>Vigna unguiculata</em> (L.) <em>Walp.</em></td>
</tr>
<tr>
<td>IV-UMS</td>
<td>Umsobo</td>
<td>Black nightshade</td>
<td><em>Solanum retroflexum</em> <em>Dunal</em></td>
</tr>
<tr>
<td>IV-MBK</td>
<td>Imbilikiane</td>
<td>-</td>
<td><em>Ipomea plebeia</em> <em>R.Br.</em></td>
</tr>
<tr>
<td>IV-MDB</td>
<td>Umdumbulu</td>
<td>Cassava</td>
<td><em>Manihot esculents</em> <em>Crantz</em></td>
</tr>
</tbody>
</table>
4.4.1 Vegetables grown in the Ntuze community

Figures 4.7 and 4.8 below show the comparison between indigenous vegetables grown and/or utilised in the households of the Ntuze community and the alien vegetables grown by the community.

4.4.1.1 Alien species

Ten alien species that are conventionally utilised in South African households were studied. The findings show that most of these alien species are grown in almost all households of the Ntuze community.

Figure 4.7: Alien species grown in the Ntuze community
4.4.1.2 Indigenous species

Findings point out that the species IV-AMD (100%), IV-UBH (100%), IV-IBMY (97.5%), IV-UQ (97.5%), IV-ZD (87.5%) and IV-MBK (75%) respectively are the IVs most utilised by the Ntuze community. The least utilised IVs are the IV-INTS (40%), IV–IMB (47.5%), IV-UMS (52.5%) and the IV-MDB (52.5%).

Figure 4.8: Indigenous vegetables utilized in the Ntuze community

4.4.2 Cultivation status of alien vegetables and morphological part(s) used

Ten different alien vegetables were included in this study. Almost all of them are used globally and can be grown in home gardens. These vegetables are seasonal and grown mainly using the western methods of production, owing to their non-African origin.
The selected alien vegetables are from seven different families, namely: *Amaranthaceae, Amaryllidaceae, Apiaceae, Asteraceae, Brassicaceae, Fabaceae,* and *Solanaceae*. These crops are mainly used for cooking and seasoning purposes.

Table 4.6: Alien vegetable distribution according to family, cultivation status and parts used

<table>
<thead>
<tr>
<th>IVs code</th>
<th>Family</th>
<th>Growth habit</th>
<th>Cultivation status</th>
<th>Part(s) used</th>
</tr>
</thead>
<tbody>
<tr>
<td>EV-ON</td>
<td><em>Amaryllidaceae</em></td>
<td>Af</td>
<td>C</td>
<td>Ro</td>
</tr>
<tr>
<td>EV-CB</td>
<td><em>Brassicaceae</em></td>
<td>Hr</td>
<td>C</td>
<td>Le</td>
</tr>
<tr>
<td>EV-TM</td>
<td><em>Solanaceae</em></td>
<td>Sw</td>
<td>C</td>
<td>Fr</td>
</tr>
<tr>
<td>EV-EP</td>
<td><em>Solanaceae</em></td>
<td>W</td>
<td>C</td>
<td>Fr</td>
</tr>
<tr>
<td>EV-LT</td>
<td><em>Asteraceae</em></td>
<td>Hr</td>
<td>C</td>
<td>Le</td>
</tr>
<tr>
<td>EV-P</td>
<td><em>Fabaceae</em></td>
<td>Cl; Hr</td>
<td>C</td>
<td>Se</td>
</tr>
<tr>
<td>EV-CR</td>
<td><em>Apiaceae</em></td>
<td>Hr</td>
<td>C</td>
<td>Ro</td>
</tr>
<tr>
<td>EV-BT</td>
<td><em>Amaranthaceae</em></td>
<td>Hr</td>
<td>C</td>
<td>Ro</td>
</tr>
<tr>
<td>EV-SP</td>
<td><em>Amaranthaceae</em></td>
<td>Hr</td>
<td>C</td>
<td>Le</td>
</tr>
<tr>
<td>EV-G</td>
<td><em>Amaryllidaceae</em></td>
<td>Bf</td>
<td>C</td>
<td>Ro</td>
</tr>
</tbody>
</table>

*Growth habit:* Af, annual forb; Hr, herb; Sw, semi-woody; W, woody; Cl, climber; Bf, biennial forb

*Cultivation status:* C, cultivated. *Parts used:* Le, leaves; Se, seed, Ro, root, Fr, fruit. (Researcher’s own construction, modelled from Ntuli et al., 2012)
4.4.3 Growth habit and cultivation status of indigenous vegetables and morphological part(s) used

The 10 different species included in this study are from eight diverse families, namely: *Amaranthaceae*, *Araceae*, *Asteraceae*, *Convolvulaceae*, *Cucurbitaceae*, *Euphorbiaceae*, *Fabaceae*, and *Solanaceae*. These indigenous vegetables grow in different forms, some of which are perennial forbs, shrubs, climbers, woody and semi-woody. The study findings showed that, for most of these indigenous vegetables, the parts that are used the most are their leaves; however, in some instances, seeds, shrubs and tubers are also used.

**Table 4.7: Indigenous vegetable distribution according to family, growth habit and parts used**

<table>
<thead>
<tr>
<th>Indigenous vegetable code</th>
<th>Family</th>
<th>Growth habit</th>
<th>Cultivation status</th>
<th>Part(s) used</th>
</tr>
</thead>
<tbody>
<tr>
<td>IV-AMD</td>
<td><em>Araceae</em></td>
<td>Pf</td>
<td>W</td>
<td>Le</td>
</tr>
<tr>
<td>IV-IMBY</td>
<td><em>Amaranthaceae</em></td>
<td>Hr</td>
<td>W; SD</td>
<td>Le</td>
</tr>
<tr>
<td>IV-ZD</td>
<td><em>Fabaceae</em></td>
<td>Hr</td>
<td>C</td>
<td>Se</td>
</tr>
<tr>
<td>IV-UQ</td>
<td><em>Asteraceae</em></td>
<td>Hr</td>
<td>W</td>
<td>Sh</td>
</tr>
<tr>
<td>IV-UBH</td>
<td><em>Convolvulaceae</em></td>
<td>Cl; Hr</td>
<td>W</td>
<td>Le</td>
</tr>
<tr>
<td>IV-INTS</td>
<td><em>Cucurbitaceae</em></td>
<td>Cl; Sw</td>
<td>W</td>
<td>Le</td>
</tr>
<tr>
<td>IV-IMB</td>
<td><em>Fabaceae</em></td>
<td>Hr</td>
<td>C</td>
<td>Le; Se</td>
</tr>
<tr>
<td>IV-UMS</td>
<td><em>Solanaceae</em></td>
<td>Hr</td>
<td>W</td>
<td>Le</td>
</tr>
<tr>
<td>IV-MBK</td>
<td><em>Convolvulaceae</em></td>
<td>Cl; Hr</td>
<td>W</td>
<td>Le</td>
</tr>
<tr>
<td>IV-MDB</td>
<td><em>Euphorbiaceae</em></td>
<td>W; S</td>
<td>C</td>
<td>Le, Tb</td>
</tr>
</tbody>
</table>

**Growth habit**: Cl, climber; Hr, herb; Pf, perennial forb; S, shrub; Sw, semi-woody; W, woody.  
**Cultivation status**: C, cultivated; W, wild; SD, semi-domesticated. **Parts used**: Le, leaves; Se, seeds, Sh, shoots, Tb, tuber. (Ntuli et al., 2012)
4.4.4 Vegetables of preference and funding support

Findings show that the majority (65%) of the study participants prefer growing indigenous vegetables over alien vegetables (35%). However, 60% indicated that they prefer being funded for alien vegetable production and only 40% stated that they would prefer being funded for indigenous vegetable production.

4.4.5 Reason(s) for preference

The reasons for vegetable preference are summarised in Figure 4.9. Findings indicate that most participants prefer growing indigenous vegetables rather than alien vegetables. Of the overall participants, 20% stated that they preferred growing indigenous vegetables because they were more familiar to them than to alien vegetables. On the contrary, 2.5% of the participants stated that they prefer growing alien vegetables over indigenous vegetables because they were more familiar with alien vegetables.

![Figure 4.9: Distribution according to vegetable preference](image-url)
4.4.6 Farming inputs of the Ntuze smallholder farmers

4.4.6.1 Equipment owned

Findings indicate that 38 of the participants owned hand-hoes and 36 indicated that they owned some form of cold storage equipment (refrigerators). Further, 30 of the participants own wheelbarrows and two own storage houses. Only one of all the participants affirmed that they own irrigation pipes and only one participant indicated ownership of a tractor. None of the farmers own of boreholes.

![Figure 4.10: Distribution according to farming equipment](image)

4.4.6.2 Equipment borrowed and hired

Five participants indicated that they borrow wheelbarrows from neighbours and only one participant indicated borrowing a hand-hoe. None of the other farming equipment is borrowed. Findings also show that 33 of the study participants hired tractors. Other than tractors, no other farming equipment was hired.

83
4.5 USES OF INDIGENOUS VEGETABLES IN THE NTUZE COMMUNITY

The 10 indigenous vegetables under study are utilised in several ways, which vary per individual household. The focus of this section of the questionnaire was to determine the production, uses and economic value of indigenous vegetable amongst the Ntuze farmers.

4.5.1 Agricultural inputs used on vegetables

Figure 4.11 shows the agricultural inputs of the Ntuze farmers used in their vegetable gardens to produce the indigenous and alien vegetables. Findings show that all the study participants made use of seedlings when planting. Many of the participants (97.5%) indicated that they also made use of seeds. One of the fertilisers mostly used in the area was the conventional 2:3:2 (30) fertiliser mixture (used by 90% of respondents), followed by organic manure (used by 85%). A greater fraction of the participants used pesticides and fungicides (75%). The inputs recorded to be used least were herbicides (2.5%).

![Figure 4.11 Distribution according to farming inputs](image_url)

Figure 4.11 Distribution according to farming inputs
4.5.2 Vegetables of convenience

The study participants indicated that, based on their farming experience, indigenous vegetables were the most convenient to grow in the Ntuze community in comparison to alien vegetables. This was affirmed by 87.5% of the participants. Only 12.5% of the participants stated that alien vegetables were convenient to grow in the Ntuze area.

4.5.3 Reason for the purchase of indigenous vegetables

Most of the respondents indicated that the reason why they purchased indigenous vegetables was for eating (57.5%). A further 30% stated that they purchased indigenous vegetables for growing and only a few indicated that they purchased them for re-selling (12.5%).

Figure 4.12: Reason for purchasing indigenous vegetables
4.5.4 Trading of indigenous vegetables

Of the research population, 85% stated that they traded indigenous vegetables that they grew. Some participants (42.5%) traded their indigenous vegetables with neighbours through the bartering system; an equal proportion sold their produce for cash (42.5%). A smaller number (15%) indicated that they did not trade their indigenous vegetables in any form.

4.5.5 Medicinal use of indigenous vegetables

The majority of the study participants (70%) indicated that they made use of indigenous vegetables for medicinal purposes, while 12% indicated that they did not make use of indigenous vegetables for any medicinal benefits. The remaining participants (18%) did not respond to this point. Table 4.8 shows the indigenous vegetables used for medicinal benefits. Five of the IVs under study were found to be of medicinal value to the Ntuze residents. These include the IV-INTS, IV-UQ, IV-UMS, IV-IMBY and the IV-UBH.

Table 4.8: Indigenous vegetables utilised for indigenous medicinal value

<table>
<thead>
<tr>
<th>IVs code</th>
<th>Ailment(s) and/or other medicinal value</th>
</tr>
</thead>
<tbody>
<tr>
<td>IV-UQ</td>
<td>Heart palpitations; Wounds; Arthritis; Regulation of young children’s body temperature; Essential vitamin for young children.</td>
</tr>
<tr>
<td>IV-IMBY</td>
<td>Runny stomach; Immune system booster</td>
</tr>
<tr>
<td>IV-UMS</td>
<td>Blood pressure</td>
</tr>
<tr>
<td>IV-INTS</td>
<td>Blood pressure</td>
</tr>
<tr>
<td>IV-UBH</td>
<td>Abscess</td>
</tr>
</tbody>
</table>
4.5.6 Indigenous vegetable yields

Findings indicated that, among the 10 indigenous vegetables of focus, the IV-UBH was highly harvested, with the IV-INTS being the least harvested. To obtain this data, the study participants were asked to indicate on a scale of 1 to 10 (where 1 was the highest and 10 was the least harvested) which IVs produced much harvest. The table also shows the frequency with which the IVs were mostly used.

Table 4.9: Indigenous vegetable yield (range of use) and harvest frequency

<table>
<thead>
<tr>
<th>IVs code</th>
<th>Use range</th>
<th>Weekly harvest</th>
</tr>
</thead>
<tbody>
<tr>
<td>IV-AMD</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>IV-IMBY</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>IV-ZD</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>IV-UQ</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>IV-UBH</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>IV-INTS</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>IV-IMB</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>IV-UMS</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>IV-MBK</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>IV-MDB</td>
<td>9</td>
<td>9</td>
</tr>
</tbody>
</table>

The tabulated data above show that the IV-UBH vegetable’s yield is highest, followed by the IV-IMBY. In terms of yield, the IV-AMD is the third-most productive indigenous vegetable, respectively followed by the IV-UQ, the IV-ZD, and the IV-MBK, the IV-UMS and the IV-IMB. The least productive IVs in terms of yield were the IV-MDB and IV-INTS respectively.
The data also reflect the order in which the indigenous vegetables were harvested per week, as follows: the IV-UBH was ranked highest, followed (in that order) by the IV-MBY, the IV-AMD as the third most harvested indigenous vegetable, followed by the IV-UQ, the IV-MBK, which (contrary to the weekly harvest) was followed by the IV-ZD. IV-UMS, IV-IMB, IV-MDB and IV-INTS respectively.

4.5.7 Indigenous vegetable methods of preparation

The indigenous vegetables under study are prepared by way of multiple cooking methods, as indicated in Figure 4.13, and are also preserved in a number of different ways, as presented in Figure 4.14.

4.5.7.1 Cooking methods

Four different cooking methods were used for the preparation of indigenous vegetables which include boiling and seasoning with salt, boiling and frying, boiling (without salt), and frying (without pre-boiling).

![Figure 4.13: Indigenous vegetable cooking methods](image)
4.5.7.2 Preservation methods

Six methods were found to be commonly used to preserve the 10 indigenous vegetables under study. Besides using vegetables within the same day of harvesting, these methods included: washing of vegetables and placing them in direct sunlight, drying the vegetables and keeping them in containers (bottles, plastic bags or sacks), boiling the vegetables and refrigerating them thereafter, and storing the vegetables at room temperature. Some respondents indicated that some of the vegetables were not preserved; a greater majority (62.5%) stated that the IV-AMD vegetable was not preserved. Other participants also indicated that they did not know of any preservation methods for some of the indigenous vegetables.

Figure 4.14: Preservation of indigenous vegetables used in the Ntuze Community
Table 4.10 shows that the majority of the farmers (97.5%) cook the IV-AMD vegetable through boiling and seasoning with salt. Although a greater percentage of the respondents (57.5%) boil and fry the IV-IMBY, quite a number of respondents (22.5%) indicated that they only fry the IV-IMBY when cooking. Almost 80% of the study participants (77.5%) only boil the IV-ZD and season them with salt. Fifty percent of the study participants indicated that, when preparing the IV-UQ, they first boil it prior to frying. Various methods of cooking the IV-UBH vegetable were found to be preferred; as a result, none of the cooking methods were used by a greater majority. Approximately forty eight percent (47.5%) of the study participants indicated that they boil the IV-UBH and season it with salt. However, 42.5% of the respondents indicated that they boil the IV-UBH without any seasoning. Contrary to the findings related to the other IVs under study, most of the study participants (72.5%) indicated that they did not know how the IV-INTS is cooked. Like the IV-UBH, the farmers indicated different cooking methods for the IV-IMB, IV-UMS, IV-IMBK and IV-MDB.
Table 4.10: Method(s) of cooking indigenous vegetables

<table>
<thead>
<tr>
<th></th>
<th>Boil and season with salt</th>
<th>Boil (without salt)</th>
<th>Boil and fry</th>
<th>Fry</th>
<th>Unknown</th>
</tr>
</thead>
<tbody>
<tr>
<td>IV-AMD</td>
<td>97.5</td>
<td>2.5</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>IV-IMBY</td>
<td>15</td>
<td>2.5</td>
<td>57.5</td>
<td>22.5</td>
<td>2.5</td>
</tr>
<tr>
<td>IV-ZD</td>
<td>77.5</td>
<td>20</td>
<td>-</td>
<td>-</td>
<td>2.5</td>
</tr>
<tr>
<td>IV-UQ</td>
<td>22.5</td>
<td>7.5</td>
<td>50</td>
<td>20</td>
<td>-</td>
</tr>
<tr>
<td>IV-UBH</td>
<td>47.5</td>
<td>42.5</td>
<td>5</td>
<td>5</td>
<td>-</td>
</tr>
<tr>
<td>IV-INTS</td>
<td>5</td>
<td>17.5</td>
<td>-</td>
<td>5</td>
<td>72.5</td>
</tr>
<tr>
<td>IV-IMB</td>
<td>35</td>
<td>15</td>
<td>5</td>
<td>15</td>
<td>30</td>
</tr>
<tr>
<td>IV-UMS</td>
<td>10</td>
<td>5</td>
<td>30</td>
<td>7.5</td>
<td>47.5</td>
</tr>
<tr>
<td>IV-IMBK</td>
<td>17.5</td>
<td>10</td>
<td>40</td>
<td>10</td>
<td>22.5</td>
</tr>
<tr>
<td>IV-MDB</td>
<td>27.5</td>
<td>25</td>
<td>2.5</td>
<td>-</td>
<td>45</td>
</tr>
</tbody>
</table>

Table 4.11 shows that the majority of the study participants (62.5%) stored the IV-AMD at room temperature as a preservation method. Almost 28% (27.5%) indicated that the IV-IMBY was preserved through boiling and refrigerating, and 25% indicated that they preserve the same vegetable through refrigeration in its natural state without prior boiling. Half (50%) of the study participants indicated that they did not know how the IV-MDB is preserved and more than half (57.5%) indicated that they did not know how the IV-INTS is preserved. Regarding the IV-UMS, 55% stated that this vegetable is stored in the refrigerator after boiling.
### Table 4.11: Method(s) of preservation of indigenous vegetables

<table>
<thead>
<tr>
<th>IV-CODE</th>
<th>PRESERVATION METHOD</th>
<th>Use within same day of harvest</th>
<th>Wash and place under the sun</th>
<th>Dry and place in a container</th>
<th>Boil and refrigerate</th>
<th>Store at room temperature</th>
<th>Refrigerate (un-cooked)</th>
<th>Not preserved</th>
<th>Do not know</th>
</tr>
</thead>
<tbody>
<tr>
<td>IV-AMD</td>
<td></td>
<td>15</td>
<td>7.5</td>
<td>7.5</td>
<td>-</td>
<td>62.5</td>
<td>2.5</td>
<td>2.5</td>
<td>2.5</td>
</tr>
<tr>
<td>IV-IMBY</td>
<td></td>
<td>2.5</td>
<td>2.5</td>
<td>2.5</td>
<td>27.5</td>
<td>7.5</td>
<td>25</td>
<td>5</td>
<td>2.5</td>
</tr>
<tr>
<td>IV-ZD</td>
<td></td>
<td>12.5</td>
<td>20</td>
<td>7.5</td>
<td>7.5</td>
<td>45</td>
<td>2.5</td>
<td>2.5</td>
<td>2.5</td>
</tr>
<tr>
<td>IV-UQ</td>
<td></td>
<td>27.5</td>
<td>-</td>
<td>2.5</td>
<td>35</td>
<td>2.5</td>
<td>25</td>
<td>5</td>
<td>2.5</td>
</tr>
<tr>
<td>IV-UBH</td>
<td></td>
<td>10</td>
<td>27.5</td>
<td>5</td>
<td>10</td>
<td>40</td>
<td>2.5</td>
<td>2.5</td>
<td>2.5</td>
</tr>
<tr>
<td>IV-INTS</td>
<td></td>
<td>12.5</td>
<td>2.5</td>
<td>2.5</td>
<td>2.5</td>
<td>12.5</td>
<td>7.5</td>
<td>2.5</td>
<td>57.5</td>
</tr>
<tr>
<td>IV-IMB</td>
<td></td>
<td>5</td>
<td>25</td>
<td>2.5</td>
<td>5</td>
<td>42.5</td>
<td>7.5</td>
<td>2.5</td>
<td>10</td>
</tr>
<tr>
<td>IV-UMS</td>
<td></td>
<td>25</td>
<td>-</td>
<td>-</td>
<td>55</td>
<td>2.5</td>
<td>12.5</td>
<td>2.5</td>
<td>2.5</td>
</tr>
<tr>
<td>IV-IMBK</td>
<td></td>
<td>27.5</td>
<td>2.5</td>
<td>-</td>
<td>30</td>
<td>2.5</td>
<td>15</td>
<td>2.5</td>
<td>20</td>
</tr>
<tr>
<td>IV-MDB</td>
<td></td>
<td>12.5</td>
<td>-</td>
<td>-</td>
<td>5</td>
<td>22.5</td>
<td>5</td>
<td>5</td>
<td>50</td>
</tr>
</tbody>
</table>

### 4.5.8 Most preferred indigenous vegetables

Findings indicated that the most preferred indigenous vegetables were the IV-IMBY, followed by the IV-AMD. The IV-IMBK was the third-most preferred, followed by another leafy vegetable, the IV-UQ. The IV-UBH was the fifth-most preferred indigenous vegetable, followed by the leafy IV-UMS. The IV-INTS, IV-UMD, IV-IMB, and IV-ZD were the least preferred indigenous vegetables, respectively.
Table 4.12: Indigenous vegetables of preference

<table>
<thead>
<tr>
<th>IVs code</th>
<th>Monthly harvest</th>
</tr>
</thead>
<tbody>
<tr>
<td>IV-AMD</td>
<td>2</td>
</tr>
<tr>
<td>IV-IMBY</td>
<td>1</td>
</tr>
<tr>
<td>IV-ZD</td>
<td>7</td>
</tr>
<tr>
<td>IV-UQ</td>
<td>4</td>
</tr>
<tr>
<td>IV-UBH</td>
<td>5</td>
</tr>
<tr>
<td>IV-INTS</td>
<td>10</td>
</tr>
<tr>
<td>IV-IMB</td>
<td>8</td>
</tr>
<tr>
<td>IV-UMS</td>
<td>6</td>
</tr>
<tr>
<td>IV-MBK</td>
<td>3</td>
</tr>
<tr>
<td>IV-MDB</td>
<td>9</td>
</tr>
</tbody>
</table>

4.5.9 Farming support

Findings show that the majority (82.5%) of the participants did not receive any form of support from any external stakeholders for their farming activities. Only 17.5% of the respondents indicated receiving support from external stakeholders. The only source of support that the farmers received, as indicated by the 17.5% of the study participants, was from the Department of Agriculture, Forestry and Fisheries (DAFF).
4.5.10 Indigenous vegetable cultivation

Figure 4.15 below indicates that the majority of the farmers (63%) have cultivated indigenous vegetables their entire lives. A further 15% have been involved in the cultivation of indigenous vegetables for between 21 and 30 years.

![Cultivation period](image)

**Figure 4.15: Indigenous vegetable cultivation period**

A smaller proportion (12%) of the farmers indicated that they had been cultivating indigenous vegetables for less than 5 years. A further 5% of the respondents indicated that they had been cultivating indigenous vegetables for 6 to 10 years. Similarly, another 5% indicated that they had cultivated indigenous vegetables between 11 and 20 years.
4.5.11 Source of knowledge about indigenous vegetables

Findings show that more than half (55%) of the study participants sourced their knowledge for indigenous vegetables from their parents’ instruction. Approximately a third (33%) of the study population indicated that they also learnt from their parents while growing up, but only through passive observation. Neighbours and friends also played a role as a source of knowledge to some of the farmers (7.5%). Only 5% of the respondents indicated that they sourced their knowledge of indigenous vegetables from their grandparents. Of all the sampled participants, none attributed their knowledge regarding indigenous vegetables to any formal education from school or any other related sources.

4.5.12 Extension services

The majority (62.5%) of the study participants indicated that there were no agricultural extension advisors in the Ntuze area – but 37.5% of the same study population stated that there were agricultural advisors. Of the 15 farmers that indicated the presence of extensionists in the Ntuze community, 33% stated that the extensionists advise them about indigenous vegetable production and use. The remaining 67%, however, stated that agricultural advisors had never given advice on indigenous vegetables. To the contrary, 60% of the participants who confirmed the existence of extension agents stated that, based on their experience of the extensionists, these agricultural advisors were of benefit to the farmers; the remaining 40% indicated that extensionists were not of any benefit to the farmers in the Ntuze area.
4.6 RELATIONSHIPS BETWEEN VARIABLES

4.6.1 Climatic conditions and species of preference

The climatic conditions had no influence on the preferred species between the indigenous and alien species (p > 0.05, n = 40). Since the observed P-value was 0.8021, there is no significant interaction between the two dependant variables.

4.6.2 Income generated through agricultural production and trade of indigenous vegetables

The trade of indigenous vegetables had an influence on the income generated through agricultural production (p < 0.05, n = 40). Since the observed P-value was 0.000294, a significant relationship exists between the trading of indigenous vegetables and income generated from agricultural production.

4.6.3 Farm activity support and trade of indigenous vegetables

The farming support given to the Ntuze farmers had no direct influence on the trading of the indigenous vegetables produced (p > 0.05, n = 40). Since the observed P-value was 0.9535, no significant relationship exists between the trading of indigenous vegetables and the farming support received by the farmers.

4.6.4 Indigenous vegetables used for medicinal value and employment status

The participants' employment status did not influence their use of indigenous vegetables for medicinal benefits (p > 0.05, n=40). Since the observed P-value was 0.5630, no significant relationship exists between the use of indigenous vegetables for medicinal value and employment status.
4.6.5 Land size and sugarcane

No direct influence was observed between the production of sugarcane and the area of land owned by the Ntuze smallholder farmers ($p > 0.05$, $n = 40$). Since the observed P-value was 0.5073, there is no significant interaction between the area of land owned and sugarcane production.

4.6.6 Sugarcane and income generated through agricultural production

Findings indicate no link between the production of sugarcane and income generated through agricultural production ($p > 0.05$, $n = 40$). The observed P-value was 0.8849; therefore, no significant relationship exists between the two variables.

4.6.7 Species of preference and cultivation period

The period of cultivation had no influence on the preferred species ($p > 0.05$, $n = 40$). Since the observed P-value was 0.5997, no mutual relationship exists between the species of preference (both alien and indigenous vegetables) and the period of cultivation.

4.6.8 Species of preference and farming inputs

The farming inputs had no influence on the species of preference ($p > 0.05$, $n = 40$). Since the observed P-values on the tested variables are greater than the significance value of $P=0.05$, there is no significance relationship that exists between the different farming inputs and the species of preference.
Table 4.12: Relationship between the farming inputs and species of preference

<table>
<thead>
<tr>
<th>Variables</th>
<th>df</th>
<th>Chi-square</th>
<th>P-value (0.05)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Species of preference &amp; (pesticides / herbicides)</td>
<td>4</td>
<td>6.4038</td>
<td>0.1709</td>
</tr>
<tr>
<td>Species of preference &amp; seedlings</td>
<td>1</td>
<td>1.9048</td>
<td>0.1675</td>
</tr>
<tr>
<td>Species of preference &amp; compost</td>
<td>1</td>
<td>0.1178</td>
<td>0.7314</td>
</tr>
<tr>
<td>Species of preference &amp; 2:3:2 (22)</td>
<td>1</td>
<td>3.0139</td>
<td>0.0826</td>
</tr>
</tbody>
</table>

4.6.9 Indigenous vegetable yields and extension services

The extension services rendered to the Ntuze smallholder farmers had no perceived influence on their indigenous vegetable yields ($p > 0.05$, $n = 40$). Since the observed $P$-values on the tested variables are greater than the significance value of $P=0.05$, there is no significant relationship that exists between the indigenous vegetable yields obtained and the extension services.

4.6.10 Indigenous vegetables and climatic conditions

Findings indicate that the climatic conditions in the Ntuze community had no perceived influence on the indigenous vegetables produced ($p > 0.05$, $n = 40$). Since the observed $P$-values on the tested variables are greater than the significance value of $P=0.05$, there is no significant relationship that exists between the prevailing climatic conditions and the indigenous vegetables.
4.7 MAIN THEMES: CHALLENGES ENCOUNTERED DURING THE CULTIVATION OF INDIGENOUS VEGETABLES

**Question:** What are the main challenges experienced with planting indigenous vegetables?

**THEME 1:** Negative influences of climate on growing indigenous vegetables. Two themes persist in the discussions on extreme climate influence [9 respondents out of the 40 interviewed].

- Drought and insufficient water
  - “Due to scarcity of rains in the past few years, our land is very dry.” R27
  - “To thrive in areas that have severe drought. They just get burnt.” R28

- Heavy rains’ influence on soils
  - “There is severe drought while some other years, like this year, there is just heavy rains.” R21
  - “Most of my crops this year were washed away due to heavy rains.” R12

**THEME 2:** Damage to crops due to soil pests – mainly soil-borne worms [7 respondents out of the 40].

- “The only thing that ever stands a chance of growing when I try to plant it is sweet potatoes, but then again worms find security in them.” – R4
- “Sometimes we harvest nothing – especially the likes of sweet potatoes and *amadumbe*. There are these underground worms that eat our crops.” – R1
THEME 3: Damage to crops from animals [9 respondents out of 40].

- Monkeys, jackals, chickens and crabs
  - “Monkeys do the harvesting for us. Those things are troublesome and what irritates the most about them is that they fight when you try to get rid of them.” R22
  - “Clay soil hinders root development and monkeys eat our produce.” R38
  - “Wild animals like jackals and monkeys just never cease to provoke us.” R37
  - “I hate everything that’s four-legged. Jackals, rabbits and monkeys are our worst enemies in this area.” R39

Other code associations

- The soils are mainly clay and are susceptible to water-logging, which may have induced rot and reduction in soil pests.
- Respondent spoke about dry lands, which was associated with the influence of drought and water resources.

Other observations and researcher’s notes:

- Monkeys are a problem in only certain areas of the village
- The respondents referred to terms such as “working backwards”, “slave”, “waste of our time” and “strength”, which may be indicators of the hard work required for this type of crop production.
- The predominant challenges originated from the soil in response to this question. Associated with pests, inputs, moisture, clay and heavy rains.
4.8 RESPONDENTS OPINIONS OF AGRICULTURAL EXTENSION SERVICES

Question: Are agricultural advisors of benefit to the farmers?

THEME 1: Contributing influences of agricultural extension officers on the farmers and their production. [7 respondents out of the 40]

- New information
  - “…information that we do not know, like mixing ground aloe with irrigation water to kill pests on crops…” R2
  - “They give us good advice and keep us up to date with new information.” R11
  - “They give advice about what to plant, how to plant, when to plant and how much space to leave in between the rows.” R20

- Health awareness
  - “…because they encourage us to grow vegetables and eat healthy foods.” R12

- Supply of farming inputs
  - “…they provide us with seeds sometimes.” R11
  - “They are of benefit to us, because sometimes they provide us with seeds.” R17
• Market identification
  
  - “Yes, they are useful, because without them we wouldn’t have market days.” R5

THEME 2: Negative influences in relation to extension services [7 respondents out of the 40]

• Poor-quality inputs
  
  - “Even if they give us seedlings, they just do not grow!” R4
  - “They provide us with ‘special seeds’ of poor quality which never grow.” R16

• Limited contact with farmers
  
  - “…they only meet with us once in a blue moon.” R4
  - “We only see them once in a while.” R23
  - Agricultural advisors do not deliver the expected services as they should.
    Respondent 15 complains that the advisors never visit farmers and further states that they forget that they are employed to serve the farmers

• Favouritism
  
  - “They have specific people that they assist.” R7
  - “Generally, the work of an agricultural advisor is (to) work with the whole community, but these ones only work with specific people.” R15
Other observations and researchers notes:

- Despite the poor extension service in the area, the farmers are doing their best to produce what they can. One respondent says: “We do not see any of their work, yet they are there; no markets, nothing, yet we’ve got good yields.” R29

- Some of the farmers have good yields but cannot identify potential markets to sell their produce. One respondent stated: “There is just no progress – We do not see any of their work, yet they are there - no markets, nothing, yet we’ve got good yields. They have their own people whom they work with.”

- There is a discrepancy between the farmers’ knowledge. Respondent 5 states that without extension officers there would not be any market dates, while Respondent 29 complains of the specialists’ incompetence as farmers have no markets where they can sell their produce.

- Farmers are aware of the role that should be played by the advisors and are dissatisfied with the lack of service delivery.

- Poor work ethic from the extension officers.
4.9 INDIGENOUS VEGETABLES USED FOR PERCEIVED MEDICINAL VALUE

Question: How are indigenous vegetables used for medicinal purposes?

THEME 1: Perceived benefits of growing indigenous vegetables for general medicinal uses. [21 respondents out of the 40].

- Treatment for blood pressure (BP)
  - "I also use intshungu to suppress blood pressure." R1
  - "Intshungu suppresses blood pressure." R5
  - "Old people use intshungu for BP." R7
  - "Intshungu is the only thing that is popular in this area, because almost everyone who is above the age of 60 uses it to cure BP." R10

- Cure for abscess and wounds
  - "Ubhatata leaves are used to cure a tumour." R22
  - "Ubhatata ripens abscess." R21
  - "I know of uqadolo which heals wounds." R34

- Runny stomach
  - "Imbuya is used for a runny stomach." R6

- Heart-related conditions
  - "I know for a fact that uqadolo is used when one has heart problems." R2
THEME 2: Perceived well-being. [3 respondents out of the 40]

- Immune system booster
  - “I use *imbuya* to boost my immune system.” R1
  - “Blackjack aids as an essential vitamin supplement for young children.” R4

- Body temperature regulation
  - “*uqadolo* is helpful for controlling young children’s temperature.” R3

Other code associations

- Some respondents are not knowledgeable about the use of indigenous vegetables for medicinal benefits. One participant states: “I’ve heard people saying that …” – R2. Others have limited information: “I do not know about the other vegetables.” R13

- Some of these vegetables are difficult to access, such as *Intshungu*. Respondent 11 states that “it is not very easy to access now”.

- Different methods of preparation and use of indigenous vegetables as medicine:
  - “You grind it and mix it with water, carefully sieve it and drink the juice extract.” R6
  - “You grind the leaves and mix with sugar to form a paste and then apply the paste on the abscess so that it ripens faster.” R21
  - “Its leaves are ground and mixed with sugar to form a paste.” R22
• Some IVs are mostly used by the elderly rather than for children. There are traditional healers in the area; one of the respondents' states: “I am a sangoma: what you are asking me is closely related to my field of expertise.” R17

• According to some respondents, indigenous vegetables are easy to access “They all grow naturally in the wild and they are quite easy to access.” R15
4.10 OTHER SOURCES OF INCOME

**Question:** What other sources of income do you have in the household?

**THEME 1:** Income generated through trade of agricultural and non-agricultural goods and services. [18 respondents out of the 40]

- **Sugarcane and timber production**
  - “We also grow sugarcane here and it has fairly good financial returns.” R4
  - “Do you see this cane field? It’s all ours here at home. We are planning to expand it…” R6
  - “We have sugarcane, which generates us good cash during its season.” R34
  - “We grow sugarcane and also have timber plantations.” R35

- **Sale of non-agricultural goods**
  - “People need convenience products and foods; for example, some houses do not have electricity and they need candles for light.” – R9
  - “I sell traditional beer. It is one of the most profitable businesses one could ever venture into in this area.” R28
  - “We sell water containers to the locals and in town.” R36

- **Street vending**
  - “I am a street vender. I sell what I produce in my garden.” R3

- **Personal skills**
  - “I am a hairdresser and that is the only way in which I make money.” R37
THEME 2: Economic and related challenges and initiatives [11 respondents out of the 40]

• Lack of job opportunities
  - “We need jobs, and no-one is hiring these days.” R1
  - “We are actually in need of some sort of financial support.” R5
  - “There’s a scarcity of jobs and no-one employs uneducated people.” R29

• Government support grant
  - “We only depend on the government funds.” R17
  - “What other source of income could there be for people like us except for grant money?” R18
  - “In this household we solely depend on pension money – nothing else.” R25

• Infrastructural development: Electricity
  - “I really wish though that this government project of installing electricity house-to-house becomes a success.” R9
Other themes:

- Social status

  - “He’s old, so he asked that we should make use of his land before the chief takes it.” R6 [Tribal authority: Land ownership]
  
  - “Write there that I am self-employed – not a street vendor!” (laughs) R3 [Embarrassment: mode of income generation]

- Respect for culture: one respondent stated: “People in this community prefer killing live chickens than buying meat injected with brine. It only makes sense, because not long ago people only ate indigenous free-range chickens, which are totally different from what you get at the supermarkets.” R13

- Some people do informal work such as domestic work: “I am a domestic worker.” R30

- “We occasionally sell indigenous vegetables for cash.” R34

- “I only sell vegetables. In fact, I supply them to street vendors in town.” R23

- People do not like using IV-UMD because it is believed to have perceived health risks. One respondent states that “we don’t even attempt eating umdumbulu in this household because of its toxic effects”. R17
5.1 INTRODUCTION

A summary of the findings of the current study and recommendations in relation to the utilisation and role that is played by indigenous vegetables toward ensuring a sustainable livelihood for the Ntuze farming community is now presented. This final chapter discusses the farmer's perceptions of the socio-economic contribution of indigenous vegetables on the community of the Ntuze farmers. The following three primary set objectives are addressed:

(i) Determining the farmers' knowledge and use of indigenous vegetables.
(ii) Measuring how indigenous vegetables contribute to food security.
(iii) Identifying the utilised and unutilised functions of indigenous vegetables in smallholder agriculture.
5.2 FARMERS’ KNOWLEDGE AND USE OF INDIGENOUS VEGETABLES

5.2.1 Dominant indigenous vegetables

Ten indigenous vegetables were identified in the Ntuze community, of which five occur naturally in the wild, namely: *Amaranthus, Bidens pilosa, Ipomea plebeia R, Br., Momordica africana* and *Solanum retroflexum Dunal*. Five cultivated indigenous vegetables were also identified, including: *Colocasia esculenta (L.) Schott, Ipomea batatas (L.), Manihot esculenta Crantz, Vigna subterranea (L.) Verdc.* and *Vigna unguiculata (L.) Walp*. In the Ntuze rural area the sweet potato plant (*Ipomea batatas (L.)*) was found to be the most dominant cultivated indigenous vegetable, followed by the taro (*Colocasia esculenta (L.) Schott*) and Bambara groundnut (*Vigna subterranea (L.) Verdc.*) respectively. Amongst the wild vegetables, pigweed (*Amaranthus*) was identified as the most dominant, followed by blackjack (*Bidens pilosa*).

Overall, the quantitative survey results ascertained that five indigenous vegetables were the most popular and most utilised in the community, namely: *Amaranthus, Bidens pilosa, Colocasia esculenta (L.) Schott, Ipomea batatas (L.) and Vigna subterranea (L.) Verdc.* The following section will therefore provide a discussion on the above vegetables and their significance to the Ntuze farmers.
5.2.1.1 Pigweed (*Amaranthus*)

*Amaranthus*, commonly known as *imbuya* to the Ntuze community, is a naturally occurring leafy vegetable that grows in the wild. The crop forms part of the diet within the community’s households and has been proven to be highly nutritious (Flyman & Afolayan, 2006; Jansen van Rensburg *et al.*, 2004). The crop grows mainly as a summer annual weed crop in areas that are, or have been previously, cultivated. There are several perceived health benefits that the Ntuze farmers associate *Amaranthus* with, such as a cure for stomach-ache and boosting of the immune system. This plant of the Amaranthaceae family grows above ground level, with an upright structure resembling that of *Bidens pilosa (L.)*. By virtue of the plant growing naturally as a weed crop, it does not require any water for irrigation, nor does any farming input to exponentiate its yield. The Ntuze farmers appreciate this crop as it is readily available, easy to access and easy to prepare.

5.2.1.2 Blackjack (*Bidens pilosa (L.*)*)

The *Bidens pilosa (L.*)* crop plant forms part of the Asteraceae family. The plant grows elongated vigorously above soil surface. Similar to *Amaranthus*, the plant is considered to be one of the most problematic weeds that the Ntuze farmers have to deal with on cultivated land, especially when it has fully matured and cannot be harvested for consumption. The *Bidens pilosa (L.*)* plant bears needle-like black seeds as its fruit. This part of the plant is not edible but can be used for replanting. The edible parts mostly used are the leaves, which are prepared like *Spinacia oleracea*, and the stem which, together with the leaves, is boiled when used for curative purposes.
The *Bidens Pilosa* (L) crop plays a very important role in filling the gap between hunger and food security in the Ntuze community as it is used complementarily with rice and maize meal. The crop does not require water for irrigation and thrives under extreme, hot temperatures. It is also appreciated for its multi-purpose medicinal benefits.

### 5.2.1.3 Taro (*Colocasia esculenta* (L.) Schott)

*Colocasia esculenta* (L.) *Schott* is a tropical crop plant which is mostly cultivated along river banks, favouring moist soils. It is commonly known as *amadumbe* to the Ntuze community and the larger KwaZulu-Natal region. Findings indicate that the *Colocasia esculenta* (L.) *Schott* plant is the second-most utilised cultivated indigenous vegetable, following *Ipomea batatas* (L.). However, no traditional uses and/or health benefits were found to be associated with this species. To the contrary, a study by Prajapati, Kalariya, Umbarkar, Parmar and Sheth (2011:92) points out that the plant has numerous traditional uses, such as a cure for diarrhoea.

### 5.2.1.4 Sweet potato (*Ipomea batatas* (L.))

Among the five cultivated vegetables forming part of this study, *Ipomea batatas* (L.) was found to be the most preferred by almost all households. Growing this crop is advantageous to the Ntuze farmers due to its multi-purpose uses (such as its medicinal use as a cure for abscesses, as well as for consumption and income generation) and most importantly because it is treated as a rain-fed crop that does not require water for irrigation. The *Ipomea batatas* (L.) plant which belongs to the Convolvulaceae family resembles the *Vigna subterranean* (L.) *Verdc*. Its stem creeps along the surface, above the ground. In the Ntuze community, *Ipomea batatas* (L.) is the most dominant utilised cultivated crop.
According to the respondents, the *Ipomea batatas* (*L.*) crop can be grown throughout all four growing seasons, regardless it being identified as a summer crop. It is generally known for its versatility due to its ability to adapt to variable climatic conditions, as well as its nutritional and non-nutritional value. Previous studies have also found the leaves and shoots of *Ipomea batatas* (*L.*) to constitute excellent fodder for herbivores, rabbits and livestock (Zannou, Gbaguidi & Dahouenon, 2017:85).

5.2.1.5  **Bambara groundnut (**Vigna subterranea** (**L.**) **Verdc.)**

*Vigna subterranea* (**L.**) **Verdc.** is a Fabaceous plant with a creeping stem at surface level. Its vegetative part resembles that of *Ipomea batatas* (*L.*), while its seeds resemble those of a bean plant. In the Ntuze area, the crop is mostly planted during the summer season. Although the respondents are of the opinion that this crop cannot be used as a main dish, it still plays an important role within the households as it is eaten as a snack. Like many other indigenous plants, the *Vigna subterranea* (**L.**) **Verdc.** is a water-friendly crop that does not require to be irrigated. No medicinal benefits were found to be linked to this crop.

5.2.2  **The effect of gender and age on the knowledge of and preference for indigenous vegetables**

Results from the survey suggest that the predominant demographic characteristic of the Ntuze farming community was that the community is mostly constituted by elderly women, with an average family size that ranged from 6 to 10 members per household. These findings concur with those of Agboola (2001), whose observation suggested that rural women are the primary vegetable producers. However, this is contrary to Sabo and Dia (2009), whose findings indicated that small-scale vegetable farming was gender-sensitive to the male gender.
In line with the trend in terms of the distribution of age in relation to the cropping systems of northern KwaZulu-Natal as asserted by Lewu & Assefa (2009:1151), 65% of the respondents were over the age of 50 and thus in their inactive stage. This figure suggests that if indigenous farming knowledge is not passed on to the younger generations, the indigenous farming population in the Ntuze farming community could be in decline in the near future – resulting in a negatively skewed implication for food security in the area.

It was also discovered that the elderly were much more informed about the production and use of indigenous vegetables in comparison to the younger generation. As such, the majority of the respondents who expressed their interest in indigenous vegetables were the elderly.

One elderly woman stated “...mina ungibona nje, angiziboni ngiphila ngaphandle kokudla kwesintu. Ngingaka nje kungenxa yakho.” (…I do not see myself living without indigenous food. It is because of it that I have grown to be this old.) On the other hand, the younger generation seemed to lack knowledge of these indigenous vegetables. As such, they prefer alien vegetables over the indigenous ones. Another elderly woman stated: “Lapha ekhaya yimi kuphela odla imfino yesintu, uma ngiyivunile elami ibhodwe liphekwa lodwa eceleni” – meaning that she is the only one in the household that eats indigenous leafy vegetables; if she has harvested these vegetables, her pot is prepared separately.
5.2.3 Vegetable convenience

There was a conflict of opinions among the respondents with regards to the convenience brought about by the indigenous and alien vegetable species. Some respondents felt that growing alien vegetables was more convenient than growing indigenous vegetables due to the reason that alien vegetables are eaten by everyone within the households including the younger generation, whereas indigenous vegetables are mostly consumed by the elderly. These findings are aligned with those of Matenge et al. (2012:2248), who found that the younger generation mostly preferred western foods over indigenous foods.

5.2.3.1 Water requirements

Most respondents found indigenous vegetables to be of convenience as they do not require much water for irrigation and their ability to withstand extreme climatic conditions. According to Slabbert, Spreeth and Kruger (2004:116), in areas where inhabitants depend on agriculture for subsistence, drought is a permanent constraint that farmers face; however, indigenous plants are able to survive periods of water deficit.

5.2.3.2 Benefits of indigenous vegetables

One of the widespread universal problems in developing countries is that of micronutrient deficiency, which results in poor health, unproductivity, high rates of mortality and morbidity (Flyman & Afolayan, 2006:492). Several studies have, however, indicated that indigenous vegetables (both wild and cultivated), have the ability to alleviate human dietary deficiencies (Flyman & Afolayan, 2006; Jansen van Rensburg et al., 2003, Kucich & Wicht, 2016).
Other than the supplementation of diets, 50% of the indigenous vegetables were found to be of medicinal benefits. One respondent stated that when consuming Swiss chard, she does not feel as good as compared to when she ingests Amaranth. In her words, the participant stated “….uyabona nje ispinashi asingisizi ngalutho, siyangisuthisa nje kodwa asenzi nolunci emzimbeni. Hhayike ngingike imbuya phela, ngivuka ngibe umqemane.” (You see, spinach does not help me in any way; it fills up my stomach but it adds no value to my body. On the other hand, imbuya gives me strength). The study findings thus concur with those of Ntuli et al. (2012:6034) who stated that indigenous vegetables with therapeutic value are species that grow naturally from the wild.

5.2.3.3 Availability and accessibility

Indigenous vegetables are of convenience to the Ntuze smallholders owing to their availability and ease of access. According to the field survey findings, indigenous plants, and particularly wild vegetables, are almost always available and accessible as they grow naturally throughout the year. These vegetables are essential to the farmers, whose food survival strategy includes the consumption of wild vegetables in the event of unforeseen circumstances. Mnguni and Giampiccoli (2015:24) point out that the use of indigenous leafy vegetables during the winter season helps in addressing food shortages. Of the cultivated vegetables, Ipomea batatas (L.) was found to be the only crop that farmers are able to grow throughout the year.

5.2.3.4 Meal preparation

Unlike alien vegetables, indigenous crops were found to be easy to prepare. Most of the cultivated indigenous vegetables are prepared simply through boiling and seasoning with salt.
This limited use of cooking ingredients helps with saving on oil, spices and other products used during food preparation. The non-cultivated indigenous vegetables, however, can either be prepared like Swiss chard or simply be consumed boiled without any additional seasoning. These non-cultivated vegetables are all leafy and mostly serve as a source of relish. One of the common concerns raised by the respondents was that the younger generation did not like “ukudla kwesintu” (heritage food), and more precisely the wild leafy vegetables. As such, old people mostly savoured these vegetables, which are mostly preferred boiled due to health concerns.

5.2.3.5 Heritage and popularity

The Ntuze community is endowed with a wide variety of indigenous vegetables that are part of the Zulu cultural heritage. These vegetables are widespread in the northern region of KwaZulu-Natal (Lewu & Mavengahama, 2010; Modi et al., 2006; Ntuli et al., 2009). While indigenous vegetables are perceived as ‘low-status food’ (Keatinge, Wang, Dinnsa & Ebert, 2015:2), their diversity is an important part of the Zulu cultural heritage – especially in terms of food security.

5.2.3.6 Financial benefits

The production and use of indigenous vegetables have financial advantages. The Ntuze farmers pointed out that these vegetables do not require pesticides and/or herbicides during production. If there are weeds, they are either removed by hand or by using a hand-hoe. Preparation of some of these vegetables only require boiling and seasoning with salt. In essence, they help in saving cooking ingredients required in the preparation of other foods.
5.2.4 Perceived medicinal and health benefits

The results showed that the IV-UQ (*Bidens pilosa* (L.)) was perceived to have many medicinal benefits in comparison to the other four cultivated indigenous vegetables. A total of five medicinal and therapeutic benefits were found to be associated with the use of *Bidens pilosa* (L.), namely: the reduction of heart palpitations, curing of wounds, arthritis, and regulation of young children’s body temperature. It also aids as an essential vitamin for young children. The current findings do not agree with those of Faber *et al.* (2010:34), who found that the leaf extract of *Bidens pilosa* (L.) was given to children to drink for curing flu and also to help relieve high blood pressure.

Current findings indicate that the *Amaranthus* crop was valued because of its therapeutic ability to cure stomach-ache and for boosting the immune system. In support of this, Faber *et al.* (2010:33) recorded that the *Amaranth* plant aided as an energy booster. *Momordica africanus* and *Solanum retroflexum* Dunal were both found to help with the lowering of high blood pressure. Only the *Ipomea batatas* (L) vegetable was found to be of use to cure abscesses.
5.3 THE CONTRIBUTION OF INDIGENOUS VEGETABLES TO THE NTUZE COMMUNITY

Food security, as defined by the United Nations Food and Agricultural Organisation (FAO, 1996), exists when everyone has unlimited access to sufficient, safe and nutritious food. As a step towards assessing the contribution of indigenous vegetables on food security, the four pillars of food security were explored in relation to the Ntuze farmers’ demographic characteristics.

5.3.1 The Ntuze smallholder farm households’ food security status

In terms of smallholder agriculture, South Africa faces the challenges of limited farming resources and market accessibility. These are among the critical challenges affecting smallholder food security. Although the Ntuze households have access to indigenous vegetables, some of them are still food insecure due to family size, food prices, household monthly income and market accessibility.

5.3.1.1 Gender of household head

The gender of the household head has an influence on the state of food security within the household. The survey indicated that households were mostly headed by women, of which the majority were unemployed and either depended on a social grant for survival or income from selling agricultural produce. Abu and Soom (2016:60) assert that the dependency ratio of female-headed households is usually higher. This level of dependency could be attributed to the fact that women that are household heads tend to be older and less educated than their male counterparts (FAO, 2012).
5.3.1.2 Cultural influence on household livelihood

The indigenous vegetables identified for purposes of this study form part of the Ntuze smallholder farmers' heritage. As such, these vegetables are valued as they form an integral part of the farmers’ livelihood and overall well-being. Almost all households in the Ntuze community grow indigenous vegetables, which are predominantly grown by women (the mother of the household). In some instances, men (the father of the household) and children do assist, but this is a very rare occurrence. It can thus be argued that one of the reasons why there is not much farming support aimed at the production and marketing of these indigenous vegetables is because the Ntuze community is governed by a patriarchal tribal structure underpinning the belief that the main breadwinner in the household should be a man. By implication this would mean that any initiative that could be undertaken towards the promotion of indigenous vegetables would empower women, and men would be intimidated by their counterparts. This bias towards men therefore affects the potential economic value that indigenous vegetables could contribute towards the households and the community at large.

5.3.1.3 Income of household

Household income refers to the total amount of money that is accessed within the household. The more income generated, the greater the likelihood of food diversity and security. If the income generated within the household were sufficient, the probability of production would be likely to increase as farming inputs (seeds, fertiliser, pesticides and herbicides) and farming implements could be afforded.
5.3.1.4 Education level of household head

Education is generally one of the most important tools known to have an influence on one’s socio-economic status. A general notion with regards to education is that after people have completed tertiary education, they have specialised knowledge in their fields and, as such, chances of employability are much more likely. Only 22% of the household heads indicated that they were employed in Ntuze; of which 15% of these people had tertiary education. These findings are evidence that if the head of the household holds a tertiary qualification, chances of being employed would be high. The results corroborate the general belief that education correlates directly with the household’s socio-economic status and state of food security.

5.3.1.5 Farm size

Farm size, as stated by Abu and Soom (2016:60), is the total area of land that is cultivated for subsistence production and cash crops by households. Most respondents indicated that they use the farming land for two purposes, namely: subsistence and sugarcane production. The average size of the land which was used for subsistence production ranged from half a hectare to a hectare. None of the respondents indicated that the limited farming space for their vegetable production was problematic to them.
5.3.2 Access to indigenous vegetables

Many indigenous leafy plants grow in the wild as weeds or cultivated vegetables (Jansen van Rensburg et al., 2004:52). Five identified indigenous wild plants were found to occur naturally in the study area, namely: Amaranthus, Bidens pilosa (L.), Ipomea plebeia R. Br., Momordica africanaus and Solanum retroflexum Dunal. In agreement with Hart et al. (2009), the current study findings indicate that indigenous leafy vegetables occur as volunteer crops in household gardens and fields. Farmers have access to these plants as they grow in cultivated and previously cultivated fields as weeds. To the contrary, the cultivated indigenous vegetables are mostly seasonal, with the exception of Ipomea batatas (L.), which could be cultivated throughout all growing seasons; access to all the other vegetables was found to be limited to their respective harvesting seasons.

5.3.3 Availability of indigenous vegetables

The Ntuze farmers indicated that they did not cultivate any indigenous leafy vegetables – not even those with the potential for cultivation such as Bidens pilosa (L.) and Amaranthus thunbergii (Jansen van Rensburg et al., 2012; Van den Heever, 1997). The reasoning for not cultivating these naturally occurring vegetables was because they were always naturally available to the farmers. By contrast; the cultivated indigenous vegetables (Colocasia esculenta (L.) Schott, Ipomea batatas (L.), Manihot esculents Crantz, Vigna subterranea (L.) Verdc. and Vigna unguiculata (L.) Walp.) were not always available as they were said to be seasonal. In some households, the Ipomea batatas (L.) plant was cultivated throughout all growing seasons and was therefore always available.
5.3.4 Effect of climate on access and availability of indigenous vegetables

The accessibility and availability of indigenous vegetables were strongly influenced by the variable weather patterns. One respondent stated that when she first arrived at the Ntuze community in 1967, it used to be very rainy, cold and windy. However, as the years went by it started becoming hot and humid and eventually these conditions led to drought. The respondent continued to say that this was up until the recent years, when the community first witnessed heavy winds that were accompanied by heavy rains, which washed away most crops that are planted in low-lying areas next to the river banks. These adverse climatic changes were observed in the years 2015, 2016, and 2017. There were uncertainties from the other respondents about the climatic conditions in the Ntuze community. Therefore, no clear findings could be established in terms of the climatic influence on the accessibility and availability of indigenous vegetables due to the double calamity of predominant drought exacerbated by periodic heavy rains.

5.3.5 Utilization and stability

Indigenous vegetables have been stigmatised and are perceived as minor crops that are food for the poor and which are underutilised, undervalued and neglected (Ebert, 2014:323). This earlier report is in contrast with the current study findings as it was established that indigenous vegetables are utilised based on preference and convenience. Indigenous vegetables do play an important role in the lives of the Ntuze farmers, whose livelihood strategy mostly depends on resource-poor agriculture and locally available resources.
5.3.5.1 Farming support and extension services

The majority of the farmers in the Ntuze community indicated that there was no form of support that was received for their farming activities. Farmers solely relied on the resources that were available to them and their own cash for farming implements and inputs. There were, however, respondents that indicated that they did receive financial support from the Department of Agriculture, Forestry and Fisheries (DAFF). These respondents were involved in a communal project that was aimed at empowering rural women through agriculture. The project comprised only women, who worked closely with the agricultural extension advisor. On a monthly basis, these women had to contribute a certain amount of money which was given to the extension officer. When asked what this amount was for, the respondents assumed that it was for the renewal of membership; only one respondent stated that the amount could possibly be a contribution for the farming inputs that they sometimes received. However, the majority of the Ntuze farmers raised their concern about the limited access to extension services.

Some of the respondents expressed concern that only certain people were in contact with extension officers, and these were believed to be the women who were involved in the communal project. One respondent expressed her dissatisfaction and stated that they rarely see agricultural advisors. On the contrary, those who benefit from the extension advisors did appreciate the work of the extensionists as they provided them with new information, advised them to grow vegetables and eat healthy foods. Farmers also indicated that they sometimes receive farming inputs from the agricultural advisors, but their only concern with these inputs, particularly the seeds and seedlings, was that they were of inferior quality.
5.3.5.2 Marketability

The difficulties of marketing indigenous vegetables has been argued by several authors (Ebert, 2014; Shackleton, Campbell, Lotz-Sisitka & Shackleton, 2008) due to their unpopularity and the stigma that is attached to them for being perceived as ‘poor people’s food’. Despite the lack of farming support to the Ntuze community, there was no correlation between the trading of agricultural production and the support received. Farmers still managed to sell their production regardless of the farming support that was received. The trading of indigenous vegetables, however, was found to have an influence on the income that farmers generated through their agricultural production. The more of their produce the farmers sold, the higher the income generated.
5.4 UTILISED AND UNUTILISED FUNCTIONS OF INDIGENOUS VEGETABLES IN SMALLHOLDER AGRICULTURE

The current research study provides evidence that indigenous agriculture plays an important role in the livelihoods of the Ntuze farmers. Through indigenous farming, households have developed a coping mechanism for their survival. This coping mechanism includes, but is not limited to, the production of indigenous vegetables for household consumption and use of indigenous vegetables for medicinal and nutritional gains, as well as monetary value. In essence, the production of indigenous vegetables in the Ntuze community has contributed to resilient family livelihoods which have brought about stability within the households despite the global climatic crisis and multiple economic challenges that South Africa as a country currently faces.

5.4.1 Resilient household farms

Resilience is described as the ability to return to a normal condition after something unpleasant (shock or injury). The Ntuze community predominantly experiences drought, but also now exacerbated by periodic heavy rains & flooding. While some households do have access to regulated municipal water, some rely on communal tanks which are filled up by municipal water trucks. One of the concerns that were stressed by the respondents was that the water trucks only visited the community once or twice a month to refill the household water tanks. However, this was not sufficient as water ran out quickly, since many households relied on only this one source of water. The study respondents are thus of opinion that the local municipality is not doing its best to meet the people’s needs; as such, they feel disregarded.

Despite the water challenge, the Ntuze farmers have developed a livelihood strategy as a solution and resilience to the predominant drought conditions as they do not have
access to water for irrigation. Despite the periodic heavy rains, even the nearby rivers are running dry, and some are inaccessible to the farmers due to their topographical location and features. The production of indigenous vegetables, due to their resilience to extreme weather conditions, such as drought, is therefore crucial to the livelihood strategy of the Ntuze farmers.

5.4.2 Livelihood vulnerability

The Ntuze community is exposed to a number of threats, these being external factors that impact the farmers’ livelihoods and farming systems. The vulnerability context often manifests as shocks (due to unforeseen circumstances), seasonality and trends. However, some of the farmers have devised coping strategies against these threats and risks, and turned them into opportunities such as the planting and marketing of indigenous vegetables in the ever-changing environmental and economic climates. Appendix A shows the link between food insecurity, a resultant of the vulnerability context, the lack of assets, and the deprivation trap. The model is derived from the theories developed by Swanepoel and De Beer (2011:8) and Lundy and Adebayo (2016:3). It is a summary of vulnerabilities that create stress which accelerates conflict and impede growth and development within the smallholder farming environment.

5.4.3 Unutilised functions of indigenous vegetables in the Ntuze community

A discrepancy became evident between the findings from the main study and the findings that were obtained during the preliminary study, which was conducted in the neighbouring community situated near Ntuze. From the pilot study, it was found that indigenous vegetables were used for assorted purposes. These purposes were
employed for marketing purposes. The way in which indigenous vegetables were used in this neighbouring community was diverse when compared to the Ntuze community. It was found, for instance, that *Colocasia esculenta* and *Ipomea batatas* (L.) were ground into baking flour and used as thickening soup for stews. The same vegetables were also used for making fried chips, thereby making meals more versatile and bringing diversity to the plate.
5.5 INTERSECTION OF QUALITATIVE AND QUANTITATIVE PARADIGMS

The methodological triangulation approach that was employed yielded complementary results from the different methodological approaches. This summary covers the three main themes of the study, namely: socio-demographic data, the role and farming of indigenous vegetables, and the uses and community activities surrounding indigenous activities. The following 12 qualitative themes agreed with quantitative findings:

- **Gender and age variation**: This information was obtained through a structured questionnaire, whereby it was found that 51% of the elderly women who were above the age of 50 were the most participative. This was confirmed by some respondents, who stated that the most engaging generation in terms of the production of indigenous vegetables were the elderly, whose source of livelihood has always revolved around the production and use of indigenous vegetables.

- **Education**: Through the use of both quantitative and qualitative methodologies, it was found that the majority of the respondents were either uneducated or dropped out of school at the secondary level. During the feedback session, one respondent states: “Kudala imfundo yayingabalulekile njenganamhlanje,” meaning that back in the days education was not as important as it is today. This statement serves as an indicator as to why the elderly are so accustomed to indigenous vegetables. It can be arguably stated that these vegetables were what they were accustomed to for lack of exposure and education about alien vegetables.
• **Employment**: Qualitative findings indicate that the majority of the study participants are unemployed; this was affirmed by a number of respondents who openly stated that they are sitting at home because they are not employed due to lack of education and lack of experience needed in the corporate industry.

• **Government monetary support**: the majority households that indicated receipt of monetary support was supported by the fact that the Ntuze community is constituted of an uneducated majority, the elderly and unemployed residents.

• **Agricultural revenue**: Most participants indicated that they generate income through their agricultural production. It was found that some of the participants were street vendors, timber producers and sugarcane producers, through which the majority of the households generated income.

• **Land ownership**: Although there was a discrepancy regarding the ownership of land, the majority of respondents indicated that they owned the land; however, they could not entirely do as they please as the land falls under the tribal authority.

• **Source of indigenous knowledge**: The descriptive statistical findings in relation to the age groups, support the farmers’ perception that the elderly are the reservoirs of knowledge about indigenous agriculture in the Ntuze area.

• **Vegetable species of preference**: In agreement with the quantitative findings, the study participants indicated that the reason why they preferred indigenous vegetables over the alien species was because indigenous vegetables formed part of their heritage and also because of the health benefits associated with them.
• **Climatic conditions:** Although the qualitative findings indicate that the climate in the Ntuze area varies frequently, the smallholder farmers indicated that there is a new phenomenon, where there are heavy rains in the community. Before the year 2015, the area experienced extreme heat, with little rain. However, of late, as of 2015, the area has experienced heavy winds and rains, which have resulted in floods.

• **Inputs and equipment used on indigenous vegetables:** The most utilised inputs in the Ntuze community are natural resources (such as kraal manure). This is because many people in the area are unemployed and rely on government support grant funds for money. As such, they cannot afford farming inputs and equipment such as irrigation pipes and boreholes due to financial constraints. However, this does not stop farmers’ production, as indigenous vegetables are resilient crops which can be grown with the minimal resources as possible.

• **Medicinal value:** Most of the respondents confirmed that indigenous vegetables had medicinal benefits; as a result, some community members consume these vegetables for purposes of well-being.

• **Farming support:** One of the concerns that were determined was that of lack of farming support. The Ntuze smallholder farmers indicated that there were no extension services in the area (with the exception of the women’s empowerment project) and that the government could intervene by supplying farmers with farming inputs and also deploying compatible agricultural advisors.
5.6 CONCLUSIVE SUMMARY

Indigenous vegetables make a significant contribution to the livelihoods of the Ntuze farming households. The socio-demographic characteristics of this community highlight the fact that the majority of unemployed and vulnerable elderly women are household heads, who are expected within the household to source food. As such, the production of indigenous vegetables has become an integral part of the community’s livelihoods.

Farmers in the community do, however, face the challenge of accessing farming resources and water for irrigation. This is because of the minimal support that farmers receive from the various role-players. In light of this, the production and utilisation of indigenous vegetables provides resilience within the households, as these vegetables require little to no water for irrigation. However, in as much as farmers do value the naturally occurring vegetables, they do not take any initiative to cultivate them regardless of their ability of being grown (*Amaranthus* and *Bidens pilosa (L.*)). This raises the risk of the potential extinction of naturally occurring indigenous vegetables in the Ntuze area.

The respondents acknowledged that indigenous vegetables are used for household consumption, medicinal value and income generation. Nevertheless, the younger generation is not knowledgeable about these vegetables. This could mean that, in the near future, there could also be a risk of indigenous vegetable shortages. Considering the evident trend in the educational level among the Ntuze pupils, together with the unemployment challenge that South Africa is currently faced with, if the knowledge of the production of these indigenous vegetables is not retained, the community might find itself being increasingly food and nutrition insecure.
5.7 COMMUNITY FEEDBACK

After the analysis of the data, feedback was given the respondents as a means of verifying whether the study findings were accurate. All the respondents who formed part of the feedback session affirmed that the findings were appropriate to the Ntuze community. All the respondents acknowledged that some parts the community faced water challenges, especially households that are situated in the deep ends of the village, far from the main road. The respondents also confirmed that women are the main producers of indigenous vegetables and that these vegetables do not require water for irrigation.

The survey findings confirm that most households rely on government grants for monetary support and states that this is because, in the past education, was not as important as it is nowadays, and people could work without any form of formal education. Another respondent states that this is because many young people have left the community for developed areas. As a result, old, vulnerable and jobless people are left alone, with no source of income other than their pension money.

It was also confirmed that in the past few years, there have been changes in weather patterns and that the area now experiences heavy winds, which affect fruit production, and rains during the summer season, which impact the smallholder farmer’s production in low-lying cultivation areas next to the rivers in the area. Of the greatest challenges experienced, some of the farmers indicated, monkeys were the most problematic. Farmers further expressed the view that they would appreciate government support through supplying farming inputs, as they cannot afford them, and also by deploying agricultural advisors in the area who will help in giving relevant farming advice.
5.8 RECOMMENDATIONS

Limited documented information exists on the indigenous vegetables of the South African rural regions, particularly northern KwaZulu-Natal. This study explored the farmers’ knowledge and use of indigenous vegetables. However, a knowledge-gap was identified between the knowledge possessed by the older generation in comparison to the younger generation. It is therefore recommended that future research could explore the following:

- Indigenous knowledge transfer and grounding in local communities to determine what the link is between the existing decline of indigenous knowledge and the younger generation.
- The integration of indigenous knowledge in education as a means of removing the stigma that is attached to these vegetables as they are often regarded as “low-status food”.
- Indigenous farming in the context of youth engagement as a means of encouraging knowledge and utilisation of indigenous vegetables.

The study also explored the manner in which indigenous vegetables contribute to food security, as well as determining the utilised and unutilised functions of indigenous vegetables. Although the use of these vegetables proved to be of importance in ensuring household food security, there is still room for further research into:

- The potential roles that indigenous vegetables could play in meeting the socio-economic needs of communities.
- The nutritional constituents of indigenous vegetables and their contribution to human well-being.
- The awareness of indigenous vegetables and promotion of their uses.
The study revolved around the central theme of socio-economics. This, in simpler terms, can be understood as the economic influence on the people’s social status, such as their education, employment, income, etc. Secondary literature, together with the findings of this study, indicated that a challenge exists with regard to commercializing indigenous vegetables. This challenge impacts the income generated within the households. Therefore, there is a material need for research on the identification of strong market avenues for smallholder farmers.

Farmers indicated that the community did not have the benefit of reliable extension services. This raises the question as to whether agricultural advisors are serving the communities as expected of them or whether they are simply remunerated without delivering services required of them to farming communities. Therefore, there is a need for future research on:

- The role played by extension officers in indigenous vegetable farming communities.
- The cause of poor extension services among smallholder rural farmers.
- The operational plan of rural extension officers to enhance production in indigenous farming systems.
- The monitoring and evaluation of agricultural advisors in the smallholder rural farming communities.

If the challenges identified by this study are addressed, the multiple socio-economic benefits of indigenous vegetables could be significantly enhanced – not only in the Ntuze community, but also to the benefit of rural communities throughout South Africa. This, in turn, would promote not only the preservation of indigenous knowledge but also the conservation of South African indigenous vegetable species.
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Appendix A: Researcher’s Food security casual loop diagram, modelled on the research findings and theories of Swanepoel & de Beer (2011) and Lundy & Adebayo (2016)
Appendix B: King Cetshwayo District Map

King Cetshwayo District geographical location (Source: Google Search Engine, 2018)
Appendix C: Ethics Approval

NELSON MANDELA UNIVERSITY

FACULTY OF SCIENCE RTI COMMITTEE

To: Dr T Pittaway/ Q. Qwabe
From: Lynette Roodt
Date: 27 September 2017
Ref: H17-SCI-AGR-001

Dear Dr T Pittaway

TITLE OF PROJECT: THE SOCIO-ECONOMIC IMPORTANCE OF INDIGENOUS VEGETABLES IN THE NTUZE SMALLHOLDER FARMING SECTOR OF NORTHERN KWAZULU-NATAL

Your above-entitled application was considered and approved by the Sub-Committee for Ethics in the Faculty of Science on 5 September 2017.

The Ethics clearance reference number is H17-SCI-AGR-001 and is valid for three years. Please inform the Committee, via your faculty officer, if any changes (particularly in the methodology) occur during this time.

An annual affirmation to the effect that the protocols in use are still those, for which approval was granted, will be required from you. You will be reminded timeously of this responsibility, and will receive the necessary documentation well in advance of any deadline.

We wish you well with the project. Please inform your co-investigators of the outcome, and convey our best wishes.

Yours sincerely

Lynette Roodt
Manager, Faculty Administrator
Faculty of Science
Appendix D: Declaration and Checklist for Independent Contractor

Declaration and Checklist for Independent Contractor

Name Of Contractor: Dr Janin Vansteenwisse - Biographical and Motivational Consultant

1. Is there any supervision or control in the manner of work? Yes
2. Are your services rendered mainly at the premises of the NMMU or at a premises provided by the NMMU? Yes
3. Does the NMMU set the hours of work to be performed? No
4. Are you remunerated at a rate per hour? No
5. Must you provide the services personally? Yes
6. Does NMMU provide the tools/equipment for you to render your services? No
7. Will there be any expenses that will be incurred from this contract? Yes
8. Would there be a risk of making a loss from this contract? No
9. Is more than 80% of your income derived from NMMU? No

The Person conforms to the requirements of an Independent Contractor and therefore NO employees will be deducted

I hereby furthermore acknowledge that the Nelson Mandela Metropolitan University, will be relying on the accuracy of the information supplied in this questionnaire, for the purposes of its compliance with the Income Tax Act, with regards to the deduction of PAYE from payments to its Service Providers.

If the undersigned declare that the above mentioned information is true and accept full responsibility should it be proven otherwise.

Signed on this, the 13th day of January 2013, at Port Elizabeth