

**EXAMINATION OF THE PERCEIVED CONTRIBUTION OF EDIBLE INDIGENOUS PLANTS IN
COMBATING FOOD AND NUTRITION INSECURITY IN THE TONGA COMMUNITY OF
ZIMBABWE**

By

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DECLARATION

I, Charity Munsaka, hereby declare that this dissertation for Masters in Rural Development (MRDV) submitted to the Institute for Rural Development, School of Agriculture at the University of Venda has not been submitted previously for any degree at this or another university. It is original in design and execution, and all reference material contained therein has been duly acknowledged.

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ABSTRACT

In most poverty-stricken countries, edible indigenous plants (EIPs) have been an ever-present component of the household food and nutrition security equation since time immemorial. The place of these plants in the household food and nutrition debate and matrix is unclear. Yet, their existence lessens the impact of food and nutrition insecurity on household livelihoods. A study that was premised on the view that the types of EIPs within their local context is important although cultural domains limit the extent of their utilisation was conducted in Muchesu Ward of Binga District in north-western Zimbabwe. The study was born out of the realisation that there was inadequate scientifically generated information on how communities benefit from the EIPs. Of interest was how prevailing global environmental and economic changes influenced household food and nutrition security. Furthermore, it was evident that new approaches were needed to help build an understanding of where EIPs fitted within the food and nutrition security debate and matrix.

The main objective of the current study was to characterise EIPs and examine their role in combating food and nutrition insecurity. Exploratory and phenomenological designs were used during characterising EIPs. Respondents were purposively sampled. Data were collected through participatory mapping, transect walks, focus group discussions, seasonal diagramming, key informant interviews and observation. Scoring, matrix ranking, and thematic content analysis were used to analyse the data. Inventories revealed that EIPs were available, accessible and utilised in various ways. Identified EIPs were classified according to the parts that were eaten namely: leafy vegetables, fruits, and tubers. Forty-seven leafy vegetables, 36 fruits and 26 tubers regarded as EIPs were identified. Seasonal availability of EIPs varied across the months of the year. Use of leafy vegetables peaked during the rainy season. Fruits were available in most months of the year although a considerable number of types was available and harvested during the rainy season. Tubers were also available in varied months of the year. Timing was crucial for harvesting tubers. The preparation of 20 EIPs and their uses were documented considering their medicinal properties and other uses. It was noted that some plants were edible and had medicinal value. Considering the observations made in the study, the following conclusions and recommendations were proposed: (1) Conservation and improved ways of harvesting EIPs so as to enhance their sustainability; (2) Produce seasonal calendars to help assess when a certain community is likely to be food insecure; and (3) Conduct further research focusing on the nutritional content of identified plants, which would enable better decision making with respect to household and community nutrition security.

Keywords: Edible indigenous plants; food and nutrition security; household; perceived contribution; indigenous knowledge

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ABBREVIATIONS

EIPs	Edible Indigenous Plants
FAO	Food and Agriculture Organisation
IRD	Institute for Rural Development
SADC	Southern African Development Community
UNIVEN	University of Venda
ZIMVAC	Zimbabwe Vulnerability Assessment Committee

CHAPTER 1 INTRODUCTION

1.1 Introduction

In this chapter, the introduction to the entire study is presented. The study was conducted in order to understand the roles of EIPs in mitigating household food and nutrition insecurity. In addition, the place of EIPs in the debate on food and nutrition security is explored. Overall, the introduction of the study is explained using the following focus: the research problem, objectives and the research questions. Next, the operational definitions and key concepts in the context of this study are explained. Thereafter, the organisation of the dissertation is presented before references are listed.

1.2 Background

The role of EIPs in the food and nutrition security equation, particularly at the household level, continues to attract attention among scholars and other stakeholders (Ashagre *et al.*, 2016; Ong *et al.*, 2016). The continued interest stems from the fact that humanitarian agencies often use household reliance on EIPs as a primary indicator of impending famine (Merode *et al.*, 2004). However, arguing that the use of EIPs reflects food shortages is a narrow and unbalanced analysis. It masks the understanding of the wider role of EIPs in the broader food and nutrition security equation even during times of abundant supply.

Edible indigenous plants are, in most cases, available both when the cereal is in abundant supply and times of shortage. This makes them crucial in addressing food and nutrition insecurity. Although Turner *et al.* (2011) do not provide statistics of the world population that depends on EIPs to supplement household diets, the scholars claim that the world over, humans have depended on wild-growing plants in their diets for hundreds of thousands of years. Many people still rely on the EIPs to meet at least part of their daily nutritional requirements. Seyoum *et al.* (2015) reinforced the Turner *et al.* (2011) claim when they point out that rural communities in the world supplement their diets with EIPs daily, which helps in achieving food and nutrition security. Badimo *et al.* (2015) report that in Botswana, each year 76-100 % of the Basarwa people rely on EIPs for their food supply. In a recent study in China (Kang *et al.* 2014) found that EIPs provided an important nutritional contribution and enabled human survival in times of need. Similarly, reporting on their study in India, Urso *et al.* (2016) reveal that EIPs help in curbing malnutrition in harsh environmental conditions. Thus, EIPs play an important role in food and nutrition security of people the world over.

Despite various scholars (Turner *et al.*, 2011; Seyoum *et al.*, 2015) claiming that EIPs contribute positively to food and nutrition security, there are still about one billion people in the world who continue to experience hunger (FAO, 2015). When faced with such a challenge, most rural households resort to EIPs to supplement their diets. However, the proportion of people who depend on EIPs to reduce the effects of food and nutrition insecurity on their health, productivity and wellbeing remains unclear. Knowing the contribution of EIPs to household food and nutrition security enhances the ability to make informed decisions on community preparedness in a well-targeted manner when disasters strike.

Some studies go beyond associating EIPs with their nutritional value. This happens because this is a narrow consideration and diverts attention from the wider value of EIPs. Shumsky (2014) conducted a study in Kenya, postulating that the EIPs were consumed for their nutritional content and taste. It has been noted that EIPs are valued differently across the world, including being utilised in various ways across diverse cultural communities (Ashagre *et al.*, 2016). This suggests that there is a close association between EIPs and the people's culture.

In Africa, food and nutrition security work is biased towards the amount of the staple crop rather than considering whether the essential nutrients are available in their right proportions. Mango *et al.* (2014) share this view and indicate that, in general, maize is used as the food and nutrition security indicator in Zimbabwe and some parts of Southern African countries. There are, thus, disparities in how food and nutrition security is measured at national and household levels. This makes it crucial to understand food and nutrition security using the contextual meaning to a study. Food and nutrition insecurity is a multi-faced concept, which can be explained in many ways.

In Zimbabwe, EIPs cannot be delinked from the everyday lives of people. Their role is particularly important because the country once regarded the breadbasket of Africa is now coined a basket case (Dzingirai, 2014). Zimbabwe has, in the past decades, experienced serious food shortages, leading to most people becoming vulnerable to food and nutrition insecurity. The Zimbabwe Vulnerability Assessment Committee (ZIMVAC, 2017) reveals that the number of people who face acute food insecurity has increased to 2.8 million from 1.5 million between 2015- 2017. Although there is inadequate evidence, the assumption here is that there has been an increase in the use of EIPs to widen their food and nutrition security portfolios.

As is the case with many parts of Southern Africa, the effects of the 2016 El Niño-induced drought has hit Zimbabwe. It is estimated about 95% of the country having received 75 % of the average rainfall that is typically received by the second week of February (ZIMVAC, 2016). The severe drought conditions have greatly increased the vulnerability of the poor in rural and communal areas through depriving access to food and livelihoods (Mamombe, 2017). Against this background, the government declared a state of national emergency that extended from 5 February 2016 to 31 March 2017 (Mamombe, 2017). Drought periods are often associated with an increase in the use of EIPs (Kang *et al.*, 2014). However, despite their importance during drought years, there is limited documentation on the use of EIPs.

Binga District, one of the poorest districts in Zimbabwe, always faces food insecurity that gets magnified during severe droughts (Chikozho *et al.*, 2015). Therefore, the current study is premised on the view that the use of EIPs should not necessarily be associated as response to food insecurity but rather its expression as part of Tonga culture. The Tonga-speaking people are the most dominant cultural group found in Binga District. The El Niño-induced drought provides an opportunity to understand the extent to which the local communities value EIPs in their everyday survival.

Specifically, the current case study was conducted in Muchesu ward. It is located about 40 kilometres to the southeast of Binga growth point. More details on the ward are provided in chapter 3. Muchesu Ward is richly endowed with EIPs. Hence the focus on how the EIPs have championed food and nutrition security in this area. A participatory research was adopted to unravel the social construction of knowledge around EIPs through the lenses of the local community. Included in the study was the extent to which the Muchesu community valued its natural capital and its management to sustain household food and nutrition security.

1.3 Statement of the Research Problem

In most rural communities, EIPs, wildlife and conventional foods help reduce food insecurity. Yet, in general, food and nutrition security are assessed based on cereal availability. In many cultural groups, for example in Ethiopia, EIPs are used as supplementary, seasonal or survival food sources (Molla *et al.*, 2011). This calls for the broadening of how food and nutrition security are viewed. In Zimbabwe, the common definition of food insecure people considers those who need more than three months of food assistance per year (ZimVac, 2014). This ignores the use of EIPs. Moreover, although it is claimed that most people in Zimbabwe need food aid and supplements during the hunger season, which extends from October to March (ZimVac, 2014), the role of EIPs is not clearly articulated. Nor is it fully documented.

As already explained in the previous sections of this dissertation, EIPs directly contribute to food and nutrition security, and they can be sold to increase household income. Ojele & Kakudidi (2015) conducted a study on the identity and use of wild edible plant species by subsistence farmers in Balangao, Uganda, and concluded that if the EIPs were marketed, they could provide a means to diversification of household livelihoods. Commercialisation of EIPs could lead to over-exploitation, particularly in areas where access to plant resource collection is open (Sundriyal & Sundriyal, 2004). Appropriate conservation practices and policies should be formulated to conserve EIPs. There is need to begin by documenting them by applying evidence-based scientific approaches. This would help better inform policies and research on food and nutrition security in the context of climate change.

Muchesu ward in Binga District in north-western Zimbabwe was an ideal geographical area for conducting the study because it was richly endowed with EIPs. Although the EIPs help communities withstand the negative effects of food insecurity, they are not yet systematically characterised. In Binga, food insecurity is a euphemism for poverty (Mavhura, 2013), which tends to be blamed on at least three intertwined problems. First, food insecurity is associated with the forcible removal of the Tonga people from their original area of habitation in 1950s to give way to the construction of Kariba Dam. Colson (1971) provides a detailed account of how the Tonga people lost entitlement to riverine recession agriculture where they harvested twice a year and therefore, were seldom victims of hunger. Furthermore, they lost their entitlement to fishing and hunting through which they used to supplement their diets. Recently, many scholars (Conyers & Cumanzala, 2004; Manyena *et al.*, 2008; Mavhura, 2013) have blamed the persistence of food insecurity to the successive governments' neglect and marginalisation of Tonga, which has denied them access to sustainable livelihoods that many other Zimbabweans accessed. Furthermore, food insecurity is argued to be originating from poor soils, low rainfall and high temperatures especially considering that Binga is in Natural Region Five, where cropping agriculture is precarious, invariably leads to poor yields and hence the persistent food insecurity challenge (Conyers, 2003).

Despite the forcible removal of Tonga people in the 1950s to give way to the construction of the Kariba Dam, loss of entitlement to fishing and hunting, government neglect and marginalisation, and the poor soils, low rainfall, and high temperatures, they have continued to survive. The key question is: What makes the Tonga people survive? It is surprising that considering the arguments above there is barely any literature that associates food and nutrition security with EIPs in Binga.

Little is known about the range of EIPs that the residents of Muchesu ward rely on during times when there is abundant food and when there is little. Nor is there well-documented information on the parts of the plants that are used, their seasonal availability and contribution to the household food requirements as well as preparation and other uses of EIPs. This is an important gap which scholars should consider filling. Documentation efforts should deal with how knowledge on the EIPs among Tonga people is understood within the food and nutrition security debates. The role of EIPs in supplementing their diets and the extent to which EIPs are ingrained in the Tonga institutions deserve scientific investigation. Available literature (Reynolds & Cousins, 1993) reveals that the Zambezi Valley, in which Binga District is found, is richly endowed with EIPs. Taking all the issues articulated above, the current case study was designed to characterize, identify EIPs and determine the extent to which they alleviated food insecurity and formed part of everyday life, even in food secure periods.

1.4 Justification of the Study

Food and nutrition insecurity are major challenges that the international community faces. Climate change has caused serious changes in agricultural seasons and yields in rural communities. Most people use EIPs to survive when a devastating drought is experienced. Interestingly, the place of EIPs in the food and nutrition equation is unclear. Therefore, it is imperative to recognise EIPs and explore how they prevent famine and hunger in rural communities, when they are accessible. The participants in this study are expected to appreciate the important aspects of EIPs and how they help alleviate food insecurity, improve nutrition and be medicinal plants to stimulate the immune system. This study will also provide useful elements for achieving the Sustainable Development Goals, Goal Number One, which aims to eradicate extreme poverty and hunger. This study also provides a starting point for future research in Muchesu. The results of this study provide insight into the needs of the Muchesu community for food and nutrition security. In addition, the study will enrich the body of knowledge on rural development, indigenous knowledge and the debate on food and nutrition security.

1.5 Research Objectives

The main objective of this study was to characterise edible indigenous plants and examine their contribution in the alleviation of food and nutrition insecurity in Muchesu ward, Binga Zimbabwe. Specific objectives of the study were to:

- a) carry out an inventory and categorise the types of EIPs found in Muchesu ward;

- b) assess the availability of EIPs across the months of the year; and
- c) document the preparation and uses of some identified EIPs

1.6 Research Questions

- a) What types of edible indigenous plants are found in Muchesu ward?
- b) When are the plants available in the year?
- c) What are the existing preparation methods and uses of EIPs in Muchesu ward?

1.7 Operational Definitions of Key Terms and Concepts

Edible indigenous Plants is a contested and multifaceted concept. Hence the term can be interpreted and defined in various ways in different environments. Edible indigenous plants can be defined through habitat (Heywood, 1999, Shava 2005), identifying the characteristics of the plants (Shumsky, 2014), identifying the season when the plant is consumed (Kallas, 2010), the resistance of the plants to climate change. For this study, EIPs are all plants which are not cultivated, are considered wild, including species harvested in farming areas, uncultivated fields or forestland.

Food and nutrition security is a flexible concept which is applied in research and policies. Food scarcity may imply the availability of inadequate supplies at a global level and at a national level. On the other hand, food and nutrition security are concerned with adequate nutrition and wellbeing. The state of having reliable access to enough quantity of affordable and nutritious food. According to Godfray *et al.* (2010) food and nutrition security means access to enough food for an active healthy life. It includes the ready availability of nutritionally adequate and safe foods and an assured ability to acquire foods in a socially acceptable way, for example, without resorting to emergency food supplies, scavenging or stealing.

Food insecurity refers to the social and economic problem of lack of food due to resource or other constraints, not voluntary fasting or dieting or because of illness, or other reasons. This definition is supported by studies conducted by Haddad *et al.* (2014), Hickel (2016) and Kreider *et al.* (2016) who defined it as a state of limited or uncertain availability of nutritionally adequate and safe foods or limited or uncertain ability to acquire acceptable foods in socially acceptable way.

In this study, *perceived contribution* means people's perceptions concerning edible indigenous plants and food insecurity.

Indigenous knowledge refers to a body of knowledge existing within or acquired by local people over a period and passed through generations (Mavhura *et al.*, 2013). Shaw *et al.* (2009) states that indigenous knowledge is locally bound. The latter definition concurs with the first in that it is locally based on a certain community thus diverse in each community based on the cultural groups of a certain group of people. In this study, indigenous knowledge is the local knowledge that is unique to a given culture or society.

1.8 Organisation of the Dissertation

This dissertation is written in paper format. The first chapter provides a general context, research problem, and justification of the study. The research questions, objectives and operational definitions adopted in this study are defined in the context of this study. Chapter 2 reviews the literature using the following themes: EIPs clarified, understanding food and nutrition security, gender, age and the components of food and nutrition security, the sustainable diets framework and the summary of the literature review. Chapters 3- 5 are all products of empirical research, each one of them anchored on a specific objective of the study. The following format was followed: summary of the research design, population, sampling procedures, data collection, data analysis, presentation of results, discussion and conclusion. In Chapter 6, the synthesis dissertation of the whole study is presented.

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CHAPTER 2 CONCEPTUALISING EDIBLE INDIGENOUS PLANTS: A LITERATURE REVIEW

2.1 Abstract

Food and nutrition security are closely related challenges facing the world in the twenty-first century. The literature on the role that edible indigenous plants (EIPs) play in meeting the dietary needs of rural households and communities is reviewed in this chapter. Concepts such as EIPs, food and nutrition security, and the sustainable diets framework are explained. The latter framework advocates for the use of local capital to solve problems of the day. It is noted in this review that food and nutrition security have diverse meanings. Thus, it is important to define this in the context of how it is understood in diverse communities. It was revealed in this review of literature that the role of EIPs in the food and nutrition equation is still unclear. Therefore, it is crucial to close this gap because the existence of these plants sustains livelihoods in most rural communities.

Keywords: Edible indigenous plants, food and nutrition security, sustainable diets framework

2.2 Introduction

In this chapter, the literature related to the perceived contribution of edible indigenous plants (EIPs) is reviewed. The study is contextualised within the body of knowledge on food and nutrition security. The chapter is divided into three broad sections. To foreground the discussion, the first part of the chapter starts with a section that defines EIPs. The major focus here is to demonstrate the various descriptions of EIPs and how they relate to food and nutrition security. Secondly, the concept of food and nutrition security is explored together with the contribution of EIPs to it. Emphasis is placed on the various components of food and nutrition security which also serve as the analytical framework.

2.3 Edible Indigenous Plants Clarified

Edible indigenous plants have been described in several ways, which can sometimes lead to confusion, given that it means many things to different people. The common descriptions include wild edible plants (Redzic, 2006; Shumsky *et al.*, 2014), edible wild plants (Shava, 2005), traditional food plants (Legwaila *et al.*, 2011) and indigenous edible plants (Dlamini *et al.*, 2010). Surprisingly, the literature is silent on why such different descriptions are used. However, it seems these descriptions are merely semantical differences. In fact, most of the studies on EIPs tend to associate them with those that occur naturally within natural ecosystems and contribute to diets and the economy of local communities (Kallas 2010, Dernini *et al.*, 2013). As already been highlighted in Chapter 1, the focus of the current study was not necessarily to explore the different descriptions. Thus, all plants that are gathered and not cultivated, are considered wild, including species harvested in agricultural areas, uncultivated areas or forestland are classified as EIPs.

Despite the commonality in terms of where the EIPs are found and their benefits to the communities, the concept of EIPs is contested. Shava (2005) refers to EIPs as both indigenous and naturalized exotic plants occurring in the natural environment. This definition suggests that EIPs may have existed and been used by certain cultural groups for a long time or may have been introduced into a locality. That way it has become part of the people's natural capital. In contrast, Kallas (2010) views edible wild plants as those endowed with one or more parts that can be used for food if gathered at the appropriate stage of growth and properly prepared prior to consumption. This definition embraces the view that EIPs are used for food, which is one of the main arguments of the current study. Heywood (1999) reports that the Food and Agriculture Organization (FAO) defines EIPs as "plants that grow spontaneously in self-maintaining populations in natural or semi-natural ecosystems and can exist independently of direct human action". The FAO view implies that EIPs can exist naturally in ecosystems and foster food and nutrition security without any influence of humans. It is

possible to define EIPs through considering their characteristics. Shumsky *et al.* (2014) identify at least five characteristics of EIPs. First, they are locally available and used based on traditional ecological knowledge (Ranfa *et al.*, 2014; Shumsky *et al.*, 2014). Secondly, EIPs are a low-input, low-cost options for increasing nutrition and reducing the need to spend limited cash resources (Smith *et al.*, 2018). The third view is that EIPs provide greater benefits to vulnerable populations (Dernini *et al.*, 2013). Another perspective relates to EIPs' contribution to livelihoods and are available during times of drought or conflict-driven famine (Boedecker *et al.*, 2014). Lastly, EIPs tolerate water stress and are therefore resilient to climate change, which is often lacking in exotic species (Zandalinias *et al.*, 2018). When considering all these definitions and characteristics, the most important aspect is that EIPs exist in local communities and play a role in alleviating food and nutrition insecurity.

Shava (2005) reveals that indigenous food plants are usually considered inferior and associated with a low standard of living. The same scholars argue that the use of EIPs is a way of life and survival because they supplement the everyday meals of households. Another study (Maroyi, 2013) reveals that edible indigenous vegetables are a source of important nutrients. The value of the nutritional content of wild vegetables was also revealed in the Chitsa *et al.* (2014) studies. Edible indigenous fruits contribute significantly to people's diets, especially when they are in season (Nyanga *et al.*, 2013). In the current study, much emphasis was placed on how EIPs help alleviate food and nutrition insecurity in Muchesu ward of Binga District in Zimbabwe. Reynolds & Cousins (1993) documented edible and non-edible indigenous plants found in the locations where the Tonga people live in the Zambezi valley, which confirms the existence of EIPs in Muchesu ward. According to Muroyiwa, (2013), diverse types of EIPs provide nourishment. Given all these facts, it is evident that the use of edible indigenous plants is part of the daily diet of most households in rural communities.

It is important to know which part of the plant to use. As different plants are available in different seasons. The harvest of some plants is seasonal. Therefore, knowing when and where to harvest is dependent on indigenous knowledge systems (Kallas, 2010; Ranfa *et al.*, 2014; Shumsky *et al.*, 2014). Most leafy vegetables and tubers are usually boiled. Indigenous edible fruits are generally eaten raw. Without proper preparation and cooking, many plants usually become toxic. Edible plants used in one part of the world are not used everywhere, given the diversity of culture and geographical locations (Thakur *et al.*, 2015). Available and accessible plants shape cultural practices, affecting health and seasonal activities.

The indigenous fruits are usually picked and eaten raw when in season. However, this depends on availability and knowledge of use. When surplus, they are dried and stored for future use. Some fruits are reduced to powder and boiled (Mabogo, 1990). Vegetables and fresh fruits are important sources of vitamin C that are frequently absent from staple foods. Usually, edible leafy vegetables should be collected and used for daily needs. Leafy vegetables are usually rich in vitamins, without chemicals (Gogo *et al.*, 2017). Edible plant diversity is a cornerstone for food and nutrition security (Zhang *et al.*, 2016).

Some of the edible indigenous plants are considered important as they are famine foods. In their study of the Naxi people in China (Zhang *et al.*, 2016) found out that edible indigenous plants are buffers to hunger and starvation when natural disasters such as drought strike. Therefore, famine plants must be conserved and protected as found by (Khan *et al.*, 2015) because they are very important in ensuring food and nutrition security. Famine foods range from fruits, tubers, roots, stems and leafy vegetables. Most of the famine food plants are not consumed when there are no adversities like drought. In their study in Ethiopia (Meragiaw *et al.*, 2018) found out that famine plants are not normally consumed due to local taboos, offensive nature of the plants and certain unpleasant characteristics and side effects.

2.4 Understanding Food and Nutrition Security

Food and nutrition security is as old as humankind. It can be traced in folklore, legends and even religious records such as the biblical story about Joseph's prediction of seven years of plenty and equal number of years of famine. However, food and nutrition security has become one of the fiercely contested or debated concepts.

There are approximately 200 definitions and 450 indicators of food and nutrition security (Mechlem, 2004). Despite such an array of definitions, food and nutrition security tends to be understood as the success of livelihoods to guarantee access to enough food at the household level (FAO, 2010). The FAO (2010) definition of food and nutrition security provides a useful goal towards which the world should strive. It can also be useful for monitoring important aspects of the well-being of households and for the design, implementation, and evaluation of related policies, programmes and projects. However, the interaction between household food access (usually referred to as household food and nutrition security) and acquisition and allocation behaviour means that households food and nutrition is influenced by varied factors.

Consistent with Devereux & Maxwell (2001), Westengen & Banik (2016) identify four major aspects of food and nutrition security, namely availability (adequate food supplies), access (people's ability to obtain the available food supplies), utilisation (calorie and micronutrient intake and absorption) and stability (environmental, economic and political stability in obtaining

food). Taken together, these definitions emphasise availability, access and nutrient composition of food. Bearing this in mind, the current study in Binga District took a broader perspective of EIPs, including their contribution to food and nutrition security.

One fundamental issue that has so far not been addressed is what nutrition means. It is a contested term. Thus, in the current study, the World Health Organisation (WHO, 2016) definition is adopted because of its common use. According to WHO (2016), nutrition is refers to:

“...the intake of food considered in relation to the body’s dietary needs. Good nutrition – an adequate, well-balanced diet combined with regular physical activity – is a cornerstone of good health. Poor nutrition can lead to reduced immunity, increased susceptibility to disease, impaired physical and mental development, and reduced productivity.”

Based on the definition presented above, food intake, including that of EIPs, plays a significant role in household nutrition. Of importance is that it contributes to the dietary needs of local communities. Several studies (Redzic, 2006; Badimo *et al.*, 2015; Neudeck *et al.*, 2012) have outlined the importance of EIPs in assisting to achieve diversity of dietary intake, food and nutrition security and income generation.

Maroyi (2013) conducted studies on the use of weeds as traditional vegetables in Shurugwi District of Zimbabwe. He found that edible weeds could contribute in a major way to food and nutrition security, basic primary health care and balanced diets of rural households, and possibly urban households as well. Maroyi (2013) further alludes that wild weeds are an important part of daily food intake with some preserved for use during the dry season when they are out of season. Critically important is that lack of alternatives makes some families in Shurugwi consume edible weeds. Muchesu area in Binga District, the focus of the current study, is different from Shurugwi in terms of environmental, social and economic conditions. It is unclear whether the Maroyi (2013) findings may be applicable to other parts of Zimbabwe, including Binga District. Considering this, Badimo *et al.* (2015) note that a gap in research still exists about a comprehensive understanding of the nutritional value and related health outcomes of EIPs. This was one of the major gaps that this study sought to fill.

2.5 Gender, Age and the Components of Food and Nutrition Security

Food and nutrition security as indicated earlier in this dissertation refers to the availability, accessibility and use and stability of food at the individual, domestic, national, regional and at the global level (Banik,2016. Access to food, availability and use are the three distinct components that are closely related. Women and men play their different roles according to the expectations of their communities. Gender roles can be reflected in the mentioned components. Nunes *et al.* (2018) posit that men know plants that are more distant from residents and women know plants that are close to them. When translating a product into food, women make sure that their families get enough food to eat over it. Women and men play their different roles according to the expectations of their communities. In most African communities, women prepare food from the raw material to the product. Women play a major role in the diversification of their diets.

To realise the full benefits of the nutritional and remedial values of EIPs, the perceptions of local people about the food plants, needs to be understood. In a study conducted in South Africa (van der Hoeven *et al.*, 2013) expounds that parents have knowledge of available indigenous plants and their use as food. Consistently (Bruun & Ngoc 2018) noted that Indigenous knowledge is influenced by age. Elderly women and men have a vast wealth of indigenous knowledge. However (Ojelel & Kakudidi, 2015) clarified that the indigenous knowledge is declining on the younger generation. Therefore, it is important to document and teach the younger generation of the importance of natural capital. Natural capital in form of plants is sovereignty in maintaining food and nutrition security, especially in this era of serious climate change. However, Nunes *et al.* (2018) in their study, found that most people did not know about native edible plants nearby but knew where to find them. This might suggest that native edible plants have been replaced by conventional foods. The lack of knowledge about plants also highlights the vulnerability of these communities due to lack of knowledge of disaster preparedness. Thus, the conservation and sustainable use of native edible plants will become essential to meet the demands of the people.

New technologies present opportunities that might be explored to archive and store Indigenous knowlegde. In their study Ashagre *et al.*, 2016 suggested that knowledge is currently eroded and lost due to loss of traditional cultural systems and conversion of rangelands and forest ecosystems to other land use types. Indigenous knowledge is an endangered commodity if not documented. Furthermore, Indigenous practices and skills are gradually being eroded and lost due to urbanisation, industrialisation as well as mobility of youth from rural settings. Those who have the knowledge die with it not being documented

hence this may mean that the knowledge might be extinct. Therefore, globalisation exposes the food system to novel economic and political pressures. These pressures present serious challenges in food and nutrition security.

There are other challenges which constrain the realisation of food and nutrition in rural communities. According to Hengsdijk & De Boer (2017), food losses and waste of the edible parts of the cereal produced for human consumption is a challenge for most farmers. This technology gap is food loss and a challenge to most household cereal needs. Lack of real development in post-harvest technologies increases the vulnerability of farmers in Africa to economic and food shocks for example, the dwindling commodity prices (Ridolfi *et al.*, 2018). There is also a gap between scientific research and policy makers. Policy makers and researchers must work together to implement and solve food and nutrition security problems.

2.6 The Sustainable Diets Framework: Theory Underpinning the Study

In the current study, the Sustainable Diets Framework Dernini *et al.*- (2013) was adopted and adapted because it advocates for the use of indigenous knowledge systems to curb food and nutrition insecurity. The main argument the current study was premised on is summarised in (Figure 2.1). The knowledge about the identification, preparation and management of forests and wild plants has been passed on from one generation to another through oral tradition. According to Dernini *et al.* (2013), the sustainable diets framework advocates for the use of this knowledge to curb hunger and starvation and was deemed relevant to adopt and apply in the study in Muchesu ward.

Sustainable diets is a relatively new concept introduced in 1986 (Dernini *et al.*, 2013). Moreover, Anestad & Fulgai (2015) observe that sustainable diets are gaining popularity. The increased attention might be due to the belief that a sustainable diet promotes the use of available resources and probably has limited negative impact on the environment. Climate variability and change is a major concern receiving considerable international attention. One of the reasons for this concern is that it causes the considerably high food and nutrition insecurity especially in sub-Saharan Africa's rainfed agricultural systems. As a result, sustainable diets are increasingly associated with low environmental impact and improved food and nutrition security.

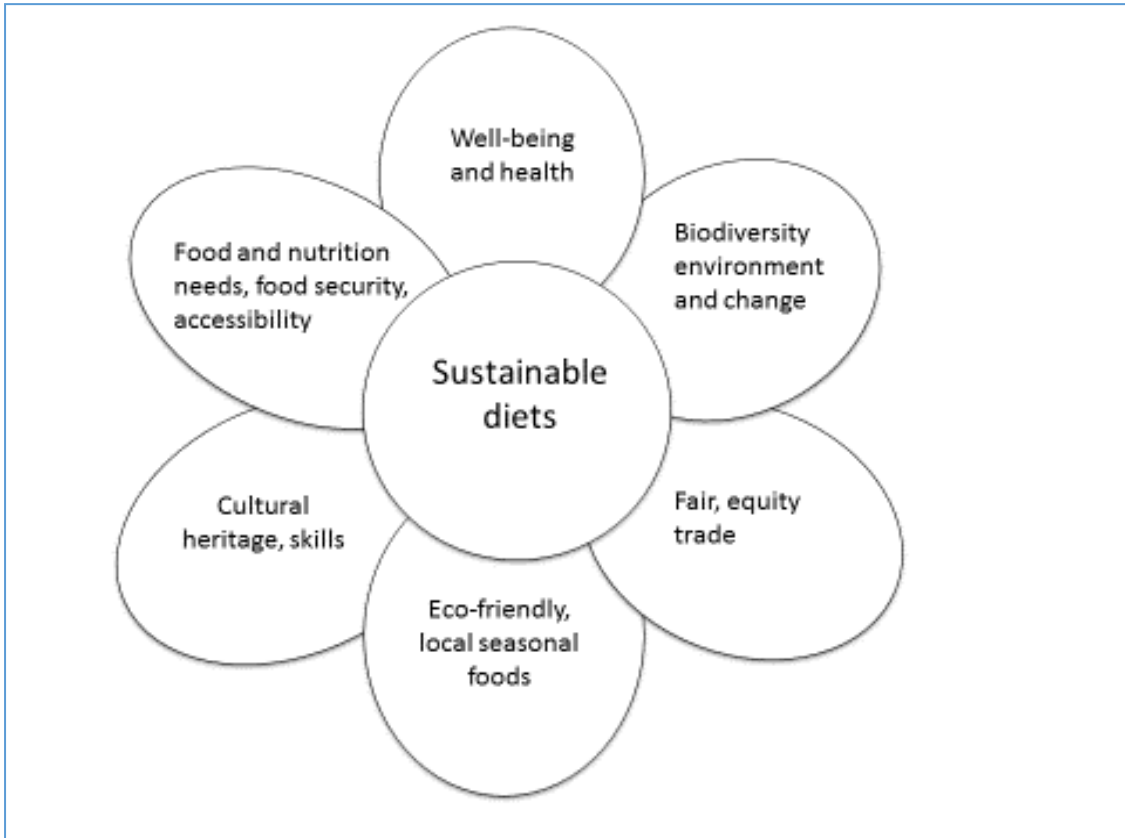


Figure 2.1: The sustainable diets framework (Adapted from Dernini *et al.*, 2013)

The Food and Agriculture Organisation (FAO) (2010) defines sustainable diets as those with low environmental impact that contribute to food and nutrition security, thereby promoting healthy lives for present and future generations. This implies that sustainable diets help protect and respect biodiversity and ecosystems through being culturally acceptable, accessible, economically fair and affordable, nutritionally adequate, safe, and healthy (Dernini *et al.*, 2013; Prospero *et al.*, 2013).

Adoption of the sustainable diets framework stemmed from consideration of its dimensions, including availability and accessibility of local resources, seasonality of food availability, environment and change, fairness, equity and trade, indigenous knowledge systems, identification and utilisation which are relevant to understanding EIPs. In this study, availability and accessibility were regarded crucial as the basis for exploring the types of EIPs found in Muchesu ward. Seasonality of food as an aspect of sustainable diets was relevant with respect to availability of EIPs across the year. Environmental change sought to build an understanding of the threats associated with EIPs. Another central consideration was indigenous knowledge, considering knowledge holders' expertise in the identification of the types of the plants and their classes as well as their expertise regarding preparation of the plants prior to consumption. All the aspects explained above are embedded in the research focus and ultimately echoed in the objectives of the study. Thus, the framework is suitable for the current study. Other aspects that anchor sustainable diets are indigenous knowledge and its roles in improving food and nutrition security.

Table 2.1 Summary of the review of the literature on edible indigenous plants

Research questions	Key findings	Gaps
1. What types of EIPs are found in Muchesu ward?	<p>a) Edible indigenous plants are defined and understood differently from one cultural group to another</p> <p>b) Despite the commonality in terms of where the EIPs are found and the benefits to the communities, there is still considerable debate and contestation associated with them</p> <p>c) EIPs contribute to livelihoods and are often available during times of drought or conflict-driven famine</p>	<p>a) Inadequate information on how EIPs fit into the food and nutrition equation</p> <p>b) There is lack of information on the types of EIPs found in many parts of rural areas</p>
2. When are EIPs available?	<p>a) There is consensus that the EIPs can exist naturally in various ecosystems and foster food and nutrition security without any human influence.</p> <p>b) EIPs exist in local communities and help alleviate food and nutrition insecurity.</p> <p>c) Most studies on EIPs are multidisciplinary in nature, applying quantitative and qualitative methods</p>	<p>There is need for research that seeks to build a comprehensive understanding of the nutritional value and associated health outcomes of EIPs</p> <p>Information on seasonal food calendars of the diverse areas of Zimbabwe is lacking. This includes Binga District and Muchesu ward</p>
3. What are the methods locally used to prepare EIPs before consumption?	<p>Indigenous knowledge and its associated roles in improving food and nutrition security anchor “sustainable diets”.</p>	<p>Limited documentation on how EIPs are prepared prior to consumption in households.</p>

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CHAPTER 3 INVENTORY OF EDIBLE INDIGENOUS PLANTS IN A FOOD-INSECURE DISTRICT OF NORTH-WESTERN ZIMBABWE

3.1 Abstract

The world faces severe food and nutrition challenges, which can be addressed through a wide range of solutions. Edible indigenous plants (EIPs) are locally available natural capital that communities are endowed with. These plants can be used in both times of need and abundance. Yet, inventories of EIPs are not readily available. An exploratory and phenomenological study was carried out in Muchesu ward located within Binga District in north-western Zimbabwe. The objective of the study was to develop an inventory of EIPs. Data were collected using participatory mapping, transect walk and focus group discussions. Fifty-seven respondents constituting of youth, men and women participated in the study. The respondents were divided into six interest groups. Forty-seven leafy vegetables, 36 fruits and 26 tubers were identified as a major resource for combating food and nutrition insecurity. The availability of EIPs varied across seasons. Data were analysed through a plenary session with the respondents to understand the dynamics of identified plants, differences in sketched maps and their location. Thematic content analysis was used to identify the emerging themes in the study. It was concluded that Muchesu ward was richly endowed with different types of plants which formed part of the household food matrix. However, household vulnerability assessments never factored them into the food systems of the local area. The study highlighted the need for contextualising food and nutrition insecurity. Food and nutrition security is a broad and complex phenomenon. Therefore, it is recommended to understand it using the local experiences rather generalising it using global perspectives which might not be applicable because of diversity in culture and environments.

Keywords: Edible indigenous plants; Food and nutrition insecurity; Interest groups

3.2 Introduction

The world faces serious food and nutrition insecurity. The disaster management discourse encourages people to solve their own problems using local available resources. Edible indigenous plants are readily available and can be used for food when needed. Studies conducted on the African continent and the rest of the world indicate the diversity and use of these plants in varied cultural groups. Studies conducted by (Polat *et al.*, 2015; Bvenura & Afolayou, 2015; Sararwo *et al.*, 2016) agree that EIPs are used for food. Little was known about the types of plants found in Muchesu ward. Thus, the study sought to document the available indigenous plants found in this area. This study was conducted in Muchesu ward which is just a small portion of Binga District in North-Western Zimbabwe. In this study, the EIPs were identified, documented and categorised with respect to the edible parts of the tree, shrub and climber to come up with an inventory. The different categories were leafy vegetables, fruits, and tubers.

3.3 Study area

3.3.1 Description of the Study Area

Binga is one of Zimbabwe's 57 administrative Districts. It is found to the north-west of the country, with the Zambezi River demarcating it from Zambia (Figure 3.1). The District has a population of over 100 000, with most of the people being of Tonga ethnic origin. The Tonga's are one of Zimbabwe's ethnic groups in the country. Binga District is quite remote. Most parts of the District are not well suited to agriculture since temperatures are high, rainfall is generally low and very erratic, much of the terrain is hilly, except in the river valleys, and the soils tend to be poor (Chikozho *et al.*, 2015). Despite Binga's remoteness, there is a large wildlife population, both within and outside protected areas. Binga District's history and the economy are dominated by the Zambezi River, which constitutes the 150-kilometer-long border between Binga District and neighbouring Zambia (Scudder, 1962). Moreover, and of significance to this study, wild animals frequently attack both crops and people, while killing wild animals (either for food or to defend people or crops) is strictly prohibited.

3.3.2 Description of Muchesu ward

Ward 12, also known as Muchesu, forms part of Binga Rural District Council which administers the area. It has a population of 2 586 people who reside in what is mainly coined communal land in Zimbabwe. It is a region of some 15 000 km² situated in north-west Zimbabwe, forming part of the Zambezi river basin immediately to the south of Lake Kariba. The elevation varies from 475 m above sea level at the Kariba lakeshore to over 1200 m on the Zambezi

escarpment inland; the mean elevation is 700-800 m with generally undulating topography. The climate is semi-arid, characterised by a single wet season from November to March and a long dry season from April to October. Mean annual rainfall shows great variation both within the region and between years, but the long-term mean is 680–750 mm per year (Hutton 1991). The natural land cover is deciduous woodland savanna dominated by the mopane tree (*Colophospermum mopane*), interspersed with abundant riparian fringes on the extensive northward drainage and occasional small, dense thickets (Timberlake *et al.*, 1993).

3.4 Negotiating Community Entry

Ethical clearance was secured from the University of Venda Ethical Clearance Committee thereby formally giving the green light to carry out the study. The study began with negotiating community entry into Muchesu ward. The researcher was granted permission to conduct the study in Muchesu ward through consulting with appropriate stakeholders, including the Binga District Rural Council, Chief of the area, and the Muchesu ward Councillor. As a result, three research assistants were selected and trained on the data collection tools and the research process. The process of negotiating entry and training of research assistants took one whole week. It was important to train research assistants to help in facilitating and collecting accurate information during the data collection process. In addition, a community input meeting was held with the community members, ward Councillor, and the researcher. The objectives of the study were explained to the respondents before data were collected. Furthermore, respondents informed consent was secured. The respondents also agreed on the timeframe for data collection to avoid disrupting the plans of the respondents and data collection. All this was done to uphold the mandates of scientific research.

3.5 Pretesting Data Collection Instruments

The data collection tools were pre-tested and then used to collect data. Pretesting was done on a small sample of the respondents before the full-scale study. This was done in order to identify any problems which might impede collecting intended data. Pretesting the tool is recommended for improving validity and reliability in qualitative data collection procedure. The data collection tools were then used to create an inventory and categorise EIPs found in Muchesu ward.

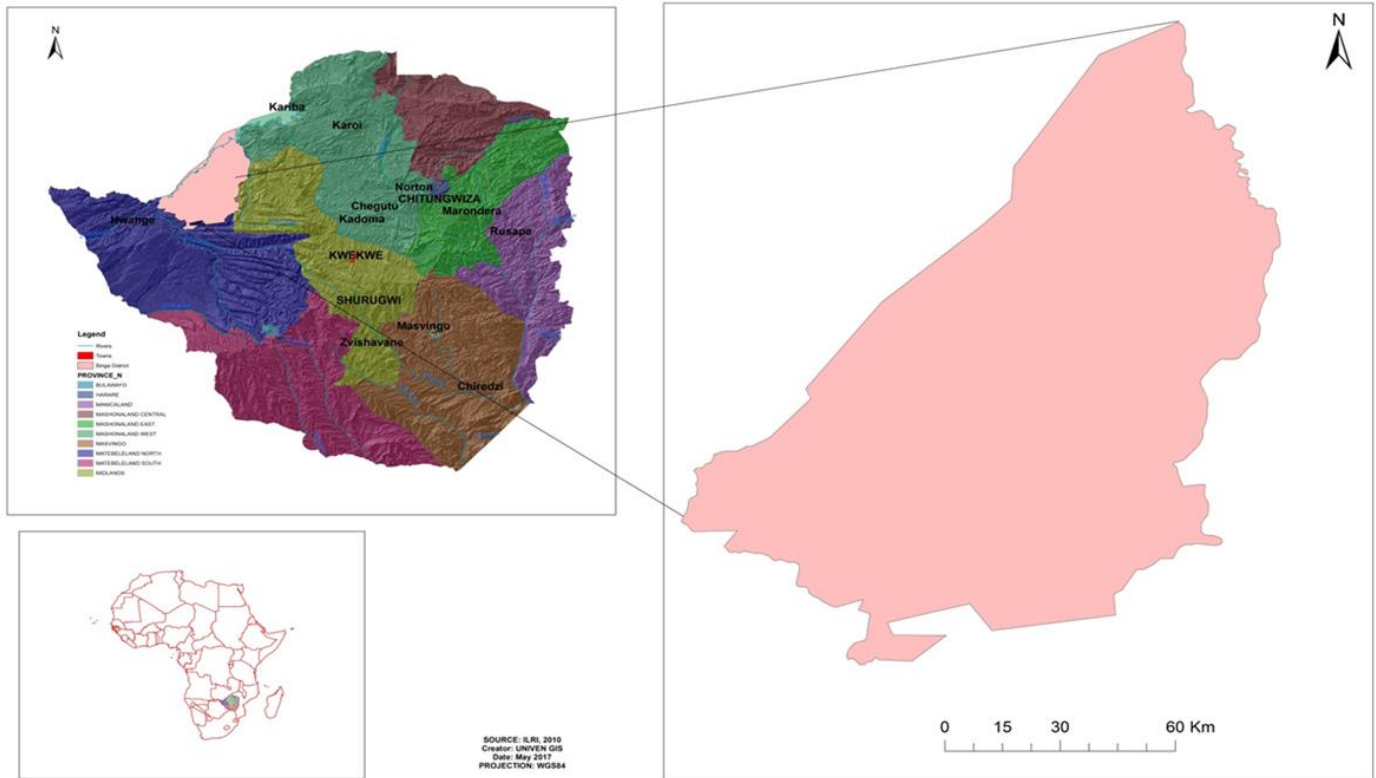


Figure 3.1 Map showing the location of Muchesu ward in Binga District in Zimbabwe

3.6 Research Design

A qualitative exploratory research design was used for this study because it is appropriate for generating and understanding a phenomenon through rich description. A comprehensive description of processes, mechanisms or settings will be generated. The study was also phenomenological in design since it sought to access the world of experiences lived by the respondents. A phenomenological design was used because the study sought to describe the meaning, experiences and perceptions of people on the contribution of EIPs to food and nutrition security in Muchesu ward.

3.6.1 Participatory mapping, transect walk and focus group discussion

Participatory mapping was the first step in the data collection process, it acted as the bridge between the community members and the researcher. Participatory mapping is a group-based qualitative method that gives respondents the freedom to shape the discussion on a given topic with minimal intervention from the researcher. Mapping can generate a rich understanding of the connections between people, places, and organisations over a space of time. Participatory mapping as a data collection technique encouraged active participation of the people whom the research intended to assist. The focus group was infused to complement the participatory mapping and clarify the sketch maps. Furthermore, explanations on why some plants were found in certain areas was verified through the focus group discussions.

Three key steps were followed to identify the EIPs. Respondents were purposively selected. In their different groups, respondents drew sketch maps displaying the boundaries of the ward and highlighting important landmarks. Subsequently, using a different marker, they identified the location of EIPs. Each interest group drew individual sketch maps based on its discernment. It took the respondents 5-6 hours to complete the detailed ward maps. The key informants helped identify specific sites where the plants were found.

The information presented in the sketch maps was verified through transect walks with the respondents. During the transect walks, data were collected using an observation guide and application of the photovoice technique. Samples of leafy vegetables, tubers, and fruits in the season were collected during the transect walks.

Participatory focus group discussions were organised to validate the findings from key informant interviews and transect walks. Three participatory focus groups, each comprising 6-8 respondents were constituted. There were equal numbers of men and women. In each focus group discussion, there was a scribe tasked to write down the EIPs not shown on the maps.

3.7 Population and Sampling Procedure

Fifty-seven people participated in this study. Respondents were purposively selected because they had more knowledge about EIPs. The participants came from the following villages: Dimbo, Dinga, Manchinga and Zuka. Six interest groups are made up of three groups of women and men each. The first group was composed of nine young women aged 18 to 35 years. The second group consisted of 12 young men aged 18 to 35 years. The third group consisted of six middle-aged women aged 35-64. The fourth group consisted of 5 middle-aged men aged 35 to 64 years. Eighteen adult women aged 65 and over formed the fifth group. Group 6 consisted of 6 adult men 65 years and older.

3.8 Data Collection Methods and Techniques

Qualitative data were collected using the participatory research approach. A semi-structured questionnaire was used. Participatory mapping and transect walks were used to obtain knowledge on EIPs. Focus group discussions were then used to clarify the data the generated during participatory mapping and the transect walks. Data collection for phase one was triangulated through participatory mapping, transect walks and participatory focus group discussions. Six interest groups were formed to carry an inventory of edible indigenous plants found in Muchesu ward. The six groups comprised female and male youth whose ages ranged from 18-35 years, women (Figure 3.2) and men (Figure 3.4) aged 35-60 years and women (Figure 3.3) and men who were 65 years and above. Respondents participated separately in their interest groups.



Figure 3.2 Women 35-60 years drawing a map showing areas where locally available edible indigenous plants are found



Figure 3.3: Women 65+ years old with a research assistant drawing a map showing areas where locally available edible indigenous plants are found



Figure 3.4: Men 35-60 years old drawing a map showing areas where locally available edible indigenous plants are found

3.9 Data Analysis

Data analysis was conducted through a facilitated plenary session. The plenary session helped to keep the original thoughts of the respondents and the data generated. Group representative presented the maps and explained any dynamics and patterns. Thematic content analysis was then used to identify emerging themes. This helped minimise misinterpretation of the results.

3.10 Ethical Considerations

Ethical clearance was secured from the University Ethics Committee (project number: SARDF/17/IRD/06/1706). Permission to conduct the research in Muchesu was obtained from the Binga Rural District Council as well as the traditional leader. The purpose of the research was explained to the respondents. They were informed that their participation was voluntary. Consent forms see (Appendix 3 attached) were signed by both the researcher and the respondents before data collection. Consent to use the participants pictures was acquired from the participants and their privacy was maintained as no names were collected during the data collection process. Respondents were assured that collected data would be used for academic processes only. The cultural aspects of the respondents were considered during data collection in that plants in sacred areas were not photographed. Research findings were presented in the form of printed hard copies and a power point presentation to the respondents.

3.11 Results

Edible Indigenous Plants were available, accessible and used for food in Muchesu ward. Figures 3.6-3.11 show the maps sketched by the respondents and they illustrate the diverse plants edible in Muchesu ward. The maps revealed that the respondents had knowledge of the EIPs as they were able to identify the types of plants and located where they were found on the maps.

The sketch map of the male youth group was more detailed compared to that drawn by female youth especially in terms of identifying the significant landmarks in the ward. The male youth group indicated the distance between landmarks and boundaries. Importantly, the maps were sketched, and on the distribution of edible indigenous plants in Muchesu ward. Male and female youth sketched maps that were distinctly different. The former group provided considerable detail in terms of directions of the landmarks, organisation of the map, boundaries of Muchesu with other villages and the adjoining Chizarira national park. Both female and male youth affirmed that the following plants were mainly found along the river

beds: Nkuyu (*Ficus sur*), Tende (*Cocculus hirsutus*) and Munga (*Acacia albida*). Bwiidi and Makuli (*Ipomoea shirambensis*) were reported to be principally confined to the hills. Female youths identified more edible indigenous leafy vegetable species than their male counterparts.

Men in the 35-60 age group's sketch map was more detailed than their women counterparts. Men sketched a map which clearly illustrated the boundaries within Muchesu and bordering Chizarira National park and neighbouring wards. The number of edible plants identified by women in the 35-60 age group was larger than that of their male counterparts. Women and men aged 35-60 years produced different sketch maps (Figures 3.8 and 3.9). Men drew a more detailed sketch map. They illustrated the main river in the ward and its feeder streams, namely Kkubukubu, Welo, Siabuyamba, and Nakatanda. In contrast, the map that women sketched illustrated the sub-villages where edible indigenous leafy vegetables, fruits and tubers were found. They indicated that Mfudu (*Vites payos*), Mbubu (*Tapiphyllum velutinum*) and Mbula (*Pavinari curatellifolia*) were mostly found in Siakujwe. Nkula (*Vangueria Infausta*) seemed to be mainly concentrated in Maacha and Siambizi. In Zuka, Mateme (*Strychnos madagascariensis*) were most common. Tende (*Cocculus hirsutus*), Camudonga (*Alternanthera sessilis*) and Kanamadada were mainly confined to areas close to the Muchesu river. When compared with their male counterparts, women who were more than 65 years old identified more of EIPs than other respondent groups (Figures 3.10 and 3.11).

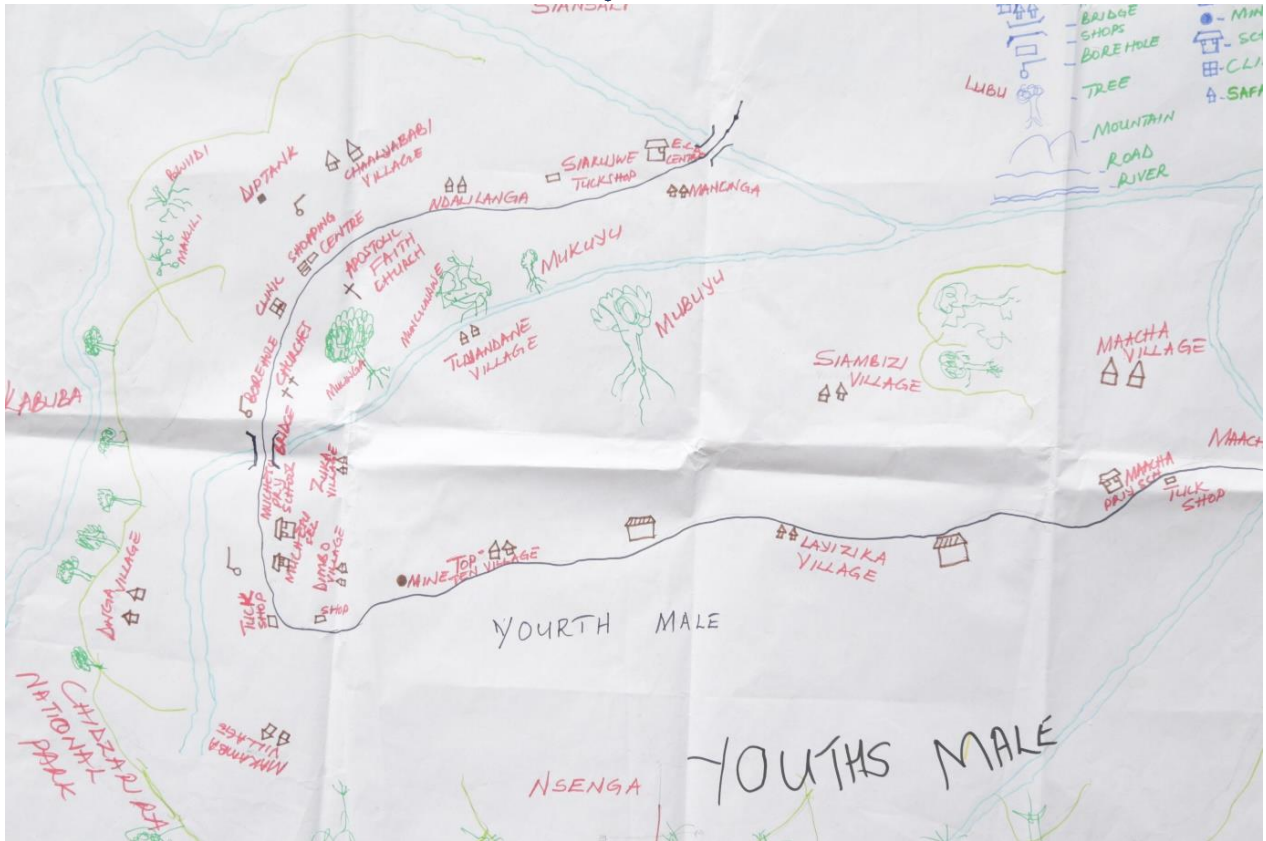


Figure 3.6 Map sketched by male youth showing the distribution of edible indigenous plants in Muchesu ward, Zimbabwe



Figure 3.8 Map sketched by men 35-60 years old showing the distribution of edible indigenous plants in Muchesu ward, Zimbabwe

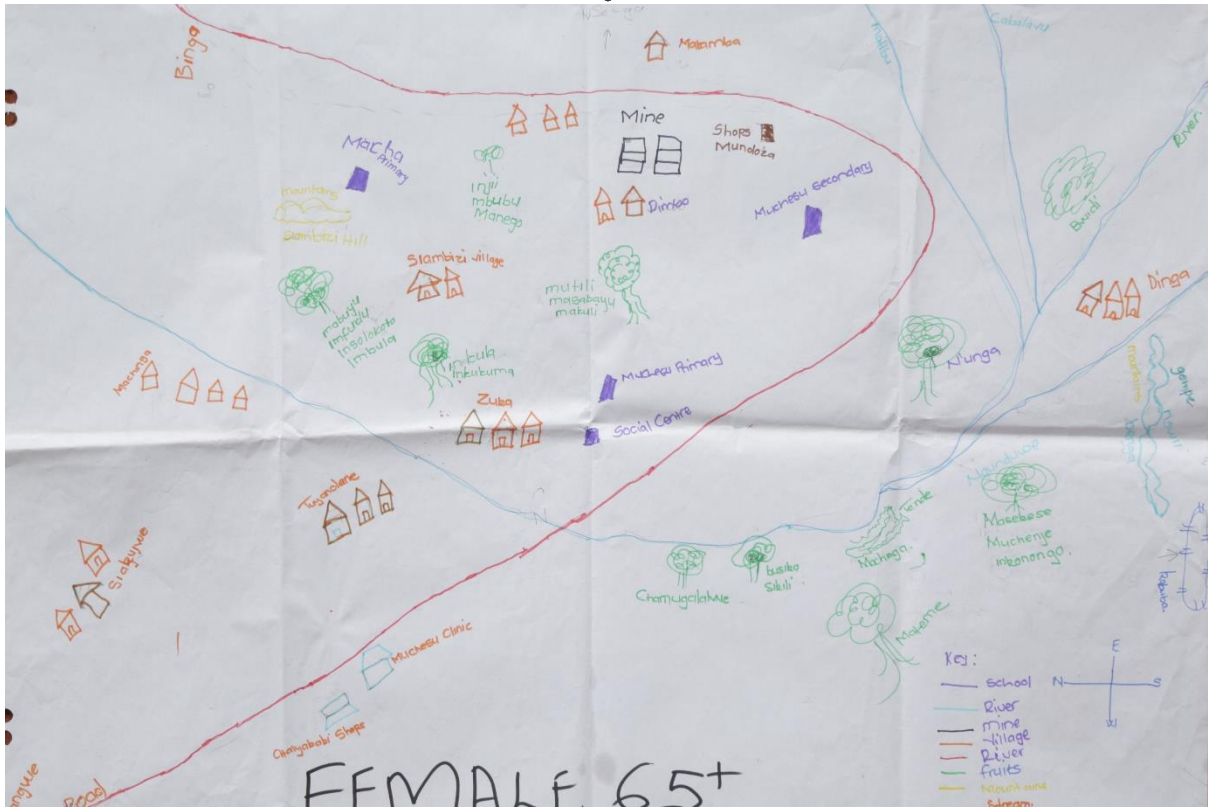


Figure 3.9 Map sketched by women aged 65+ years showing the distribution of edible indigenous plants in Muchesu ward, Zimbabwe



Figure 3.10 Map sketched by men aged 65+ showing the distribution of edible indigenous plants in Muchesu ward, Zimbabwe

The elderly men who were at least 65 years old included the main road within Muchesu ward which connected it with neighbouring wards. Also included on the map were the main Muchesu and Sibungwe rivers and their 10 feeder streams. The elderly women aged more than 65 years could not sketch their own map and argued that this was due to them being illiterate. Nevertheless, they requested for assistance in drawing the sketch map. Thus, a research assistant was assigned to assist them, resulting in them producing their own map (Figure 3.4). Their map contained several significant landmarks, including the boundaries and several tributaries.

Female youth identified nine leafy vegetables and the male youth identified 12 leafy vegetables. The most prevalent edible leafy vegetables according to this age group when in season were; Bbonko (*Amaranthus hybridus*) and tende (*Cocculus hirsutus*). The most important leafy vegetables according to these participants were Bbonko (*Amaranthus hybridus*), Tende (*Cocculus hirsutus*), Camudonga (*Alternanthera sessilis*) and Chisyungwa (*Cleome gynandra*).

The women aged 35-60 years identified 18 vegetables whilst men identified 12 vegetables. According to the women Tende (*Cocculus hirsutus*), Mpoko, and Nsoboyo (*Vernonia amygdalina*) were the most common vegetables. Nkomba (*Ceratotherca sesamoides*), Mbuyubuyu (*Adansonia digitata*) and Mukambo (*Pterocarpus lucens*). It is important to note that this age group provided a diverse list of vegetables.

The number of edible indigenous identified by the elderly women was 30 leafy vegetables. Compared to the elderly women the elderly men identified twenty-five (25) leafy vegetables. The most prevalent leafy vegetables according to this group were Telele bbuyu (*Corchorus tridens*), Tende (*Cocculus hirsutus*), Camugalalwe, Mundyoli (*Triplochiton zambasiasus*), Nsoboyo (*Vernonia amygdalina*), Mpoko, Ndululu (*Micrococca mercurialis*), Kabombwe (*Boscia salifolia*), Mbuyubuyu (*Adansonia digitata*), Camudonga (*Alternanthera sessilis*), Chisyungwa (*Cleome gynandra*), Debelebe (*Cissus welwitschii*) and Kanyangunyangu. This group agreed mostly on when the leafy vegetables were accessible. The number of edible indigenous leafy vegetables were identified was 47. However, this is not the exhaustive list of edible indigenous plants found in Muchesu ward. Tende (*Cocculus hirsutus*), Bbonko (*Amaranthus Hybridus*), Telele bbuyu (*Corchorus asplenifolius*), Cisyungwa (*Cleome gynandra*), Mundyoli, Mukambo (*Pterocarpus lucens*), Mbuyubuyu (*Adansonia digitata*), Nkomba, (*Ceratotherca sesamoides*), and *Kabbondo*, are the most prevalent indigenous edible leafy vegetables (Tables 3.1-3.3).

The scientific names of the following indigenous leafy vegetables could not be identified; Kabbondo, Camugalalwe, Kalubazwezwe, Kanyangunyangu, Mpoko, Mutili, Kakooba, Kumbaile, Camugwengwele, Kanamadada, Siaundu, Nyelele, Canimbali, Chagoga, Kalulalula and Cigokole were not found thus the local names were used in the study.

Female youth identified 12 edible fruits, that were regarded as edible. On the other hand, male youth identified 23. The most prevalent fruits according to the youth groups were: Manego (*Azanza garkeana*), Nchomvwa (*Ximenia americana*), Nkula (*Vangueria Infausta*), Ngunduwe (*Grewia pachycalyx*), Machende abasokwe (*Grewia villosa*), Mbula (*Pavinari curatellifolia*), Nkuyu (*Ficus sur*) and Masekese (*Bauhinia thonningii*). They agreed on when most plants were harvested when in the season.

Adult women identified 14 fruits whilst the adult men identified 15. The common fruits harvested in these interest groups were: Nkula (*Vangueria Infausta*), Mfundu (*Vites payos*), Mbubu (*Tapiphyllum velutinum*), Mantamba (*Strychnos cocculoides*), Injii (*Berchemia discolor*), Nkukuma (*Hexalobus monopetalus*), Nchacati (*Canthium frangula*) and Mbubu (*Tapiphyllum velutinum*). The adult women and men agreed on the seasonal availability of some fruits and the months when they were accessible.

Elderly women and men identified 22 and 23 fruits, respectively. These were more than the younger respondents. The preferred fruits when in the season in the season were: Nkula (*Vangueria Infausta*), Injii (*Berchemia discolor*), Sika (*Tamarindus Indica*), Mbubu (*Tapiphyllum velutinum*), Nzininingwa, (*Vangueria randii*), Mfundu (*Vites payos*), Mantamba (*Strychnos cocculoides*), Mateme (*Strychnos madagascariensis*), Ngunduwe (*Grewia pachycalyx*), Nsikili (*Trichilia emetica*), N'unga (*Acacia albida*), Mbula (*Pavinari curatellifolia*), Nkukuma (*Hexalobus monopetalus*) and Macende abasokwe (*Grewia villosa*). The same trend was observed as these interest groups agreed when the fruits were available. Injii (*Berchemia discolor*), Nkula (*Vangueria Infausta*), Manego (*Azanza garkeana*), Mbubu (*Tapiphyllum velutinum*), Sika (*Tamarindus indica*), Mateme (*Strychnos madagascariensis*), Mfundu (*Vites payos*), N'unga (*Acacia albida*), Nkuyu (*Faidherbia albida*), Mabuyu (*Adansonia digitata*) and Nsumo (*Vantheriopsis lanciflora*) were the most common indigenous edible fruits (Tables 3.4 -3.6). Out of the thirty-six indigenous fruits identified in Muchesu ward, 30 were harvested from trees and six from shrubs. The identified shrubs were Nchomvwa (*Ximenia americana*), Ngunduwe (*Grewia pachycalyx*), Mbubu (*Tapiphyllum velutinum*) and Manchinga (*Friesodielsia obovata*). Ingoogo and Makunka were important edible fruits but their English and scientific names could not be verified.

Table 3.1 A list of prominent edible indigenous leafy vegetables identified in Muchesu Ward, Binga Zimbabwe

Local name	Biological name	Location	Interest groups						Tally
			F Y	M Y	35-60 W	35-60 M	65+ W	65+ M	
Tende	<i>Cocculus hirsutus</i>	Near water sources and in forests	x	x	x	x	x	x	6
Telele bbuyu	<i>Corchorus tridens</i>	Grasslands and woodlands and on vlei margins	x	x	x	x	x	x	6
Cisyungwa	<i>Cleome gynandra</i>	Disturbed ground, in deserted village fields and old cattle kraals	x	x	x	x	x	x	6
Bbonko	<i>Amaranthus hybridus</i>	Common on disturbed soil, on old crop lands	x	x	x	x	x	x	6
Mundyoli	<i>Triplochiton zambasiasus</i>	Plains, forests	x	x	x	x	x	x	6
Mukambo	<i>Pterocarpus lucens</i>	Plains, forests	x	x	x	x	x	x	6
Mbuyubuyu	<i>Adansonia digitata</i>	Woodlands, forests	x	x	x	x	x	x	6
Nkomba	<i>Ceratotheca sesamoides</i>	Grasslands and vlei margins	x	x	x	x	x	x	6

Kabbondo		cultivated lands	x	x	x	x	x	x	6
Nsobo	<i>Vernonia amygdalina</i>	Forests		x	x	x	x	x	5
Camugalalwe		Along the river bank	x	x			x	x	4

Key: FY = female youth; MY = Male youth; 35-60W = Women 35-60 years old; 35-60M=Men 35-60 years old; 65+W=Women 65 years old and above; 65+M=65 years old men and above

Table 3.2 A list of moderately common edible indigenous leafy vegetables identified in Muchesu ward, Binga Zimbabwe

Local name	Biological name	Location	Interest groups					Tally	
			FY	MY	35-60W	35-60M	65+W		65+M
Kalubazwezwe		Grasslands			x	x	x		3
Kanyangunyangu		Forests, plains			x		x	x	3
Mpoko		Forests				x	x	x	3
Ndululu	<i>Micrococca mercurialis</i>	Forests	x				x	x	3
Kabombwe	<i>Boscia salifolia</i>	Plains, forests	x		x			x	3
Mwii	<i>Berchemia discolor</i>	Along water courses, sandy soils in woodlands and on termite mounds	x		x			x	3
Camudonga	<i>Alternanthera sessilis</i>	Along the river banks	x				x		2
Kafuwakanswi	<i>Polycarpon prostratum</i>	Along the river banks			x		x		2
Mutili		Plains, woodlands			x		x		2
Kakooba	-	Forest			x		x		2
Kumbaile	-	Plains			x		x		2
Debelebe	<i>Cissus welwitschii</i>	Woodlands	x				x		2
Siamukwalu	<i>Glinus lotoides</i>	Forests			x		x		2
Camugwengwele	-	Woodlands			x		x		2

Kanamadada	-	Along water sources			x	x	2
Sialundu	-	Forests	x	x			2
Mbelebele	<i>Sesbania sesban</i>	Forests	x	x			2
Sibbololozya	<i>Polygonum senegalense</i>	Forests		x		x	2
Mupwepwe	<i>Abelmoschus esculentus</i>	Grasslands and swampy areas			x	x	2
Kandongondongo	<i>Chamaecrista absus</i>	Plains		x		x	2
Kanamadada	-	Along water sources	x	x			2

Key: FY = female youth; MY = Male youth; 35-60W = Women 35-60 years old; 35-60M=Men 35-60 years old; 65+W=Women 65 years old and above; 65+M=65 years old men and above.

Table 3.3 A list of less common indigenous edible leafy vegetables identified in Muchesu ward, Binga Zimbabwe

Local name	Biological name	Location	Interest groups						Tally	
			F Y	M Y	35- 60 W	35- 60 M	65+ W	65+ M		
Muswi	<i>Ochna pulchra</i>	Grasslands						x		1
Tindi	<i>Neorautanenia mitis</i>	Forests						x		1
Siamukwalwu	<i>Glinus oppositifolius</i>	Forests						x		1
Matwasulwe	<i>Ipomea plebeia</i>	Forests, backyards, plains						x		1
Nyelele		Forests						x		1
Siachikwiye	<i>Corchorus trilocularis</i>	Forests						x		1
Masanze	<i>Portulaca oleracea</i>	Plains, woodlands						x		1
Chincenya	<i>Triumfetta rhomboidea</i>	Gardens and cultivated land						x		1
Canimbali		Woodlands				x				1
Chagoga		Forests		x						1
Kalulalula		Plains		x						1
Kaliba	<i>Salvinia molesta</i>	Woodlands							x	1
Kanembe	<i>Aloe spp.</i>	Plains							x	1
Kkumbayile		Forests				x				1

Key: FY = female youth; MY = Male youth; 35-60W = Women 35-60 years old; 35-60M=Men 35-60 years old; 65+W=Women 65 years old and above; 65+M=65 years old men and above.

Table 3.4 A list of prominent edible indigenous fruits identified in Muchesu ward, Binga Zimbabwe

Local name	Biological name	Location	Interest groups						Tally
			F Y	M Y	35-60 W	35-60 M	65+ W	65+ M	
Injii	<i>Berchemia discolor</i>	Along water courses, sandy soils in woodlands and on termite mounds	x	x	x	x	x	x	6
Nkula	<i>Vangueria Infausta</i>	Wooded grassland, granite kopjes, and termite mounds	x	x	x	x	x	x	6
Maneg o	<i>Azanza garkeana</i>	All types of woodlands, near termite mounds in deserted village fields	x	x	x	x	x	x	6
Mbubu	<i>Tapiphyllum velutinum</i>	Forests	x	x	x	x	x	x	6
Sika	<i>Tamarindus Indica</i>	Along water courses and river fringes on or near termite mounds	x	x	x	x	x	x	6
Matem e s	<i>Strychnos madagascariensis</i>	Rocky plains	x	x	x	x	x	x	6

Mfudu	<i>Vites payos</i>	Open woodlands, rocky outcrops and termite mounds	x	x	x	x	x	x	6
N'unga	<i>Acacia albida</i>	Along water sources, woodlands		x		x	x	x	6
Nkuyu	<i>Ficus sur</i>	Termite mounds, forest vegies, in woodlands and rocky kopjes	x	x	x	x	x	x	6
Mbubu	<i>Vangueira Infausta</i>	Forests and woodlands	x	x	x	x	x	x	6
Mabuyu	<i>Adansonia digitata</i>	Dry hot areas	x	x	x	x	x	x	6
Nsumo	<i>Vangheriopsis lanciflora</i>	Forests, home area	x	x	x	x	x	x	6

Key: FY = female youth; MY = Male youth; 35-60W = Women 35-60 years old; 35-60M=Men 35-60 years old; 65+W=Women 65 years old and above; 65+M=65 years old men and above.

Table 3.5 A list of moderately common edible indigenous fruits identified in Muchesu ward, Binga Zimbabwe

Local name	Biologic al name	Locati on	Interest groups						Tall y
			F Y	M Y	35- 60 W	35- 60 M	65+ W	65+ M	
Ngunduwe	<i>Grewia pachycalyx</i>	Woodlands	x	x	x			x	4
Macinga	<i>Friesodielsi a obovata</i>	Forests				x	x	x	3
Machende asokwe	<i>Grewia villosa</i>	Forests	x	x	x				3
Nchomvwa	<i>Ximenia americana</i>	Woodlands	x	x	x				3
Masekese	<i>Bauhinia thonningii</i>	Woodland, grassland and termite mounds	x	x	x				3
Madumbucenen ene	<i>Vangueriop sis lanciflora</i>	Wooded grassland, rocky outcrops, and termite mounds				x	x	x	3
Nzizingwa	<i>Vangueria randii</i>	Woodlands		x	x				2
Nkukuma	<i>Hexalobus monopetalu s</i>	Forests, woodlands		x	x				2
Njelekete	<i>Xanthocercis zambesiaca</i>	Rich soil along river fringes, termite mounds		x	x				2

Mbula	<i>Pavinari curatellifolia</i>	Forests, near homes	x		x		2	
Mantamba	<i>Strychnos cocculoides</i>	Wild	x		x		2	
Nsikili	<i>Trichilia emetica</i>	Rich soils and woodlands		x		x	2	
Ntumbula	<i>Flacourtia Indica</i>	Woodland		x		x	2	
Menampembele	<i>Ximenia caffra</i>	Forests	x			x	2	
Nchachati	<i>Canthium frangula</i>	Forests and woodlands		x		x	2	
Nfulibutimbo	<i>Vitex petersiana</i>	Wild				x	x	2

Key: FY = female youth; MY = Male youth; 35-60W = Women 35-60 years old; 35-60M=Men 35-60 years old; 65+W=Women 65 years old and above; 65+M=65 years old men and above

Table 3.6 A list of less common edible indigenous fruits identified in Muchesu ward, Binga Zimbabwe

Local name	Biological name	Location	Interest groups						Tally
			F Y	M Y	35-60 W	35-60 M	65+ W	65+ M	
Lunene	<i>Cardiospermum corindum</i>	forests, plains					x		1
Nkononga	<i>Garcinia livingstonei</i>	Woodlands					x		1
Ingoogo		woodlands, near homes					x		1
Makunka		Forests					x		1
Mantondo	<i>Cordyla africana</i>	Forests					x		1
Nkononga	<i>Garcinia livingstonei</i>	amongst rocks and granite kopjes	x						1
Sozwe	<i>Courbonia glauca</i>	forests, woodlands						x	1
Nsolokoto	<i>Xerododerris stulmanni</i>	Woodlands						x	1

Key: FY = female youth; MY = Male youth; 35-60W = Women 35-60 years old; 35-60M=Men 35-60 years old; 65+W=Women 65 years old and above; 65+M=65 years old men and above

Table 3.7 A list of prominent edible indigenous tubers collected in Muchesu ward, Binga Zimbabwe

Local name	Biological name	Location	Interest groups						Tally
			FY	MY	35-60W	35-60M	65+W	65+M	
Bbonga		near homes, mountains, forests	x	x	x	x	x	x	6
Masabayu		hills, grasslands	x	x	x	x	x	x	6
Bwiidi		mountains, hills	x	x	x	x	x	x	6
Makuli	<i>Ipomoea shirambensis</i>	grasslands, hills		x	x	x	x	x	5
Mpoo	<i>Brachystelma</i>	hills, grasslands		x	x	x	x	x	5
Kabombwe	<i>Boscia salicifolia</i>	woodlands, forests	x	x	x		x		4
Ndingwa-makwa		Hills			x		x	x	3
Mbwaabwa	<i>Commiphora africana</i>	Hills		x	x		x		3
Gompe		mountains forests			x	x	x	x	3
Nsukowi		Forests					x	x	3

Key: FY = female youth; MY = Male youth; 35-60W = Women 35-60 years old; 35-60M=Men 35-60 years old; 65+W=Women 65 years old and above; 65+M=65 years old men and above

Table 3 .8 list of less common edible indigenous tubers collected in Muchesu ward, Binga Zimbabwe

Local name	Biological name	Location	Interest groups						Tally	
			F Y	M Y	35-60 W	35-60 M	65+ W	65+ M		
Nsyukubwili		Grasslands			x			x		2
Lupopa	<i>Kedrostis natalensis</i>	hills, forests			x			x		2
Masale		swampy areas, grasslands			x	x				2
Ndia		forests, hills						x	x	2
Nswuu	<i>Cyperus fulgens</i>	grasslands, swampy mashes				x			x	2
Mutili		Woodlands					x		x	2
Toompo		woodlands, forests			x					1
Golonga		mountains, grassland, and hills						x		1
Mubboli		hills, grasslands						x		1
Inkona	<i>Amorphophallus abyssinicus</i>	grasslands, hills						x		1
Kabbulabbula		forests, hills							x	1

Nkona		Hills		x	1
Tukuli dwadwa		Hills		x	1
Chikusu	<i>Bulbostylis hispidula</i>	grasslands		x	1

Key: FY = female youth; MY = Male youth; 35-60W = Women 35-60 years old; 35-60M=Men 35-60 years old; 65+W=Women 65 years old and above; 65+M=65 years old men and above.

Busika (*Tamarindus Indica*), Mbubu (*Tapiphyllum velutinum*) and Mabyu (*Adansonia digitata*) were commonly used in most households. They were usually harvested, dried and stored. *Lweele*, a common dropping consistency porridge, was prepared from the dried fruits. The nuclei of Musikili (*Trichilia emetica*) contain energy-giving oil, which was used to cook Cisyuungwa (*Cleome gynandra*) in this area.

Female youth identified four tubers when in the season whilst male youth identified 10 tubers. Bwiidi, Masabayu, Bbonga were the most common tubers identified by the youth. The number of tubers identified was lesser compared to the leafy vegetables and the fruits Table 3.8.

The number of identified tubers was lesser compared to the leafy vegetables and the fruits. Men and women identified six and nine tubers, respectively. Makuli (*Ipomoea shirambensis*) Masabayu, Masale and Bbonga, were the most harvested tubers identified by women and men. It was observed that the different interest groups identified diverse plants as noted with the identification of leafy vegetables and the fruits.

Elderly women identified 16 tubers whereas the elderly men identified 13 tubers. The most prevalent tubers for this age group were: Bwiidi, Bbonga, Masabayu, Nkononga, Ndingwamakwa, Mutili, Nswuu (*Cyperus fulgens*) Mpoo and Gompe. Most of the tubers identified in this study were creepers except for Mbwaabwa (*Commiphora africana*), Kabombwe (*Boscia salicifolia*) and Nswuu (*Cyperus fulgens*) (Tables 3.7 and 3.8). Bbonga, Masabayu, Bwiidi were the most prevalent indigenous edible tubers (Tables 3.5-3.7) on the tally section. Most scientific names of the tubers were not identified in this study. The following local names of tubers were used in the study: Bbonga, Masabayu, Bwiidi, Ndingwamakwa, Gompe, Nsukowi, Masale, Ndia, Mutili, Toompo, Golonga, Mubboli, Kabbulalabula, Nkona and Tukuli Dwadwa. Figure 3.12 shows some selected tubers found in Muchesu ward.



Figure 3.12 Some tubers identified in Muchesu ward, Binga Zimbabwe

3.12 Discussion

The inventory of EIPs carried out in Muchesu ward revealed that there were numerous species used to meet the food and nutrition needs of the people when in the season. The identified commonly used part of the plants were in the form of leafy vegetables, fruits and tubers. Use of the plants helped diversify the diet and thus lessened food and nutrition insecurity. These findings concur with those from past studies, which revealed that wild foods that households harvested lessened possible food crisis in some communities (Bwewer & Kork, 2015; Bacchetta *et al.*, 2016; Hickey *et al.*, 2016). Studies undertaken in other Sub Saharan African countries such as Benin (Boedecker *et al.*, 2014), Botswana (Badimo *et al.*, 2015), Kenya (Shumsky *et al.*, 2014) and South Africa (Paumgarten *et al.*, 2018) reveal that climate change, globalisation, poor yields have amplified dependence on wild foods. Therefore, the existence of these plants has helped in addressing household food and nutrition insecurity (WFP, 2016). The sustainable diets framework was adapted in this study because it is relevant and echoes the objectives of the current study. Accessibility is one of the major components of the sustainable diets framework. The identification of the types of EIPs found in Muchesu ward was premised on the above-mentioned component of the sustainable diets framework.

In this study, 47 leafy vegetables were identified. Leafy vegetables played a major role in Muchesu ward as most households used them to supplement their diet. These findings are consistent with those obtained in Bvenura & Afoulau (2015); Chivenge *et al.* (2015) who confirmed the importance of edible indigenous leafy vegetables in household food and nutrition security. Community members in Muchesu ward planted vegetable gardens during the winter period. The gardens supplemented their livelihoods as produce can be consumed or sold. However, this initiative was threatened by wildlife that deviated from the game reserve (Brown & Raymond, 2014). It was noted in the current study that after the demolition of most gardens in September 2017, most households supplemented their diets with Mukambo (*Pterocarpus lucens*), a native edible plant which was in the season. Dernini, (2013) reinforced the above argument by stating that people must use the natural capital they have in their communities to solve problems. Accordingly, the sustainable diet framework was relevant in the current study. Thus, a holistic approach is needed in debates on food and nutrition security. Therefore, it is apparent that various factors cause food and nutritional insecurity.

Gender dynamics played a role in the identification of indigenous edible plants. In Muchesu ward, women and girls gather edible indigenous plants daily. Reynolds & Cousins (1993), noted that gathering can supply relish on more days than agriculture, animal husbandry, fishing and hunting combined. Gender dynamics in accessing, and identification EIPs are

aligned to the different gender roles ascribed to community members in Muchesu ward. Women usually do most of the cooking and gathering of plants to supplement the family diet. However, some men testified to the fact that they were more likely to bring fruits home than relish.

Men in the current study highlighted the fruit trees found in mountains and hills. The reason men were able to identify the above-mentioned places might be because of their gender roles of tending for animals and hunting. On the other hand, women identified most leafy vegetables along the path way and along water sources, possibly because of the gender roles of cooking, fetching water and firewood. Therefore it is clear that men tend to identify plants that are distant from them whilst women identified plants that were closer to their gender roles. It emerged in the study that women and girls gathered most of the EIPs especially for relish. The results of this study concur with Sunderland *et al.* (2014) who explained that women dominated the gathering of wild food in Asia and Africa. Furthermore, Sunderland *et al.* (2014) argued that men and women tend to collaborate when harvesting highvalue sale food plants. Therefore, gender roles increased the chances of noticing EIPs in the mentioned areas.

Thirty-six indigenous, edible fruits were identified in Muchesu ward. It was revealed in this study that indigenous, edible fruits play a major role in ensuring food and nutrition security. The indigenous fruits of Muchesu ward are found and accessible in various locations. Fresh fruits when in the season for example Mabuyu (*Adansonia digitata*), Injii (*Berchemia discolor*) and Mateme (*Strychnos madagascariensis*) are very rich in vitamin C. Reynolds & Cousins (1993), in their study found out that the BaTonga eat the fruits of at least 51 trees. The BaTonga are the main cultural group found in Muchesu ward. Similarly, in Muchesu ward thirty-six fruits were identified as edible. The difference in the number of trees edible may be because of the different study areas where the fruits were identified. Furthermore, climate change has led to the extinction of some plant species. Fruits ripen at different times in Muchesu District. The consumption of some fruits is done during the famine periods; Sozwe (*Courbonia glauca*), Masekese (*Bauhinia thonningii*) and N'unga (*Acacia albida*). In a study conducted in South Africa, Mabogo (1990) identified *Berchemia discolor*, *Ximenia americana* and *Adansonia digitata* fruits were harvested by the VhaVenda when in the season. Similarly, Urso *et al.* (2016) in Angola identified the above-mentioned fruits. Interestingly the BaTonga in the current study identified the same fruits. Transect walks were the similar cross cutting data collection technique in these different countries.

Twenty-six tubers were identified in Muchesu ward. Surprisingly in this study unique tubers were identified, and it was important to note that in Muchesu ward tubers are used as starch and as relish. This suggests the unique knowledge of the BaTonga in Muchesu ward. It was noted in the study that most tubers are found in mountains and hills. Interestingly, when assessing the scientific names of the identified indigenous edible tubers, it was not easy to obtain the names. This indicates that more research is needed on the profiling of edible tubers in Muchesu ward and Southern Africa as a whole. It was also noted in the study that age influenced respondents' knowledge EIPs. This observation substantiates the results of Dernini *et al.* (2013) and Badimo *et al.* (2015). Furthermore, it was apparent in the current study that the knowledge of most tubers is diminishing amongst the younger generation. Thus, identification and documentation of the EIPs especially with accompanying photographs was important with respect to disseminating knowledge to the youth. However, the current study did not address the sustainability of use of EIPs. Cultural heritage, skills, gender and age were regarded important during the inventory and documentation of EIPs.

3.13 Conclusion

The Tonga people residing in Muchesu ward of Binga District used a wide range of leafy vegetables, tubers, and fruits when in the season to supplement or complement their diets. Even though, new ways of life have been adopted the diets of the BaTonga continued to have EIPs as integral components. Collection of plants when in the season highlighted the need for sustainability and conservation. The fact that young members of the community had considerably less knowledge of the EIPs indicated the need for investing in more rigorous education and dissemination of information on them.

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CHAPTER 4 RELATIVE AVAILABILITY OF EDIBLE INDIGENOUS PLANTS ACROSS MONTHS IN A FOOD AND NUTRITION CHALLENGED DISTRICT OF ZIMBABWE

4.1 Abstract

The availability of edible indigenous plants (EIPs) in varied communities in the world plays a major role in combating food and nutrition insecurity, especially in rural communities. The use must be explored on cultural domains and contextualised within their terrain. The seasonal diagram, a qualitative participatory method, was used to collect community knowledge on the availability of EIPs in supplementing daily diets. A phenomenological qualitative design was appropriate to understand in detail the dynamics and when EIPs are available and used for food. The plants were classified from January to December using sixty stones. The argument of the sixty stones was that it is a multiple of 12 and a year has twelve months if each plant is available in each month of the year five stones were allocated in each month. Respondents were purposively selected. Thirty-two (32) community members participated in this study. The respondents were comprised of the youth aged 18 to 35 years; adults aged 36 to 60 and the elderly over 65 years. The sample included women and men. Data were analysed through success ranking. Six interest groups were composed of the participants mentioned above. It was apparent in the current study that the community was aware when certain plants were accessible in Muchesu ward. This study concludes that EIPs are important and that the younger generation must learn to prepare and conserve them as they play a major role in combating food and nutrition security. Thus, the study recommends that the nutritional content of these plants be researched and documented. Harvesting of the plants in Muchesu ward is an ongoing activity hence conservation and good harvesting must be encouraged.

Keywords; combating, food and nutrition security, indigenous knowledge, seasonal diagramming, supplement

4.2 Introduction

Edible indigenous plants play a major role in diversifying diet, especially in vulnerable households. The availability of these plants plays a major role in supplementing the daily food requirements of most rural communities. Paumgarten *et al.* (2018) in their study noted that it is necessary to understand the broader contribution of these plants to food and nutrition security. This study sought to understand the availability and place of EIPs in the food and nutrition security debate. The previous chapter made an inventory and categorised EIPs found in the Muchesu ward. It was established in the previous chapter that these plants are available and can be used when needed. The inventory was conducted to understand the types of available EIPs found in Muchesu ward. Once there was an overview of these plants, the next goal was to obtain the availability of these plants during the months of the year. the purpose of this chapter was to determine when these EIPs are found throughout the year. This was important because it allowed assessing when Muchesu ward was likely to be food insecure.

4.3 Study area

This study was carried out in Muchesu ward, Binga District in North -Western Zimbabwe. The study area description is presented in detail in chapter 3 under the following sections;3.3-3.3.2 and figure 3.1.

4.4 Research Design

To check the inventory in Chapter 3, a phenomenological qualitative inquiry was appropriate. There was not much information about the seasonal availability of EIPs in Muchesu ward. A phenomenological design, in this case, focused on the territorial context of the search for the availability of these plants at different months of the year. In addition, participants' daily experiences were explored regarding the use of the plants. Data were collected through seasonal diagramming.

4.5 Population and Sampling procedure

The respondents who participated in the inventory phase were preferred and purposively selected. The participants were from the following villages: Chalyababi, Tuyandane, Manchinga, Zuka, Maacha, and Dinga. Six groups were formed thus, three groups of women and three groups of men. The first group of women included young people aged 18 to 35 and five (5) participants were in this group. The second group consisted of 35 and 60 years old and six (6) participants were part of this group. The third group of women aged 65 and over,

eleven (11) participants. Thus, twenty-two (22) women participated in this study. Similarly, men were divided into three groups that had the same age group with groups of women. The focus groups were comprised of three (3) young men, three (3) men, and four (4) men, meaning that ten (10) men participated in this study. In total Thirty-two (32) people participated in this study.

4.6 Data Collection Methods and Techniques

The data were collected through a focus group discussion infused with seasonal diagramming. Infusing both methods was important to improve the reliability and validity of the data. Previous research suggests that the strength of group discussions is that the interaction of participants is in the formulation of data Given (2008); Strydom *et al.* (2017). The researcher was the main facilitator of the data collection process and was assisted by two research assistants. The respondents were divided into six groups as in participatory mapping; this was done to check if there were emerging trends in the study. The seasonal calendar was the tool used to collect the data. Using group information, focus group respondents were asked to compile a list of EIPs for each month. During data collection, one seasonal diagram was missing for the elderly men instead a table was used to collect data. All these aspects were ranked using success ranking to show which plants are the most significant in Muchesu ward.

4.7 Data Analysis

The interest group explained the dynamics behind it in the seasonal calendar. After each part of the plant eaten was noted / graded, a picture was taken of the product and each picture was explained by each group to all participants (Figures 4.1-4.6). This was done to understand the participants' daily lived experiences. Success ranking was used to analyse the calendars.

4.8 Results



Figure 4.1 Seasonal diagramming of leafy vegetables as perceived by female youth in Muchesu ward, Binga Zimbabwe



Figure 4.2 Seasonal diagramming of leafy vegetables as perceived by male youth in Muchesu ward, Binga Zimbabwe



Figure 4.3 Seasonal diagramming of leafy vegetables identified by adult women in Muchesu ward, Binga Zimbabwe



Figure 4.4 Seasonal diagramming for leafy vegetables done by adult men in Muchesu ward, Binga Zimbabwe



Figure 4.5 Seasonal diagramming of leafy vegetables done by elderly women in Muchesu ward, Binga Zimbabwe



Figure 4.6 Seasonal diagramming of leafy vegetables identified by elderly men Muchesu ward, Binga Zimbabwe

4.8.1 Description of results on leafy vegetables as perceived by youth, women and men

The main objective of this study was to evaluate when EIPs are available during the months of the year. The study area was rich with EIPs. The edible plants were available for use when the need arose. The plants were accessible in diverse places of Muchesu ward. Plants were harvested from forests, trails, near water sources, mountains and near farms.

Leafy vegetables were abundant during the rainy season extending from September to April. Tende (*Cocculus hirsutus*), Mbelebele, Camugalalwe, Kafuwakanswi, Siamukwalu Camugwengwele and Mundyoli (*Triplochiton zambasiasus*) are the leafy vegetables that were available throughout the year and were harvested in diverse areas. Telele bbuyu (*Corchorus tridens*), Bbonko (*Amaranthus hybridus*) and Nkomba (*Ceratotheca sesamoides*) were accessible anywhere where there was water as they grew like weeds in home gardens, backyards and cattle kraals.

In the dry periods i.e. from April to mid-September knowledge of the trees which provided leafy vegetables was very crucial as this will determine the use of the leaves for relish. When leaves sprout in spring new leaves can be used for relish. The leaves are usually used for relish when they are still tender and soft, when they harden they are not palatable. Timing is therefore crucial for the leaves to be harvested at the right time. The following leafy vegetables were harvested in spring: Mupwepwe, Kanembe, Kandongondongo, Mbelebele, Mwii (*Berchemia discolor*), Matwasulwe, Kabombwe (*Boscia salifolia*), Mukambo (*Pterocarpus lucens*) and Mbuyubuyu (*Adansonia digitata*). From May to August there was a low availability of leafy vegetables.

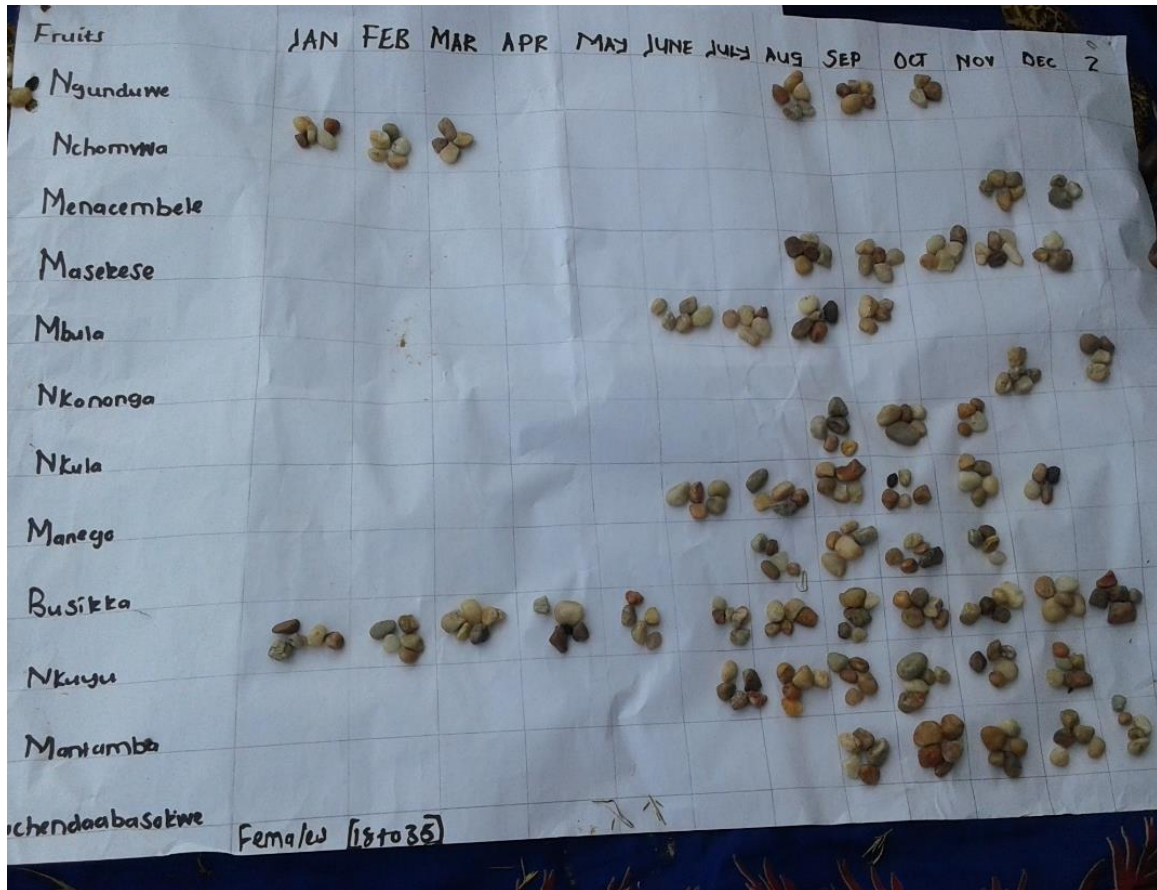


Figure 4.7 Seasonal diagramming of fruits according to the perceptions of Female youths in Muchesu ward, Binga Zimbabwe



Figure 4.8 Seasonal diagramming of fruits according to the perceptions of male youths in Muchesu ward, Binga Zimbabwe



Figure 4.10 Seasonal diagramming of fruits according the perceptions of adult men in Muchesu ward, Binga Zimbabwe



Figure 4.11 Seasonal diagramming according to the perceptions of the elderly female in Muchesu ward, Binga Zimbabwe

4.8.2 Edible indigenous fruits as perceived by youth, adults and the elderly

The following fruits were harvested from January to April: Nchomvwa (*Ximenia americana*), Macheabasokwe (*Grewia villosa*), Mbubu (*Tapiphyllum velutinum*), Nfulibutimbo (*Vitex petersiana*), Nzininingwa (*Vangueria randii*), Injii (*Berchemia discolor*), Mabuyu (*Adansonia digitata*), Sozwe (*Courbonia glauca*), Mfundu (*Vites payos*), Nsikili (*Trichilia emetica*), Mancinga (*Friesodielsia obovata*), Lunene (*Cardiospermum corindum*), Nkukuma (*Hexalobus monopetalus*), Nchacati (*Canthium frangula*), Mbula (*Pavinari curatellifolia*), Manego (*Azanza garkeana*) and Busikka (*Tamarindus Indica*) are accessed in winter. Most fruits are not available in winter. In the months of August to December the following fruits were harvested in Muchesu ward: Ngunduwe (*Grewia pachycalyx*), Menacembele (*Ximenia caffra*), Masekese (*Bauhinia thonningii*), Nkononga (*Garcinia livingstonei*), Nkuyu (*Ficus sur*), Mateme (*Strychnos madagascariensis*), Mantamba (*Strychnos cocculoides*) Makunka, Mantondo. N'unga (*Acacia albida*), Sozwe (*Courbonia glauca*) and Masekese (*Bauhinia thonningii*) were famine foods. N'unga (*Acacia albida*) is used as fodder for goats. There was a low availability of indigenous fruits in winter.

4.8.3 Tubers identified in Muchesu ward as perceived by youth, adults and the elderly

The following tubers were regarded as important in combating food and nutrition insecurity: Kuli (*Ipomea shirambensis*), Sabayu, Kabombwe (*Boscia salifolia*) Masale, Bwiidi, Mutili, Ndia, and Gompe because there were harvested throughout the year. A considerable number of tubers were harvested from January to April: Golonga, Bbonga, Masabayu, Ndingwa-makwa, Nsyukubwili, Mbwaabwa (*Comiphora africana*) Mpoo (*Brachystelma*) Mubboli, Ndia, Nkona, Mapopa (*Kedrostis natalensis*). Two tubers were harvested from October to December: Gompe and Nswuu. The following tubers were famine foods: Gompe, Golonga, Ndigwamakwa, Mubboli, and Bbonga.



Figure 4.12 Seasonal diagramming of tubers as perceived by female youths in Muchesu ward, Binga Zimbabwe

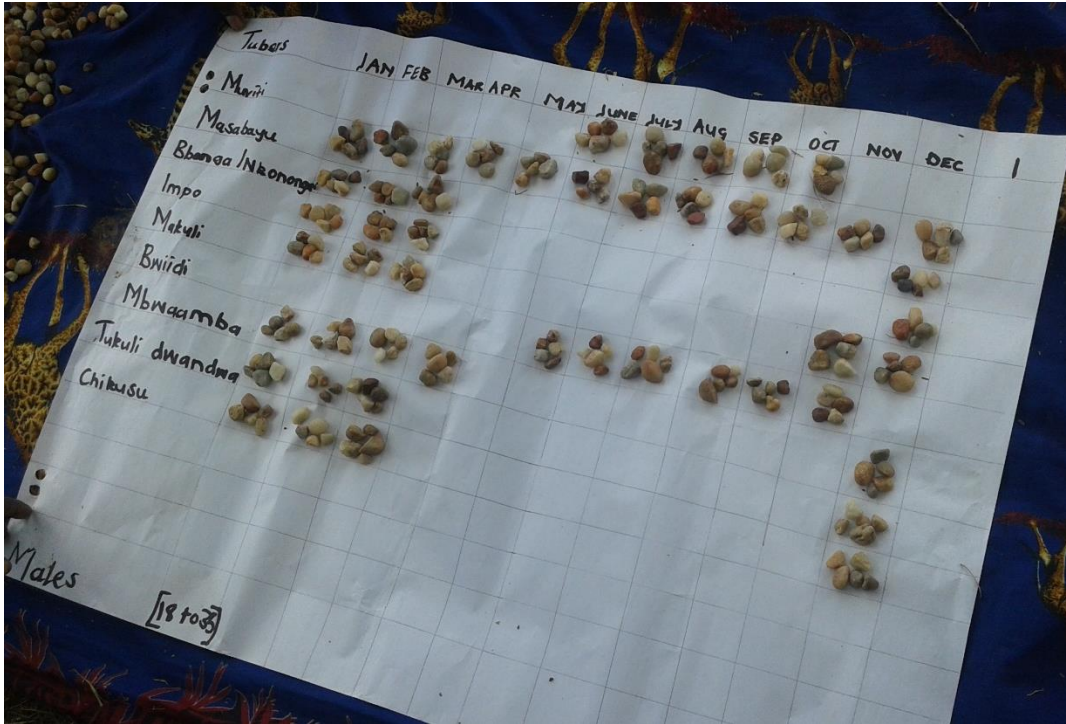


Figure 4.13 Seasonal diagramming of tubers as perceived by male youth in Muchesu ward, Binga Zimbabwe



Figure 4.14 Seasoning diagramming of tubers as perceived by adult women in Muchesu ward, Binga Zimbabwe



Figure 4.15 Seasonal diagramming as perceived by adult men in Muchesu ward, Binga Zimbabwe

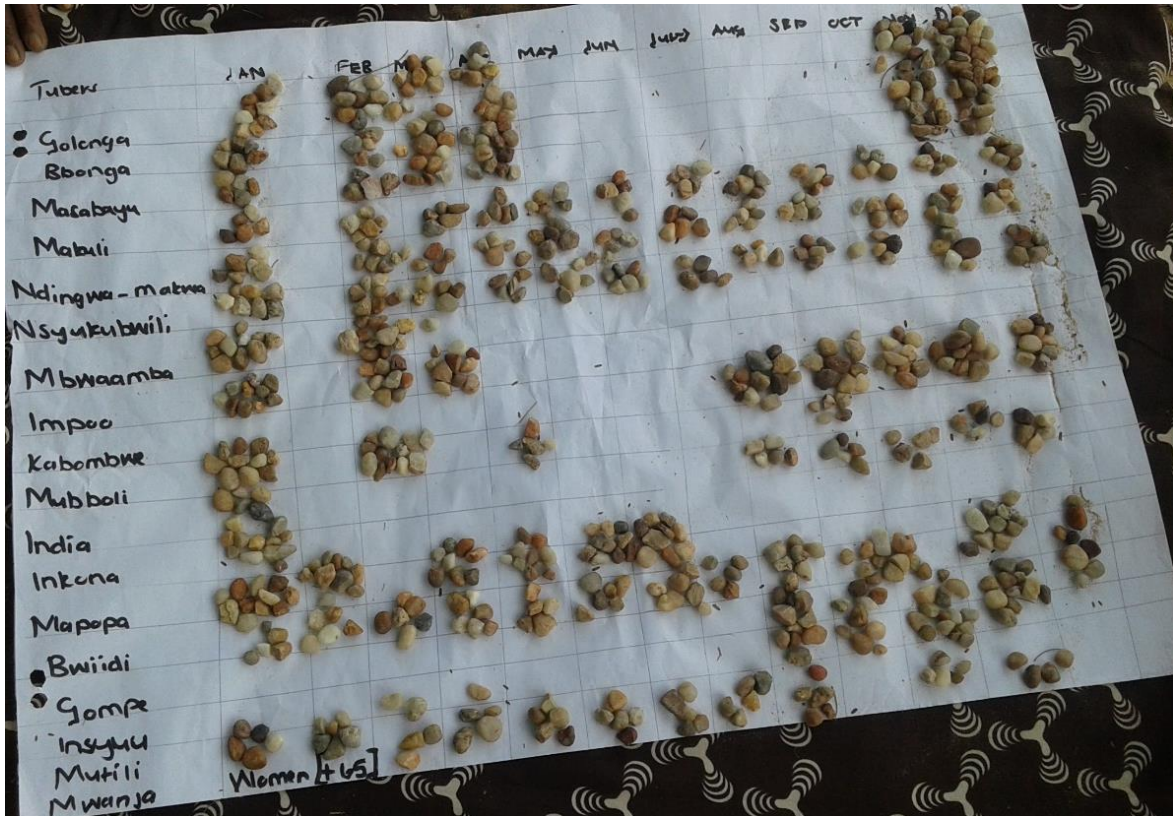


Figure 4.16 Seasonal diagramming of tubers as perceived by elderly women in Muchesu ward, Binga Zimbabwe



Figure 4.17 Seasonal diagramming as perceived by elderly men in Muchesu ward, Binga Zimbabwe

4.9 Discussion

Edible indigenous plants, when in the season, are harvested and used for food in Muchesu ward. It was apparent in the current study that the seasonal availability of EIPs helps most households to diversify their diets. Seasonality of food is one of the major components of the sustainable diets framework adapted in this study. It was observed that the use of some EIPs is heavily determined by their seasonality as highlighted in the sustainable diets framework. The existence of the plants offered a rich and diversified diet that could be alternative in case of drought. It is imperative to recognise that some cultural groups in the world as Tonga use these plants because of their taste and preference not as a sign of poverty. Instead, their use protrudes how some communities survive using local resources. The existence of these plants means that the communities that can access them are very lucky because, in other cultural communities, climate change has hit hard and some EIPs are now extinct. The findings of the current study are reinforced by Redzic (2006); Ranfa *et al.* (2014); Shumsky *et al.* (2014) who explained that the availability and use of EIPs depend on ecological and the cultural context.

The Tonga in Muchesu ward are richly endowed with knowledge on the uses of diverse EIPs within their vicinity. Reynolds & Cousins (1993) in their study found out that Tonga eats at least 51 different trees. Most leafy vegetables are in abundance during the rainy season from September to April. During this period, there are usually lots of diverse farm produce. Therefore, it is likely that people are food secure during this time. During favourable rainy seasons, some of the garden plants mentioned in this study are collected and stored for use during the lean season. The findings of the study are in sync with Maroyi (2013) who conducted a study in Eastern Zimbabwe. Maroyi (2013) confirmed that wild weeds are an important part of daily food intake with some preserved for use during the dry season when they are out of season.

The respondents explained that they usually gather leafy vegetables only for a daily meal. This fact suggests the fresh vegetables provide more nutritional value to the respondents' diet this is corroborated by Boedecker *et al.* (2014), Bacchetta *et al.* (2016). However, participants clarified that the following leafy vegetables were dried and stored for future use: Cisyungwa (*Cleome gynandra*), Telele bbuyu (*Corchorus tridens*), Nkomba (*Ceratotheca sesamoides*) and Kabbondo. The storage of indigenous plants for future use reveals how some communities manage the edible indigenous plants to diversify their diets during lean periods.

Edible indigenous plants are used for relish in Muchesu ward at most daily. Reynolds & Cousins (1993) in their study revealed that most of the BaTonga diet consists of sadza (*insima*) a thick porridge which is a staple food for most households in Southern Africa. Sadza (*insima*) was prepared from the following cereals: finger millet (*miila*) pearl millet (*nzembwe*) and maize (*mapopwe*). Respondents further explained that they own domestic animals like goats, sheep, and cows. However, there are rarely slaughtered for food. Similarly, Mabogo (1990) found the same about the VhaVenda in South Africa.

Women in Muchesu ward proved to be knowledgeable about the seasonality of mostly leafy vegetables. This might suggest that women are the ones who explore alternatives to supplement the diet of the family. Studies carried out by Badimo *et al.* (2015) and (Boedecker *et al.*, 2016) echo the above sentiment. However, on the other hand as revealed in the previous chapter men are more aware of nature and may bring home leafy vegetables or fruits but as noted by Mabogo (1990) in his study men do not have the patience of proper harvesting especially on leafy vegetables instead the whole plant might be uprooted thus threatening the sustainability of these plants. Picking of vegetables reaches its peak during the rainy season.

The farm calendar of the Tonga people Table 4.1 documented some of the major activities which take place in the BaTonga communities. From the farm calendar, there are some important facts about edible indigenous plants seasonal availability. According to the farm calendar: Inkula (*Vangueria Infausta*), Manego (*Azanza garkeana*) are some of the fruits which are harvested in August. On the other hand, the farm calendar revealed that this is the time when wild fruit trees have flowers. The difference in the views above-mentioned statements proves that nature always produces for the sustenance of humanity. Furthermore, the farm calendar validates the fact presented in some section of this dissertation that the diet of the BaTonga is mainly porridge (*insima*) as the farm calendar highlights manual jobs throughout the year. There are other activities which help in supplementing the diet of Tonga in Muchesu ward. These activities include fishing, woodcarving, weaving, pottery making (Chikozho *et al.*, 2015; Nkatazo 2016). It was also revealed in the study that money also plays a major role in the diversification of the diet in Muchesu ward. Money was used to buy the food needed by a household. The participants also highlighted that education helps in conservation and learning more about the natural resources at their disposal. There are other activities which help in supplementing the diet of the Tonga in Muchesu ward. These activities include fishing, woodcarving, weaving, pottery making (Chikozho *et al.*, 2015; Nkatazo, 2016). It was also revealed in the study that money also plays a major role in the diversification of the diet in Muchesu ward. Money was used to buy food needed by a household. The participants also highlighted that education helps in conservation and learning more about the natural resources at their disposal.

Table 4.1 Farm Calendar of the Tonga people

Activity	Month	Month	Tonga meaning
	English	Tonga	
Virgin fields are cleared	August	Mukulampumba	Wild fruits begin to flower
Clearing fields of old stalks	September	Jowela	The noise of the birds sucking nectar
Field preparation	October	Lwenzu	
First planting	November	Sizhumbi	The rain is promising
Planting/weeding	December	Nalupale	Working in hard soil (Planting/weeding)
Weeding while living at the field	January	Mukamaziba	The month of many pools
Ripening of crops	February	Mulumu	The month of new crops
First harvest -millet and short-season sorghum	March	Muyobo	The head of millet forms
Harvest	April	Mukubwibwangala	The ripe head of millet
Harvest of late season sorghum	May	Chiyumu	The millet is dry in the fields
Return from fields to village homes	June	Tyatyamunzi	People come home from harvesting
Off season	July	Ibupupa	The month of the wind

Adapted from Reynolds & Cousins (1993)

It was observed that there were more women than men who participated in the study. Women participated in the study because it is the women in the Tonga culture who are mostly concerned with the collection and preparation of food. The separation of women and men consisted of ensuring that respondents participated freely without the feeling of being inferior because each member was with peers whose common characteristics were shared. Other food crops grown in Muchesu include peanuts, cowpeas, tomatoes and vegetables such as rape, spinach, and choumollier. The vegetable gardens are found next to streams and are grown in the coldest months of the year. According to the farm calendar above in the cold months, people have time to tend to their vegetable gardens because there is less farm work.

4.10 Conclusion

Seasonal availability of edible indigenous plants varies according to the months of the year. The variation complements the needs of the residents of the Muchesu ward. Gender dynamics influenced the identification and the utilisation of some plants. The knowledge of where and when certain plants can be harvested is important as this will maximise the nutritional content of one's diet. Seasonal food calendars help in evaluating when a community might need external assistance to curb food and nutrition insecurity. Progress and science have led to the wholesale use of wild plants. The sustainability and proper harvesting was encouraged to conserve the delicate ecology that makes all wildlife possible since harvesting the plants is ongoing.

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CHAPTER 5 DOCUMENTATION OF HOW EDIBLE INDIGENOUS PLANTS ARE COOKED AND MEDICINAL USES IN NORTH WESTERN ZIMBABWE

5.1 Abstract

Indigenous knowledge systems are seriously diminishing. Globalisation and new ways of supplementing the diet have changed the traditional diet. This has led to the use of Edible Indigenous Plants (EIPs) being labeled as substandard foods and their use as a sign of poverty. It is in this context that this study sought to document and archive the preparations and use of the plants in the BaTonga community in Muchesu ward. In the wake of severe climatic changes, problem-solving initiated locally using native tools is preferable as problems will be mitigated by using resident resources before the arrival of external assistance. An exploratory study was conducted in Muchesu ward, Binga district of north-western Zimbabwe. Eleven respondents were purposively selected. This study documented 20 EIPs and explored how they are cooked. Nine medicinal uses of edible plants were documented. The data were collected through one on one interviews and observation. The data were analysed by thematic content analysis. It was apparent in the study that there are important and unique uses of the identified plants. Indigenous knowledge holders have promised to share their knowledge with those who are willing to learn. The information on how some EIPs are cooked and used for medicinal purposes was greatly appreciated by the community and indigenous knowledge holders. Continuous documentation of the indigenous knowledge and dissemination was encouraged. Interestingly these plants are locally available, accessible and utilised for the treatment of diseases.

Keywords; Edible indigenous plants, preparation, medicinal uses

5.2 Introduction

Evidence exists from all over the world where communities have used the EIPs to maintain food and health hazards (Kang *et al.*, 2014; Badimo *et al.*, 2015; Ashagre *et al.*, 2016). Understanding and valuing the role that these plants play in championing food and nutrition security must be explored. Regardless, edible indigenous plants are sidelined as not important especially in national policies and debates in the food and nutrition paradigm. As elaborated in Chapter 4, EIPs when in season supplemented the nutritional needs of people as noted in earlier studies (Maroyi 2013; Nyanga *et al.*, (2013).

Identifying the seasonal availability of plants does not play the major part if the practical skills and the art involved in the preparation of these plants is not explored. The knowledge of edible indigenous plants is diminishing as the young generation is not so keen on the use of these edible indigenous plants. There are other factors which influence the diet of the future generation, issues like globalisation, industrial agriculture, and the modern food industry implicate a shift in diet and food preferences.

5.3 Study area

This study was carried out in Muchesu ward, Binga District in North -Western Zimbabwe. The study area description is presented in detail in chapter 3 under the following sections 3.3-3.3.2 and Figure 3.1.

5.4 Research Design

An exploratory qualitative research approach was used to identify, document the edible indigenous plants found in Muchesu ward that is the leafy vegetables, tubers, and fruits, preparation methods, seasonality patterns, to come up with an inventory of EIPs to determine their contribution to food and nutrition insecurity

5.5 Population and Sampling

The participants for this study were indigenous knowledge holders. Purposive sampling was suitable because the participants needed for this segment were people who had more knowlegde about the plants.

5.6 Data Collection Methods and Techniques

To generate data through overt observation the following steps were followed. Firstly, the site to be observed were selected. Candidate sites for observation were selected. Visits to the selected sites were made before data collection. The factors to be observed were adopted and the role of the research team was confirmed. Preparation of some EIPs was observed. One on one interviews were appropriate in gathering detailed perpetual information about the preparation of edible indigenous plants. Overt observation and one on one interviews complemented each other in validating and improving the validity of the data collected.

5.7 Data Analysis

The thematic content analysis was used to analyse data in this study. The data collected were recorded in form of summaries in memos, notes and form of drafts this was done to capture the direct thoughts of the participants and process the data so that it can be analysed. When data processing was done the process of data analysis started. The first step was to categorise and sort the data according to how plants are prepared and the medicinal uses. Open coding was the second step which is the process of figuring out the meanings of the data, that is emerging themes were noted this is also referred to as early coding. Axial coding was done after open coding, axial coding is the process of re-examining what was done in open coding, at this stage the identification of related themes, and grouping terms according to variables was done. Selective coding was done after axial coding, selective coding is the finer part of data analysis, themes will be illustrated using content analysis. The thematic content analysis was used to categorise and generate emerging themes. The emerging themes informed the conclusion of the study variables and concepts. The themes were identified and analysed to determine whether they answered the objectives of the study. Furthermore, comparisons between what was said by the respondents and the emerging themes of the data were made. This is where the in-depth analysis of qualitative research was done. Finally, the data were interpreted and elaborated thus the findings. Complete data were coded. Generated patterns of data helped in the prioritisation of edible indigenous plants in the food and nutrition security debates. Thematic analysis was used to determine whether the main objectives of the study were addressed.

5.8 Results

5.8.1 Description of how some Edible Indigenous plants cooked

Gompe

This plant is a climber. The tuber is the edible part of this climber. The tuber is poisonous thus, the preparation process before consumption is important. The following steps must be adhered to when preparing Gompe. Peel the tuber and remove all the outer skin. Cut the tuber into desired pieces. Sun dry the cut pieces. Dried pieces are cooked using distilled water from Mopane ash to remove the poison from the tuber. After an hour boiling, empty the distilled water and wash the tubers. In case an individual is drugged from eating the tuber, *Bukowa* (Indigenous cucumber) seeds can be used as an antidote for the poison. The antidote is prepared by roasting the *Bukowa* seeds. After roasting the seeds are pounded into a powder. The powder is mixed with water to make a solution which can be drunk. Alternatively, the person can neutralise the poison by drinking goat milk. The tuber is poisonous when consumed hot, it must be cooled for a while then it can be consumed.

Camudonga (*Alternanthera sessilis*)

This plant has soft leaves which can be used for relishing any time during the year. Usually, diced pumpkin fruit are added to the vegetables. The vegetables must be blanched for a few minutes as it can easily be overcooked. Overcooking the vegetables is discouraged. The vegetable is very tasty, and it is a good side dish for fish.

Bwiidi

This climber has hairy tubers which look orange when uncooked. This tuber is a delicacy and it makes good relish. The following steps are followed to prepare Bwiidi. The tubers are washed and cut into desired pieces. Dried leaves of Bbonko (*Amaranthus hybridus*) are burnt to form ash. Water is then poured onto the ash. Water is strained from the ash, this is an alternate for bicarbonate of soda which is called “*mukungu* in Tonga. The water is then added to the cut pieces of the tuber. Simmer for a while until cooked. It is usually eaten like meat with *nsima* (sadza).

Nswuu (*Cyperus fulgens*)

These small bulbs look like tiny onions. The tubers can be roasted by removing the outer skin, washing and then roasting for a few minutes. Otherwise the tubers can be washed and eaten raw.

Kabombwe (*Boscia salicifolia*)

The roots/tuber from this tree can be washed, cut into small pieces. The cut pieces are then pounded using a pestle and mortar until soft and into a dough like mixture. The pound mixture is then placed on a sieve, water will be poured on the sieve and the juice from the mixture will be collected in a container under the sieve. When the roots no longer have juice discard the mixture. The water strained is bitter. Bring to the boil the water collected from the strained roots. The skill in making this syrup is amazing and mind-blowing. The strained juice is then boiled, when boiling the juice will overflow before its ready. When the juice stop overflowing the mixture is ready and tastes very sweet. The juice is drunk like tea or as a main ingredient for making a base for soups or desserts.

The flowers of the same tree are aslo edible as relish. To prepare the relish wash the flowers, bring to the boil, when the flowers are soft, add pumpkin seeds powder. The pumkin seeds are roasted pounded, sieved, the powder is added into the cooked flowers.

Mutili

The preparation process starts off with the washing of the tubers in cold water. The tubers are then peeled to remove the outer skins. Cut the tubers into desired shapes. Make “Mukungu” using Mopane ash. “Mukungu” is a mixture of ash and water. Water with ash is then strained and added to the cut tubers. Bring to the boil. After 20 minutes remove from the fire to stop the cooking process and wash. Boil the tubers for another 15 minutes, strain water from the tubers, simmer. When the tubers are yellow and soft there are ready for consumption.

Nsikili (*Trichilia emetica*)

To make cooking oil the following steps are followed. The fruits are harvested, washed and boiled. When the water used to boil the fruits turns milky white remove from the fire and strain the oil. The cooked fruits may be eaten but they are not palatable. The oil is a special for cooking Chisyungwa (*Cleome gynandra*) a vegetable common in Muchesu ward.

Muunga (*Acacia albida*)

The beans of Muunga must be boiled for at least a day. After prolonged soaking and cooking, the beans are shelled then cooked for a second time in a water solution of ashes. Not until this has been poured off and the beans soaked but not cooked in a third change of water is the food edible. This one of the plants which is mainly consumed during stress periods. Scudder 1962 noted that this plant might not be exploited anywhere else in Africa considering the laborious way of the preparation for consumption, the species is otherwise toxic in its natural state.

Table 5.1 Illustrates How some Edible Indigenous Plants are consumed in Muchesu ward, Binga Zimbabwe

Local name	name/Scientific name	Botanical name	Part eaten	Eaten raw	Roasting	Boiling
Mundyoli	<i>Triplochiton zambasiasus</i>	Tree	Leaf			x
Mukambo	<i>Pterocarpus lucens</i>	Tree	Leaf			x
Chisyuungwa	<i>Cleome gynandra</i>	Shrub	Leaf			x
Bbonko	<i>Amaranthus hybridus</i>	Shrub	Leaf			x
Telele bbuyu	<i>Corchorus tridens</i>	Tree	Leaf			x
Nkomba	<i>Ceratotheca sesamoides</i>		Leaf			x
Nsikili	<i>Trichilia emetica</i>	Tree	Fruit			x
Sika	<i>Tamarindus Indica</i>	Tree	Fruit	x		x
N'unga	<i>Acacia albida</i>	Tree	Fruit			x
Mateme	<i>Strychnos madagascariens</i>	Tree	Fruit	x	x	
Nsumo						
Vangheriopsis	<i>lanciflora</i>	Tree	Fruit	x		
Mfundu	<i>Vitex payos</i>	Tree	Fruit	x		
Sozwe	<i>Courbonia glauca</i>	Shrub	Fruit	x		x
Gompe	Creeper		Tuber		x	x
Mutili	Creeper		Tuber			
Sabayu	Creeper		Tuber	x		
Injii	<i>Berchemia discolor</i>	Tree	Fruit, leaf	x		x
Mabuyu	<i>Adansonia digitata</i>	Tree	Fruit, Leaf	x	x	
Kabombwe	<i>Boscia salifolia</i>	Tree	Leaf and Tuber			x

Table 5.2 Shows the specific uses of the Edible indigenous plants identified in Muchesu ward, Binga Zimbabwe

Local & Scientific Name	Medicinal Uses
Sozwe <i>Courbonia glauca</i>	Tuber is soaked in water for a while and water strained from this process cures stomach ache
Nkomba <i>Ceratotheca sesamoides</i>	Cooked leaves with a runny water consistent cures constipation
Kabbondo	Leaves are pressed, and the solution extracted from this creeper cures fever
Chisyungwa <i>Cleome gynandra</i>	Leaves of this vegetable are pounded pressed, the juice from the leaves is used as an eye ointment
Kanembe <i>Aloe spp.</i>	Aloe is soaked in drinking water for chickens to prevent chickens to be attacked by diseases
Masabayu	The tuber of this creeper is pounded added into the water drank by cattle to aid cows manufacture more milk
Mutili	Roots are pounded and put in bee hive so that bees do not bite when harvesting honey
Muunga <i>Acacia albida</i>	Fruits of this tree make great fodder for domestic and wild animals, leaves are also good manure
Mumbula <i>Pavinari curatellifolia</i>	Bark of the tree cures ear aches by blowing wind on the bark and into the affected ear
Busika <i>Tamarindus Indica</i>	Cures internal sores in the body. It is aslo a laxative, for an individual who is constipated, the seeds are removed, and the pulp is crushed mixed with the ash for Mubimba tree to make a watery porridge which can be drank by the patient.

5.9 Discussion

The knowledge of plants passed from one generation to another is a rich heritage and can make the difference between life and death. When natural disasters such as drought strike, the most valuable knowledge holders know where and how to prepare edible indigenous plants. Indigenous knowledge is the treasure of society that is imperative for development. This knowledge should be documented and archived for future use. Nature provides many edible products that can be used to supplement diets, thus contributing to the maintenance of food and nutritional security and the well being of people.

In the study plants were accessed in the local environment. The findings of the study are in sync with Kallas (2010) and Shava (2005) who indicated that these plants are found in the natural environment and used when harvested at the appropriate time. In addition, studies by Tregold *et al.* (1986), clarified that the traditional diet of Zimbabweans is rich and excellent. The BaTonga are very famous for the use of native edible plants. Scudder (1976) noted that "Tonga used not only more wild food plants than any other African population of farmers or hunter-gatherers, which we have information on, but they have also treated more toxic plants more extensively than is reported elsewhere". The point made by Scudder confirms the main argument of this study that the use of EIPs is not usually a sign of poverty but a unique practice of certain cultural groups. The BaTonga use of toxic plants observed in the current study is similar to the observation by Mabogo (1990) who reported that the Vhavenda in South Africa prolonged the cooking period of poisonous vegetables.

It was noted in the current study that indigenous fruits provided vitamins for the body and were utilised to treat diseases. These findings corroborate Ahmed & Pieroni, (2016); Hickey (2016). It was revealed in their studies that fruits provide vitamins. Fruits are an important dietary supplement, generally accessible to different months and seasons. It is important to note that some fruits have medicinal properties that make them worth more than they are for food safety and medicinal properties. It has been noted in the current study that the fact that EIPs are also edible and used for their medicinal properties makes them valuable plants that must be documented. In Muchesu ward for an example; Sika fruit (*Tamarindus Indica*) has medicinal properties. Interestingly in this study, it was revealed that EIPs are not used for food only but can also double as medicine. Ten edible plants ranging from leafy vegetables, tubers and fruits were identified as to have medicinal properties. Diseases which can be treated are diverse in Muchesu ward. Similarly, to this study Ogre *et al.*, (2013); Polat *et al.*, (2015)

reinforced that EIPs are edible and used for multiple other uses which include medicinal properties

The Tonga people found in Muchesu ward use tubers in times of plenty and famine. In a study conducted in Southern Zimbabwe, it was noted that the Bantu do not eat tubers unless during the famine Mabogo (1990). However, this study reported contrary to the point made by Mabogo, as the BaTonga of Bantu-speaking in Muchesu ward use tubers for food because of preference. Bwiidi a tuber found in Muchesu is a special delicacy tuber that is edible as relish when in the season not because of famine. Salt is a common ingredient added to all vegetable dishes of the BaTonga. A study conducted in the Zambezi valley by Reynolds & Cousins (1993) revealed salt was originally obtained by ash which was used to expedite cooking, but this is now accomplished by the commercially available bicarbonate of soda.

Indigenous knowledge system is one of the major components of the sustainable diet framework. The sustainable diets framework advocated for the maintenance and use of indigenous knowledge systems to sustain livelihoods. It was noted that Indigenous knowledge systems played a major role in knowledge transfer in the current study. The identification of the names of plants, their uses, their toxicity, their growth patterns, where were they can be found, how to protect them, is passed on from one generation to the next. Adults teach, carefully instruct their children correct their mistakes, criticise their efforts, reward their achievements and make sure they listen and watch Mabogo (1990), Reynolds & Cousins (1993); Yow (2014). In this study, the elderly participated so that the knowledge was documented and archived. The adults are the main source of knowledge in diverse communities.

5.10 Conclusion

The preparation of some plants in detail was documented in this study. The selected plants were significant in of Muchesu ward. The various indigenous plants have been documented. The preparation of some famine plants is important as this knowledge can be archived for future generations. Plant utilisation differs across cultural domains. Therefore, the use of these plants should not be generalised to be a sign of poverty but a powerful resource that shows how people use natural capital to supplement their diet and cure illness without spending money which is a scarce resource especially in rural communities.

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CHAPTER 6: SYNTHESIS OF EXAMINATION OF THE PERCEIVED CONTRIBUTION OF EDIBLE INDIGENOUS PLANTS IN COMBATING FOOD AND NUTRITION INSECURITY IN THE TONGA COMMUNITY OF ZIMBABWE

6.1 Introduction

Food and nutrition security are some of the major challenges of the 21st century. According to the United Nations Food and Agriculture Organisation (FAO, 2016) report on “The state of Food and Nutrition in the World”; The global hunger is estimated at 815 million people, 243 million in Africa. Africa has the highest prevalence of undernourished with 23% of the population (Springmann *et al.*, 2016). It has been noted in diverse studies on food and nutrition that security is a multifaced, thus it important for it to be contextualised with specific study areas and communities. Therefore, a holistic approach to food and nutrition is recommendable Dernini *et al.* (2013) since there is no single solution to this problem. The gathering of edible indigenous plants is important in rural and urban communities. In many cultural groups, for example in Ethiopia, edible indigenous plants are used as supplementary, seasonal or survival food sources. Therefore, their place in the equation of food and nutrition should be included in most policy documents. The existence of these natural resources prevents a certain population of the world from dying of hunger. The use of the plants is beneficial to their maximum capacity. Appropriate conservation practices and policies should be formulated to conserve edible indigenous plants Hailemariam *et al.* (2017) which would help to better understand climate change and build resilience in communities which might help in disaster management preparedness.

6.2 Justification of the Methodology Used in the Study

Qualitative research was the approach used in this study. This was appropriate because the study sought to give a glimpse of a phenomenon Strydom *et al.* (2017). Two research designs were employed in the study. The explorative designed complemented the participatory research tools used to collect data. The latter design capacitated the engagements during participatory mapping, seasonal diagramming and transect tools the respondents. Data triangulation was employed in the study within one objective. Given (2008) explains that triangulation improves the quality and reliability of the data. Diverse methods were used to analyse the data (Table 6.1).

Table 6.1: Summary of the Study and key Issues

Objective	Methodology	Major findings
Carry out an inventory and categorise the types of EIPs found in Muchesu ward	Explorative & Phenomological Designs. 57 respondents were purposively selected. Data was collected through triangulation of participatory mapping infused with focus group discussions and Transect walks. to improve the reliability and validity of the data. Maps were analysed through a plenary session where comparisons and explanations were made to understand the perceptions of the participants.	EIPs were available, accessible and utilised when in season. 47 leafy vegetables were identified and were regarded as the most important. 36 fruits were also identified and were regarded as important in diversification of the diet in Muchesu ward. 26 tubers were identified, and it was important to know when to harvest and how to cook some as they are poisonous. Some scientific names of the identified plants were not found instead the local name is used.
Assessing the seasonal availability of EIPs in Muchesu ward	Explorative Design. 30 participants participated were purposively selected. Data was analysed during seasonal diagramming through matrix ranking	Participants were aware when and where to access EIPs for use. Leafy vegetables were abundant during the rainy season. Most fruits were important for diversification of the diet in Muchesu. Unique and diverse tubers were found in Muchesu ward which vary in utilisation.
Documentation of preparation and some uses of EIPs in Muchesu ward	Phenomological design 11 key Informants and were purposively selected Data was analysed through thematic content analysis	Participants were knowledgeable on how some EIPs are prepared and used. 20 EIPs were documented on how they are prepared. 9 plants are described in detail on how they used. Indigenous knowledge is important as it lays the foundation for human survival.

6.2.1 The Sustainable Diets Framework and How it was Adapted in the Study

The sustainable diets framework has 6 major components, viz.: (1) Food and Nutrition needs Food security and Accessibility (2) Cultural Heritage and Skills (3) Eco friendly/ local seasonal food, (4) Fair equity and trade, (5) Biodiversity/Environment change (6) Health and well being. These components are embedded in the literature reviewed and data collected in the empirical studies. The component on fair equity and trade was not applicable in this study. The summary of the adaptation and issues from the study are summarised in Table 6.2. The components mentioned later will be summarised in chronological order in how they appear in the literature reviewed and in the objectives of the study.

6.3 Major Issues Emerging from the Study

There is little documentation of the types of edible indigenous plants found in Muchesu and Binga neighbourhoods. Considering that custodians of indigenous knowledge are usually the elderly, there is danger in that some use and types of plants might be lost when they die. It was evident in the study because the young participants compared to the former identified few and obvious plants. Adults identified more edible plants. This information reveals that soon indigenous knowledge could be extinguished. The above information alludes that indigenous knowledge might be influenced by age.

It has been noted in this study that there are several EIPs used by the inhabitants of Muchesu ward. Some plants are used daily. Policy makers and non-governmental organisations say nothing about the role they play in ensuring that some people do not die of hunger. Instead, some scholars assume that the use of these plants is a sign of poverty. Such an analysis of the use of EIPs as a sign of poverty is very narrow because some plants are used to their liking. Instead, it must be understood that the context and culture of a people influence how they interact with their environment.

There is no seasonal food calendar in Zimbabwe and Binga District. Seasonal calendars are important because they help determine when people are likely to be food insecure. It is important that they cannot be uniform seasonal calendars in Zimbabwe given the differences in rainfall patterns, seasonal patterns and even soil disparities that determine most of Zimbabwe's agricultural scale.

Table 6.2: A Summary of the Sustainable Diets Framework and emerging issues

Sustainable Diet Components	Issues Emerging from the Study
Food and nutrition needs, Accesibility	The definition of Food and Nutrition security is complex considering the differences in geographical locations,diets ,culture and the types of food consumed.Therefore, the study recommends contextualising these concepts using local domains.
Eco-friendly/Local Seasonal Foods	The use of edible indigenous plants in Muchesu ward was influenced by the following: taste, , accessibility and location.The diet of the people in Muchesu was diverse when the edible plants are in season.
Cultural Heritage	Indigenous knowledge systems played a major role in the study.The identification,location and use of the plants for food and other uses was dependent on the indigenous knowlegde.
Biodiversity/Environment	The proper harvesting of the plants is an ongoing process therefore, proper harvesting of the plants to ensure their sustainability was encouraged in Muchesu ward.
Health and well-being	The existence of the plants promoted the health and well being of the populace in Muchesu especially when the plants were consumed fresh for example, the edible indigenous fruits when in season.

6.4 Contribution of the study to the body of knowledge on Rural Development

- a) Contextualised perceptions on the contribution of edible Indigenous plants on the diversification of the diet of Muchesu ward
- b) Evidence that rural communities contribute to a holistic approach to food and nutrition security

6.5 Recommendations

6.5.1 Recommendations for policy

- a) There should be a close link between scientific science and community to collaborate and inform policy on food and nutrition security debates.
- b) Partnerships with various stakeholders which include community leaders, information and technology sector to work together with communities and document and make food calendars which will help in assessing when communities are likely to be food insecure.
- c) Conservation and proper harvesting of EIPs must be encouraged within communities endowed with EIPs to improve their sustainability

6.5.2 Recommendations for further Research

- a) There is need for research on seasonal food calendars in different countries and communities
- b) Documentation of edible indigenous tubers in Southern Africa.
- c) The nutritional value of some edible indigenous must be explored to conserve and sustain the important plant which aid in nutrition.

6.6 Conclusions

The study revealed that Muchesu ward is richly endowed with edible indigenous plants. The parts of the plants documented in the current study were leafy vegetables, tubers, and fruits. The availability of these plants is seasonal. Some plants documented in this study are used for food and also for medicine as mentioned in the dissertation. Nature is endowed with vast natural capital which when used to its fullest sustains human life. The world is currently facing severe climate changes which might threaten the sustainability of these plants. Since the harvesting of these plants is an

everyday activity in some communities,proper harvesting and conservation are encouraged. important because when they are hungry, they will be very useful. So, it is important to preserve the plants that the earth has provided.

6.7 References

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APPENDICIES

APPENDIX 1: ETHICAL CLEARANCE

RESEARCH AND INNOVATION
OFFICE OF THE DIRECTOR

NAME OF RESEARCHER/INVESTIGATOR:

Ms C Munsaka

Student No:

11613001

PROJECT TITLE: Examination of the perceived contribution of Edible Indigenous plants in combating food and nutrition insecurity in the Tonga Community of Zimbabwe.

PROJECT NO: SARDF/17/IRD/06/1706

SUPERVISORS/ CO-RESEARCHERS/ CO-INVESTIGATORS

NAME	INSTITUTION & DEPARTMENT	ROLE
Prof J Francis	University of Venda	Supervisor
Dr LF Mushaphi	University of Venda	Co- Supervisor
Mrs MA Malhauula	University of Venda	Co- Supervisor
Ms C Munsaka	University of Venda	Investigator - Student

ISSUED BY:

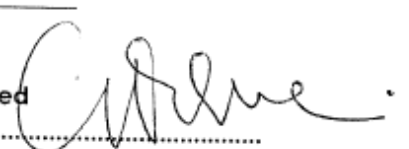
UNIVERSITY OF VENDA, RESEARCH ETHICS COMMITTEE

Date Considered: June 2017

Decision by Ethical Clearance Committee Granted

Signature of Chairperson of the Committee:

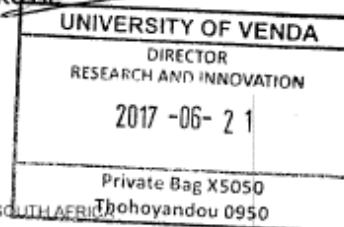
Name of the Chairperson of the Committee: Prof. G.E. Ekosse




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APPENDIX 2: Information Sheet

INTRODUCTION

My name is **Charity Munsaka**; I am a student at the University of Venda registered for Master's Degree in Rural Development (MRDV). I am carrying out research on: **Examination of the perceived contribution of edible Indigenous plants to combating food and nutrition insecurity in a Tonga community of Zimbabwe.**

I kindly request for your participation in this research by expressing your views on the topic. The purpose of this study is to understand your perceptions on the contribution of edible indigenous plants to combat food and nutrition insecurity in Muchesu. The study will also document indigenous knowledge thus encouraging the Muchesu ward to appreciate their cultural richness and uniqueness.

Your participation is voluntary, and you will be asked to respond to questions related to the research topic. The interview will take about 30-50mins. The discussion is not an oral examination and therefore all views expressed will be treated with respect and accepted as the individual's perceptions about EIPs.

All views gathered in the study will be handled in a strictly confidential manner. No names or any form of identification will be disclosed. Collected information will not be linked to any name in the report of the study. Information collected will only be used for academic purposes and will not be disclosed to any unauthorised people. You will also be given feedback of the consolidated data.

APPENDIX 3: Informed Consent Declaration Form

In terms of the ethical requirements of the University of Venda, you are invited you to complete this form as an indication of your permission to voluntarily participate in this study.

I _____ hereby confirm that I have been fully informed about the purpose, procedures, and activities of the study. I was given full opportunity to ask any questions and I understood that participation is voluntary; withdrawal at any stage of the process does not incline to any form of explanations.

I therefore hereby freely **Give/Do not give** my consent to voluntarily take part in the study as outlined (**Delete the inapplicable**).

Signature _____

Date

Researcher's Signature _____ Date _____

APPENDIX 4: Objective One Data Collection Tool

Materials

Flip chart papers

Markers

Pencils

Eraser

Coloured Pens

Instructions

1. As a group, think about Muchesu ward
2. Draw a rough sketch map of the ward. Show the boundaries and important land marks/features in the ward.
3. Using a different marker, show where in the sketch map edible indigenous plants are mostly concentrated.
4. List the Edible Indigenous Plants
5. How are the various parts collected and what stage of growth?
6. Verify the data on the sketch map through a transect walks. In the process take pictures of identified plants

Further Instructions

7. Identify the key experts in edible indigenous plants
8. Consult knowledge holders on the history of edible indigenous plants
9. How did you identify the participants in the focus group discussions, what were the numbers in the groups
10. Describe participatory mapping and how it was conducted

APPENDIX 5: Interview Guide

Section A

Demographic information

Village/Growth Point _____

Instructions: Please tick (X) on the appropriate box

Gender

Male

Female

Age

0-10 years

>11-17 years

18-25 years

26-35 years

36-60 years

61 years & above

Section B

1. Edible indigenous plants that are found in Muchesu

Plant name Vernacular	English/scientific name (<i>if known</i>)	Type	Picture No.	Part of the plant used
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				

APPENDIX 6: Objective Two data collection Tool

Plant name	Times of Availability											
	J	F	M	A	M	J	J	A	S	O	N	D
1												
2												
3												
4												
5												
6												
7												
8												
9												
10												

APPENDIX 7: Objective Three data collection Tool

Plant name	How Do you prepare before consumption	Eaten raw	How did you know about how a plant is prepared
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

6 APPENDIX 8: Medicinal Uses of Edible Indigenous Plants

Plant name	Medicinal Properties	How is the medicine prepared?
1		
2		
3		
4		
5		
6		